Examining Escalating House Prices in Large Canadian Metropolitan Centres

Canada

CMHC SCHL

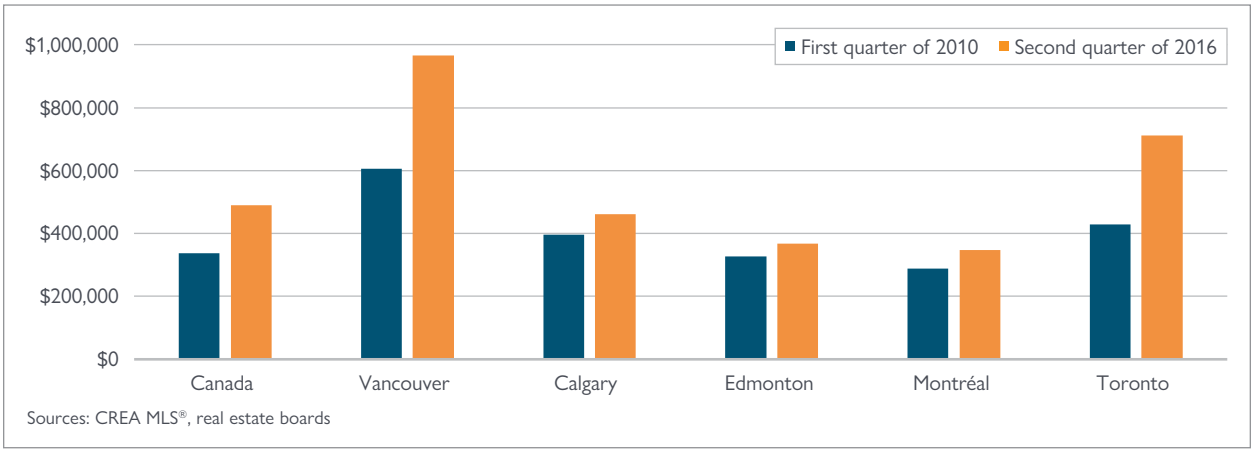
Executive Summary

The Minister of Families, Children and Social Development asked CMHC to study the causes of rapidly rising home prices in major metropolitan centres across Canada since 2010. In fulfilling this task, we have performed advanced, data-driven quantitative and statistical analyses, and engaged with stakeholders and government partners. This report elaborates on our analytical results. We concentrate in our analysis on the period of escalating home prices from 2010 until 2016, prior to the imposition of policies by provincial governments.

ANALYSIS

Cities across Canada show marked differences in the growth of their prices. While Toronto and Vancouver showed large and persistent increases in prices, there was only modest price growth in Montréal. Despite softer local economic conditions, home prices in oil-dependent Calgary and Edmonton ended the period slightly higher.

Average Seasonally Adjusted Price of a Home on Canada's Multiple Listing Service (MLS®)



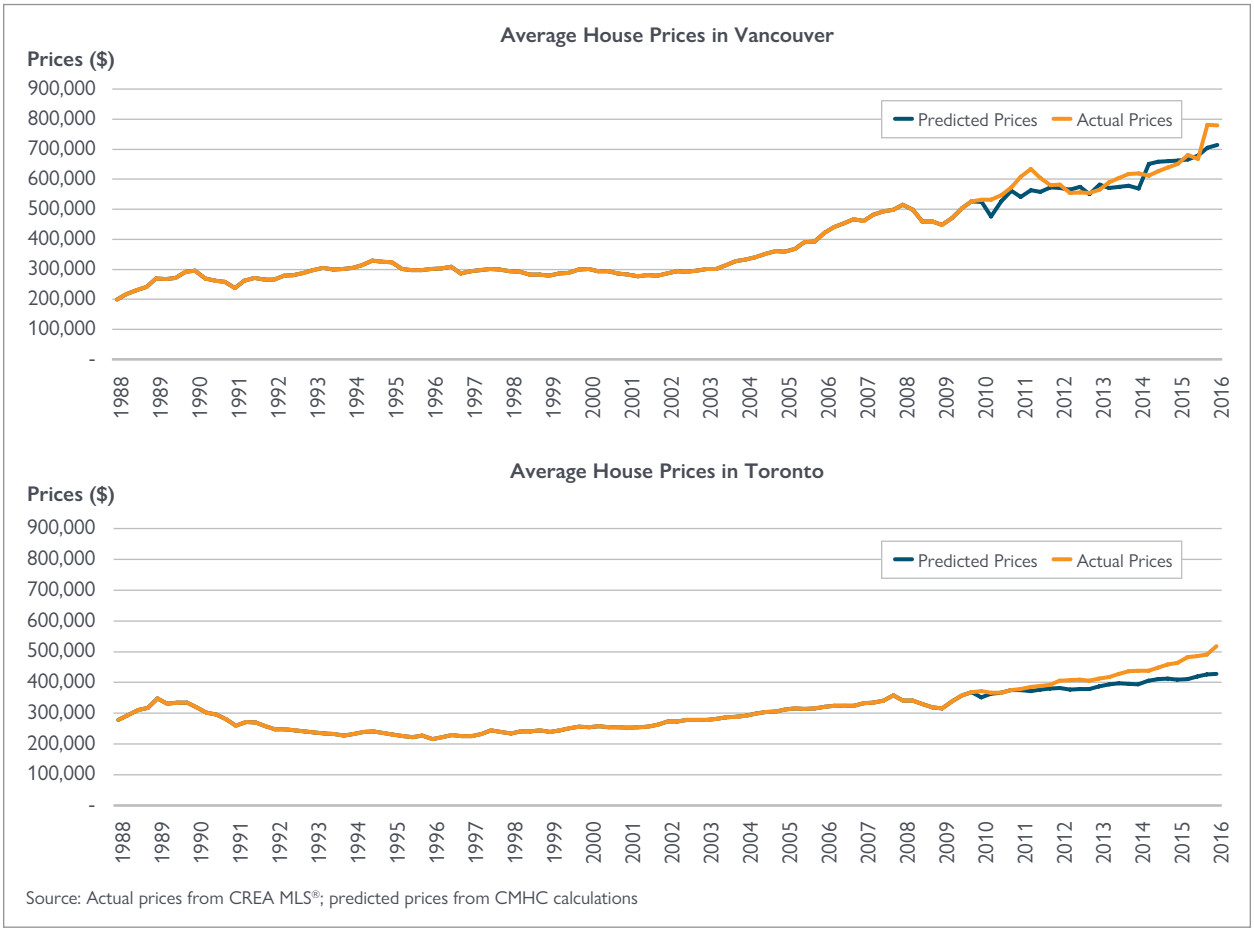
Sources: CREA MLS®, real estate boards

Examining the path of house price growth requires looking at both supply and demand. We started our work by looking at conventional demand factors. Patterns of economic and population growth together with lower mortgage rates do indeed explain a substantial part of price changes in Canadian cities. Incorporating supply takes our analysis further. As the U.S. economists Ed Glaeser and Joseph Gyourko pointed out, "High prices always and everywhere reflect the intersection of strong demand and limited supply." We found that over the last seven years overall, the supply response of new housing in Toronto and Vancouver was weaker than might have been expected given the upsurge in demand.

The Demand Side of Housing

To examine variations in local market conditions, we undertook statistical analyses to determine the extent to which rising home prices are consistent with by the economic forces that are conventionally associated with upward price movements—including higher disposable incomes,[1] positive population growth[2] and low mortgage rates. These fundamental factors tend to increase the attractiveness of (or the demand for) homeownership. Against the backdrop of local variations, we found that these fundamentals are at work in Canada. Taken together, they play a large part in long-term house price growth across Canada's major markets. The following two charts show the difference in actual price increases in Vancouver and Toronto as compared to the predicted performance. The model does a reasonable job in predicting prices in Vancouver, but less so in Toronto.

Real Average Prices From 1988 to 2016; Predicted Prices From 2010 to 2016



Source: Actual prices from CREA MLS®; predicted prices from CMHC calculations

While house prices increased by 48 per cent in Vancouver over the 2010-16 period in real terms, those conventional economic factors played a part in nearly 75 per cent of this increase according to our estimates. Meanwhile, prices increased by 40 per cent in Toronto, of which 40 per cent is accounted for by conventional demand-side factors. Since the Minister asked us to explain price increase since 2010, we only used data up until 2010 when forecasting prices to 2016.

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[1] In oil-dependent provinces, changes in disposable income are closely tied to changes in oil prices, which therefore influences the amount of income available for households to spend on housing.

[2] Canada's economy continues to attract a high level of immigrants, as new targets for immigration are set by the federal government. Immigration has tended to be two to three times greater than the level of natural population growth (births less deaths), particularly in Vancouver and Toronto. This provides a boost to local housing requirements, which in turn necessitates further housing supply.

While our analyses showed that these fundamental factors helped account for much of the price growth, there was a portion of the gap that remained unexplained, but particularly for Vancouver and Toronto. We investigated the data for additional key factors that could explain the elevated activity levels. We found that there had been a shift in the distribution of sales toward high-end homes, with almost all the growth in prices for these properties coming from more expensive, single-detached units. This suggests that looking at different points in the income distribution is just as important as studying how income levels evolve across the distribution.

Higher income levels at the upper end of the distribution would enable high-income households to purchase bigger and more luxurious homes, while also allowing others greater access to mortgage financing. But more complex urbanization forces may also be at work. Outside the resource sector, high-paying jobs tend to be increasingly located in large cities. Many of those who hold these jobs—in industries such as financial services, advanced technology development or health care—benefit from being in close proximity to others in similar jobs. As well, businesses locate their workplaces where they can access these pools of talent—in major metropolitan centres. Consequently, disposable income among some groups is rising more rapidly in certain cities.

Moreover, these trends reinforce the role of larger cities in attracting highly educated professionals from both other parts of Canada and abroad, thereby providing even a further boost to the demand for housing. Although our statistical analyses corroborate these effects, more detailed data on the drivers of growth in economic fundamentals in these areas would assist in developing a keener understanding of these events.

As a next step, we introduced proxies for investor and speculative activity, and found that they also contributed to house price increases since 2010, but to a lesser extent than traditional economic factors. If the number of housing starts is much higher than the rate of household formation, we argue that this difference was likely financed by investors. To measure speculative activity, we used a "price acceleration" metric as a signal for excess optimism for real estate.

We were not entirely satisfied with these proxies, so we have developed additional data sources. While being of great value over coming years, these data will not cast much light on history unfortunately.

Firstly, we worked with Statistics Canada to develop detailed data on rental income from properties held by individual investors. These data highlighted to us the significant extent to which Canadians purchase properties to enhance their incomes. It also suggested to us that these investors may have played a critical role in increasing the supply of new housing in Canada. Although further analysis is needed, we therefore caution that actions curtailing investors' interest in financing new housing construction could impact long-term housing supply adversely.

Secondly, we have introduced a new survey to examine the motivations and behaviours of new homebuyers. Concern has been expressed in many countries that when home prices rise rapidly, homebuyers' hopes for future home price appreciation may become too optimistic. To develop a gauge for this, our survey delves deeper into the homebuying process as well. We are very grateful to Canadians who responded to our survey. While Canadians' expectations of house price growth over the long term appears high, it is in line with recent historical experience. But our survey highlights concerns that some of those caught up in bidding wars risk overpaying.

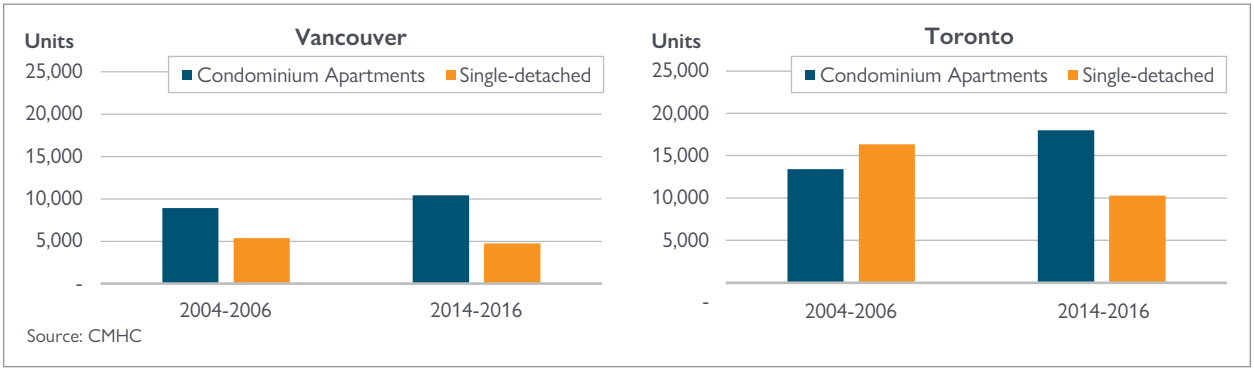
A persistent challenge in understanding demand for housing in Canada is the extent of foreign investment. We have supported Statistics Canada in their efforts to bring better data to bear on this question while filling short-term data gaps ourselves. Ontario and British Columbia have also started collecting data on the flow of foreign investment. It remains difficult to quantify the impact of foreign investment, however. The comprehensive data released by Statistics Canada in late 2017 suggest that non-residents account for 3.4 per cent of residential properties in Toronto, and 4.9 per cent in Vancouver. Non-resident owners, however, tend to own proportionately more condominium apartments than single-detached housing. As discussed below, however, prices of single-detached housing have increased proportionately more than those of condominium apartments.

While official data on the stock and flow of foreign investment appear low, it is possible that upsurges of foreign investment at market peaks could alter expectations of domestic homebuyers' on the price they should pay for housing, and encourage domestic speculators. Our new Homebuyers Motivation Survey shows that 52 per cent of the buyers who purchased a home recently in Toronto and Vancouver believed that foreign buyers were having an influence on home prices in those centres. Actions taken by the provinces to curtail foreign investment could therefore have been timely to reduce excessive short-term spikes in house prices.

The Supply Side of Housing

Clearly stronger demand for housing should ultimately increase the supply of housing, as higher prices will encourage development and redevelopment of land. We first took a close look at the data. These suggest that the composition of housing starts has evolved over time, reflecting a greater tendency toward the supply of condominium apartments rather than single-detached homes, particularly in pricier cities such as Vancouver and Toronto.

Average Housing Starts in Toronto and Vancouver

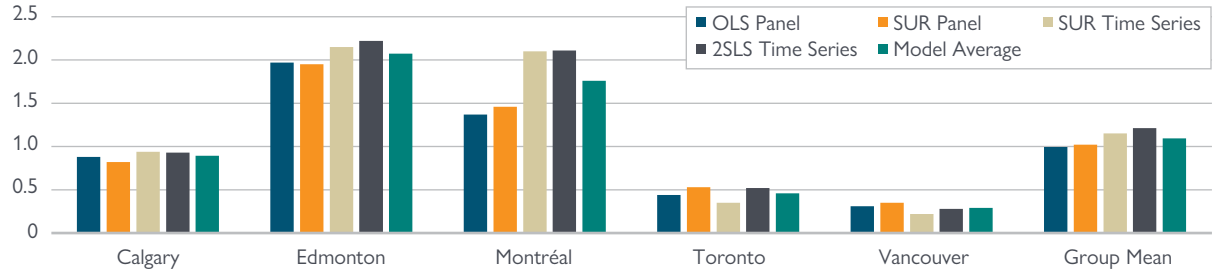


There are a number of reasons that could account for the slower pace of growth in the supply response for single-detached homes. First, in areas where the supply of land is constrained for geographic or policy reasons, favourable economic conditions and population growth will lead to higher land prices. As land becomes more expensive, developers will prefer building either more expensive homes or denser housing types, such as condominiums.

These market forces have moved in tandem with municipal and provincial policies encouraging increased housing density. Higher density has come to be seen by them as a desirable trait that mitigates the health, environmental and economic costs of unmanaged growth. Density lowers adverse pollution and GHG emissions, and lowers the cost of providing infrastructure, for instance. As discussed above, by promoting increased levels of innovation, higher density also holds out the prospect of increased productivity gains as well. While urban growth boundaries may have contributed to higher land prices, the desirable outcome from such price increases is greater housing density. Critical to ensuring such density is facilitating redevelopment of under utilized land.

Given the importance of constraints on the supply side of the market, we examined several metrics, including geography and regulations, but our results did not clearly isolate any particular restraining factor. Geographic constraints were found to be relevant, but it is also difficult to separate their effect from regulation. We found that supply responses to price increases in Toronto and Vancouver were proportionately weaker than the responses in other cities, which is consistent with corresponding regulation and geographic characteristics.

Estimated Long-Run Supply Elasticity of Housing Starts from Different Models



Source: CMHC based on data from Statistics Canada, Conference Board of Canada, Canadian Real Estate Association, and CMHC. OLS panel refers to separately estimating a stock-flow model with a demand equation and a supply equation in a panel; SUR panel simultaneously estimating the model in a panel; SUR time series simultaneously estimating the model by CMA; and 2SLS time series simultaneously estimating the model using instrument variables by CMA.

Supply constraints are not only important in determining the types of homes on the market, but can also influence expectations of future price gains. Weaker supply responses mean that strengthening demand will be met by expectations of further appreciation in house prices rather than by a supply response to accommodate that increased demand and bring prices back down. As such, the supply responsiveness found here is highly correlated with the finding of price acceleration in CMHC's Housing Market Assessment, indicating the presence of speculative activity.

In our consultations with many municipalities, we found general agreement that the state of housing supply is not well understood. We believe therefore that CMHC should work with provincial and municipal partners to develop a better understanding of how the supply side operates. While reducing the uncertainty of the planning process could yield substantial gains, we also believe it is appropriate for all levels of government to make fuller use of the full range of policy options to address negative externalities of development and encourage density.

The overall challenge, we believe, is to combat urban sprawl and increase the densification of our cities. We believe that municipalities have been constrained in the types of policies they can use in the face of the numerous affordability, infrastructure and environmental challenges that they face. Overcoming these challenges can be fostered through coordinated use of a wider suite of policy instruments by all levels of government. While there is a role for the federal government to introduce policies to help municipalities overcome their challenges, ensuring policy coherence requires close coordination between all levels of government.

Densification, however, needs to increase the supply of all types of housing; preserving enclaves of single-detached housing will likely only serve to increase wealth inequality and not meet the housing needs of a growing population. It is particularly imperative that the process of redeveloping land within the borders of Canadian cities occur efficiently and promote change in the form of local neighbourhoods. While many Canadians fear increased density, we found evidence that high-density communities can be made in low-rise structures through partnerships between developers and local communities and government.

We present policy options for consideration. We fully recognize that this is the beginning of a process of improving the functioning of Canadian housing markets. We also recognize that we have much work to do on improving our own data and the availability of data to researchers. We will work with all partners to improve data and learn more about the operation of the housing market.

WHAT WE PLAN TO DO

Helping Canadians meet their housing needs is an important responsibility that falls to all levels of government. Housing is also connected to other government priorities, such as action on climate change, social inclusiveness, economic growth and macroeconomic stability. Federal collaboration with all partners is therefore needed to develop and coordinate a cohesive policy framework.

The federal government, through CMHC, can play a facilitating role in this regard, including addressing important data and analytical gaps to help cities better anticipate and respond to strong demand.

With this in mind, CMHC will continue to address data and information gaps. We have consulted regularly with stakeholders for several years, and worked with other stakeholders and government partners on gaps that we cannot address on our own. Some of the gaps we have already helped to fill include data on the degree of foreign ownership of condominiums in large Canadian cities, turnover rates in rental markets, and the prices and square footage of newly-built condominiums.

In our consultations, we have also encountered common problems faced by cities across Canada. We believe therefore that CMHC should develop an analytical and research framework on housing and urban economics with input from municipal and provincial governments.

The Government of Canada, with the help of CMHC, will continue to work with governments at all levels to:

- Fill key data and analytical gaps in housing that restrict our ability to predict housing market forces and anticipate changing needs;
- Share new information broadly to promote analysis and new ideas from a community of interest;
- Better understand the underlying factors that limit housing supply in high-priced markets, and support more timely and flexible ways to respond to those challenges; and
- Monitor both demand- and supply-side policies that are implemented in Canada and around the world to measure their effectiveness in responding to rising house prices.

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1 Introduction

Home prices in select Canadian centres have escalated rapidly over recent years. After describing these price increases, this chapter outlines why these increases matter. Their immediate effect is to place at risk the ability of Canadians to access properties that meet their needs and respect their capacity to pay. But, as experience of the last recession attests, rising home prices also place growth in Canadians' living standards at risk through higher debt levels. Such a potential for housing markets to affect the rest of the economy suggests the scale that housing has reached in the economy. But housing also cannot be examined in isolation from the rest of the economy. A range of global changes, from flows of capital to greater concern about the environment, are changing decisions by homeowners and policymakers that influence our communities.

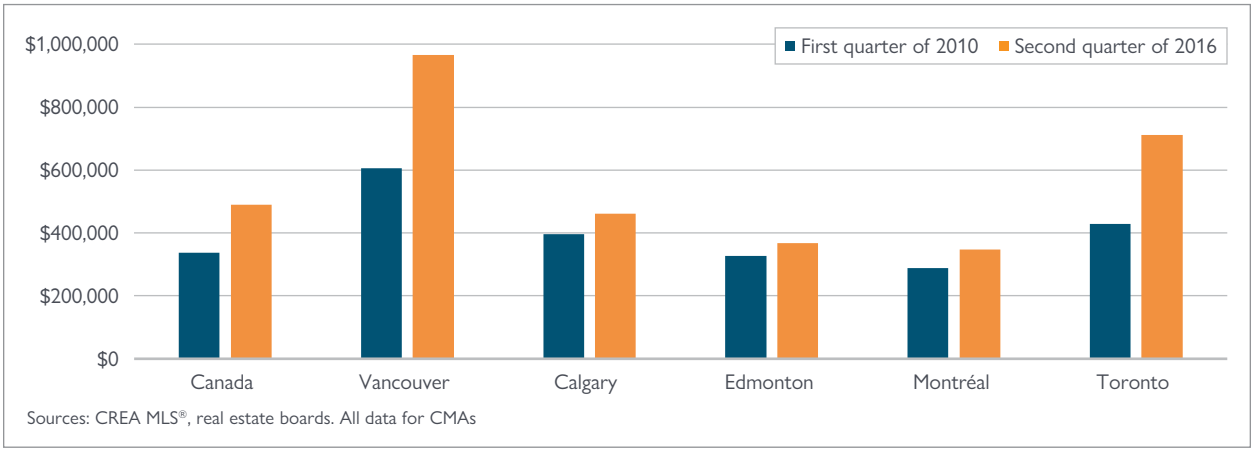
In this report, we generally report data until the end of 2016. There are a few reasons for this. First, we only have annual data to that point. Secondly, our research endeavour was concentrated on examining the period of price growth in Canada, and not the policy reactions that happened in late 2016 and 2017. We do not purport to examine or evaluate policy actions taken. Since price changes in 2017 were influenced by these policies, we would not want this analysis to be portrayed as an evaluation of those policies.

For ease of exposition in this report, we refer to the areas examined as Montréal, Toronto, Edmonton, Calgary and Vancouver. Our analysis relates to the wider economic areas that contain these cities, which Statistics Canada calls Census Metropolitan Areas (CMAs). Our analysis does not pertain to the city administrations, such as the Ville de Montréal, the City of Toronto and so forth, unless specifically referenced. Again, for Vancouver, our analysis relates to the wider Metro Vancouver area. Indeed, one of the challenges in this report has been inconsistent reporting of data because of differences in definitions of geographic areas.

1.1 WHAT HAS HAPPENED TO HOME PRICES?

Figure 1 shows the change in average home prices from 2010 to 2016. Prices in Toronto and Vancouver increased markedly, while prices increased more consistently in Montréal. This figure masks the ups and downs of home prices for Calgary and Edmonton following changes in the price of oil. Prices in the Greater Toronto and Greater Vancouver areas increased the average price for all of Canada, as these geographies account for such a large part of total home sales in the country.

Figure 1: Average Price of a Home



Sources: CREA MLS®, real estate boards. All data for CMAs

1.2 WHY SHOULD WE BE CONCERNED ABOUT RISING HOME PRICES?

The core mandates of CMHC are to facilitate access to housing, and contribute to the stability of the financial system. These objectives are important because by both meeting the basic human need of shelter and lowering risks to rising living standards, Canadians' well-being is improved and preserved over the long term. Home prices that increase too rapidly risk damaging this prospect by taking housing beyond Canadians' capacity to pay, and by creating risks to the financial system.

Having access to shelter is a core necessity, whether households choose to own or rent their homes. But Canadians want to ensure they enjoy other aspects of well-being as well, including other goods and services. So Canadian households are concerned that the cost of their homes does not become an undue burden.

The rise of the financial importance of the housing market in the economy over the last few decades has equally increased risks to the wider economy if turbulence were to strike it. This risk became very apparent in the last recession, particularly in the U.S. and some European markets. Higher home prices drive households to incur more debt to buy a home. This debt creates a vulnerability, as continuing to service debt is difficult in the event of a job loss if the economy turns down. Faltering economic growth can snowball into a larger economic contraction because such a large share of households' income would go to meeting debt payments, curtailing their other expenditures.

Rising prices can have wider effects as well. In a globalizing economy, driven by technological change, much innovation activity now originates in cities. Limiting cities' capacity to expand their pools of those talented workers who generate the new ideas and products of tomorrow also limits growth in productivity and overall living standards in the wider economy over the long-term.

The analysis presented in the rest of this document explores in detail why home prices have increased. Clearly, local decisions are important, but these decisions are not isolated from what is happening in the wider global scene.

1.3 THE INFLUENCE OF GLOBAL MEGATRENDS ON HOUSING MARKETS

While households make decisions on their place to live based on all sorts of local circumstances, these circumstances are tethered to global changes. Prices of homes in resource-abundant provinces have been whipsawed by first the hopes of ever-increasing demand for commodity exports to China, and then by increased competition from the development of new oil-extraction technologies. And as the importance of global trends continues to grow, their influence on Canadian housing markets are unlikely to wane.[3]

These global trends include:

- **Increased global economic interlinkages.** The rise of large developing economies is altering trade patterns. As discussed above, these trends can help parts of Canada, such as when the demand for resources from Western Canada was strong, boosting property prices there;
- **Increased global financial flows.** The rise of large developing economies increased the supply of global savings (Bernanke, 2005). With increased openness to financial flows, this pool of savings can find its way to anywhere in the world, including Canadian real estate. There has also been an indirect impact by lowering global real interest

[3] Englund and Ioannides (1997) found there was a high degree of similarity of house prices across countries for the years 1970-1992; that is, even prior to the onset of the recent upswing of globalization.

rates, encouraging further direct investment in financial assets, including by Canadians. As housing is increasingly seen by many as a financial asset, Canadians bought more real estate for themselves;

- **Technology changes.** Technology is having widespread impacts on our daily lives. Oftentimes, new technology is developed in leading cities, and such innovation will play a greater part in raising living standards. Experience shows that highly skilled and educated workers will be more productive, generating more ideas, if they locate close together. Already, global innovation hubs like San Francisco and Boston are attracting highly talented workers who earn high incomes, driving home prices higher in those cities. Indeed, some argue that the major beneficiaries of technology change are property owners in those cities! Enabling talent to co-locate without driving up home prices holds out the prospect of driving long-term productivity growth. Technology will also have more direct impacts on housing. Consumers are moving their purchases online, leading to less need for land-intensive retailers and parking lots, suggesting that increased amounts of land could be available for housing;
- **Global environmental challenges.** Rising concerns about both local pollution and global climate change are leading to a range of policy actions. A sizable source of emissions is transportation, so actions to curtail its use will encourage households to live either closer to their place of work (in city centres in many cases) or in areas with convenient access to public transit; and
- **Aging population.** The effect of changing demographics also highlights how complicated the effects of these changes can be to predict. An aging population will cause more households to shift to dwellings requiring less effort for home maintenance, likely leading to more demand for apartments, but it will also alter the total pool of savings, in turn influencing interest rates and hence the ability to purchase housing.

The push and pull of these forces can also influence policy choices, as different levels of government react to their own particular challenges. Environmental and technological changes suggest that policies should encourage households to live closer to city centres, and increase density. At the same time, limiting development in city centres could lead to higher home prices and attract speculative capital, creating risks for the entire economy.

1.4 SUMMARY OF ANALYSIS

The analyses in the following chapters take several perspectives on house price growth across Canadian cities. While there remain important data gaps, it shows that there are many reasons why demand for housing has increased—including low mortgage rates and strong economic growth that has also attracted workers from other places. While some of these elements may be common across cities, they can have different effects across cities. As well as the complexity of modern cities, a key reason for this is that the supply response in terms of new construction can differ in each city. If this response to higher prices is rapid then price growth is unlikely to remain high. In this regard, policies that lower the efficiency of redeveloping land into new and denser homes will limit housing wealth to the few while creating economic risks through higher debt levels for many.

2 Laying Out the Facts and Framework for Understanding Housing Markets

CHAPTER OBJECTIVES:

- Outline a simple framework for the initial economic analysis of the housing market.
- Discuss stylized facts on large Canadian housing markets that will guide our analysis.

KEY FINDINGS:

- Price increases have tended to be greater for more expensive single-detached housing than for condominium apartments.
- Supply responses have been proportionately greater for condominium apartments than for single-detached housing.
- Investor demand for condominium apartments has increased. In turn, this increase lifts the supply of rental properties, but these units tend to be more expensive than units from existing purpose-built rentals. There appears to be a wider prevalence of mortgage helpers as well.

2.1 WHAT IS THE FRAMEWORK FOR THINKING ABOUT THE HOUSING MARKET?

In this section, we outline a basic framework regarding the economics of housing. The framework shows how the intertwining of buildings, geography and demography plays a part in understanding the economic analysis of housing markets. This framework is then used to organize our analysis of basic facts obtained from the data in Section 2.2. This framework will be enhanced further in the following chapters.

2.1.1 Households' Decisions about a Place to Live

Housing is different from many other goods and services obtained in the marketplace, as everyone has a basic need for shelter. This is not a choice, as households cannot do without shelter. Nevertheless individuals' tastes, circumstances and capacity to purchase housing services differ. Households have different demands for characteristics that they would like in a home (space, location, quality, number of amenities, physical mobility, transport links, etc.), and they need to make decisions on these based on what they can afford just as they do for all commodities and services.

A key early decision on housing is whether to buy or to rent. Rental has advantages in terms of not committing large amounts of savings, but ownership can be a form of insurance against future rent increases in high growth markets (Sinai and Souleles, 2005). Rental may also be more appropriate for some, and increasingly so in the modern economy, if workers have to or want to be mobile between jobs that may be located in different cities. Purchasing a home tends to tie them to a particular location (Blanchflower and Oswald, 2013). Rental properties may also be more convenient for seniors, and serve as a means of releasing equity from their homes. Other key decisions include location as well as the size and quality of the building. Being close to the workplace lowers commuting time, while larger homes are attractive as a household size grows with the number of children.

These decisions have become more complicated over recent decades as real estate moved to having two roles: as mentioned, it provides the space to meet the needs and wants of households for shelter, but it has also developed to be a financial asset since households commit such large amounts of money to these physical assets.[4] Hence, the decisions households make about owning their home also rests on their capacity to make a substantial commitment of capital. They make these decisions based on their view of future incomes (including their future geographical mobility). Other elements that enter their calculation include the evolution of mortgage rates, interest rates, property taxes; the alternative uses to which the cash used to buy a home can be put; the risks from owning; maintenance costs; and any future capital gains from higher prices.[5]

2.1.2 The Market for Physical Space

Taking the sum of households' decisions on shelter choices across their local communities will be reflected in the performance of the local housing market. Because of the number of factors that can affect households differently, the local housing market then reflects the ebb and flow of desires and incomes both over its population and over time. Among the goods and services that people buy, housing tends to be unique because there are so many differences in housing characteristics, and their match to the wants and needs of households. Hence, examining housing has to be done at a finer level than at the level of the whole economy. Different segments of society need to be looked at separately, and housing markets in different locales have their own features, but they are still influenced by fundamental long-term trends.

2.1.2.1 Demographics

An example of some large-scale trends that will influence the housing market to an ever greater extent is the aging of society. An older population may want to live in smaller units that are easier to maintain, within easy walking distance of shops, and that can be afforded on a fixed-income basis. Collectively, this may lead to a shift away from single-detached homes toward apartment living. Already, demographic trends toward smaller household size are influencing the patterns of housing.

2.1.2.2 Economic Trends

Similarly, different patterns of economic growth at the aggregate level influence housing markets. Booming oil prices drove house prices in Alberta, Saskatchewan and Newfoundland & Labrador, while developing services industries contribute to the economies of Quebec and Ontario.

These patterns of demand move at different paces. They change slowly in the case of aging, but rapidly and unpredictably in the case of commodity markets. Whichever the case, they come face-to-face with a housing stock that is slow to change. The stock of buildings is not repeatedly knocked down to meet the changing needs of society, but adjusts slowly as builders supply new structures. These changes can lead to mismatches between demand and supply as markets transition.

2.1.2.3 The Stock of Housing

Choices made by households over many generations affect, and are affected by, the stock of available housing. Figure 2 shows that there are large differences in the stock of housing across Canadian cities. Calgary and Edmonton tend to have more single-detached homes whereas other cities tend to have denser housing. Toronto has more high-rises, while Montréal has proportionately more low-rise structures, with Vancouver in between. This pattern is in turn reflected in the dwelling and population densities of cities. In turn, these patterns have impacts on population and dwelling densities, which are examined in greater detail in Chapter 10.

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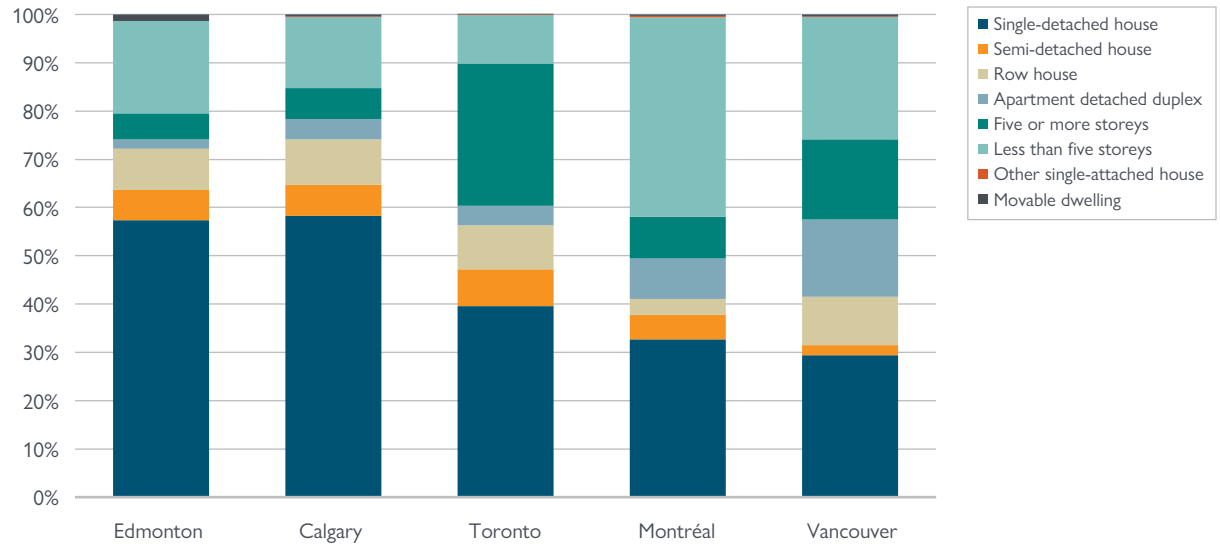
[4] For initial analysis of these two roles, see DiPasquale and Wheaton (1992).

[5] This expresses the economists' description of the user cost of housing. See, for example, Gyourko and Sinai (2002), Poterba (1984), OECD (2005) and ECB (2003).

Figure 2: The Stock of Housing in Large Canadian Cities, 2016



Source: Statistics Canada, CMHC calculations. Occupied Housing Stock by Structure Type, 2016.

2.1.3 Financial Links

Although housing has been linked strongly with wider economic trends, perhaps the most profound development affecting the housing market over the last few decades is their increased inter-linkage with financial markets. This evolution has created linkages between financial asset markets and the market for physical space.

The scale of these assets has grown to such a magnitude that any disruption in the housing market can now have large impacts, and pose risks to macroeconomic stability. Indeed, a prominent U.S. economist has argued that "housing is the business cycle" (Leamer, 2007). Risks can go either way, with even local housing markets susceptible to changes in the global economy.

2.2 LAYING OUT THE FACTS: PATTERNS AND FACTS WE ARE TRYING TO EXPLAIN

2.2.1 What do the Data Show?

The conceptual framework laid out in the previous section suggests that many aspects need to be considered when explaining the level and growth of house prices. This section highlights some of the more salient facts that motivate our analysis. In other words, what are the key generally accepted truths—stylized facts—about Canadian housing markets, which our explanations of rising home prices have to be consistent with? These facts are summarized at the end of this section alongside the challenges they pose to the interpretation of movements in Canada's housing markets. First, we draw on the work of many analysts at CMHC who have examined Canada's housing markets and published their analysis in the *Housing Market Assessment* and the *Housing Market Outlook*.

2.2.1.1 What has Happened to Prices?

Recent economic signposts point to sustained demand in Canada's housing markets as well as regional shifts in homebuying patterns. Between 2010 and 2016, the national average price of a home on Canada's Multiple Listing Service (MLS®) rose from about a third of a million dollars to nearly a half. Demographic fundamentals underpinning these shifts include an aging population, high urban density in major cities, and the changing composition of households in Canada (Figure 1).

Despite this, the overall picture for Canada's housing market clouds regional differences, as the first key stylized fact suggests. These differences evolve against the backdrop of wide variations in economic growth patterns and local market conditions. Therefore, statistics for Canada's major census metropolitan areas (CMAs) provide a better indication of the state of the housing market than would be the case with provincial or national level data.

KEY STYLIZED FACT 1: The Canadian housing market differs by CMA

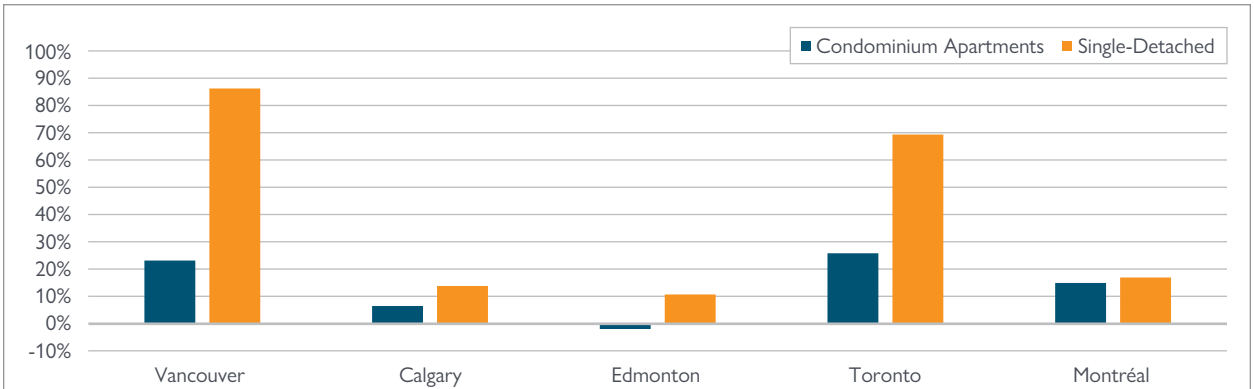
Our first objective, therefore, was to look at price patterns across those key large Canadian centres: Vancouver, Calgary, Edmonton, Toronto and Montréal. The story unfolds with Canada's local housing markets continuing to see accelerating price growth in Toronto and Vancouver—enough to offset the effects of weaker activity in other major metropolitan centres. Among the major CMAs, Toronto and Vancouver continued to set the pace of growth over the period, but conditions remained softer elsewhere. From 2010 to 2016, prices in nominal terms surged 67 per cent to over $700,000 in Toronto, and by 60 per cent to nearly $1 million in Vancouver.

Elsewhere in Canada, trends remained mixed. Montréal prices rose 20 per cent over the period. And the picture in Toronto and Vancouver stands in marked contrast to the slowdown that hit Calgary and Edmonton. Housing activity in the oil-dependent centres has been weighed down by the downturn in crude oil markets that kept house prices below 2014 peak levels. Between 2010 and 2014, prices had jumped almost 17 per cent in Calgary and 15 per cent in Edmonton, before declining from the second half of 2014.

2.2.1.2 Price Increases have Differed within Canadian Housing Markets

A closer look at the numbers reveals that aggregate price measures also tend to mask the range of homeownership options available to buyers across home types. Over the 2010-16 period, price growth has not been uniform across home types, and while single-detached home prices have shown the strongest price response, condominium apartment prices have also moved higher.

Figure 3: Median price Growth by Dwelling Type (2010-2016)*



Sources: CREA MLS®, real estate boards
* Average of price growth for each month from, 2016 over 2010. Data for Montréal include all condominium apartments and single-family homes.

Across the Greater Toronto area, the price gap between single-detached homes and condominium apartments continued to grow over the 2010-16 period. In 2016, the median price of single-detached homes was more than double that of condominium apartments. Over the period, the median price of single-detached homes and condominium apartments surged 69 per cent and 26 per cent, respectively.

A similar story holds for the Vancouver market. The price gap between home types continued to widen over the 2010-16 period, with single-detached home prices gaining ground at a faster pace than condominium apartments—over four-and-a-half times the rate. The median price of single-detached homes nearly doubled over the period, while condominium apartment prices advanced at a still-strong 20 per cent.

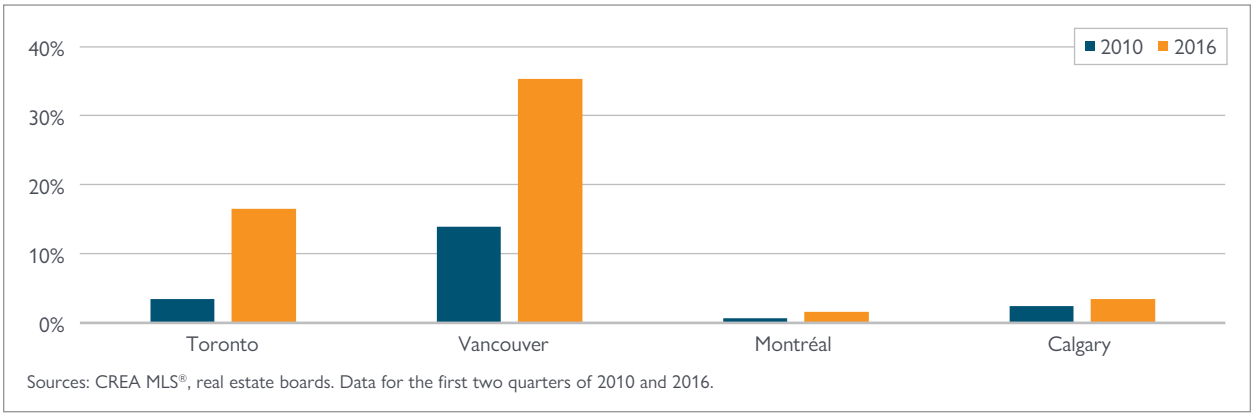
KEY STYLIZED FACT 2: higher prices in Vancouver and Toronto have been driven largely by higher single-detached home prices

The boost in single-detached home prices can be partially attributed to a combination of factors—including strong housing demand, low resale home inventories and a limited supply of land for new development in major metropolitan centres.

2.2.2 Sales Profile Shifting

The gap between average and median home prices has also increased, suggesting a shift in the distribution of sales toward high-end housing markets over the 2010 to 2016 period. In fact, Canada's market for million-dollar homes continued to pick up steam, with almost all of the growth in the number of homes sold over $1 million coming from single-detached homes. While we concentrate on this metric here, a more sophisticated analysis of the data is presented in the chapter appendix. Note that in this chart, and in many of the following charts, data may sometimes be suppressed for some CMAs because of the absence of sufficient data from the limited number of observations (e.g., there are not enough homes above a million dollars in Edmonton to provide a robust estimate of shift in this chart).

Figure 4: Market Share for Homes Worth $1 Million or more



Sources: CREA MLS®, real estate boards. Data for the first two quarters of 2010 and 2016.

Across the Greater Toronto area, price growth has pushed the share of homes selling over the million-dollar mark to 17 per cent in 2016, up from a modest 3 per cent in 2010. Almost all of the growth in the number of homes sold over $1 million were for single-detached homes, which saw prices grow nearly 70 per cent over the period. These gains come as no surprise, given that the average selling price for single-detached homes in Toronto's 416 area code region has been above the $1 million mark since early 2015, thereby pricing out many potential buyers.

The Vancouver market also strengthened, with single-detached homes costing over $1 million accounting for 35 per cent of sales in 2016, compared with 14 per cent in 2010. Over the same period, prices for single-detached homes that cost over $1 million nearly doubled.

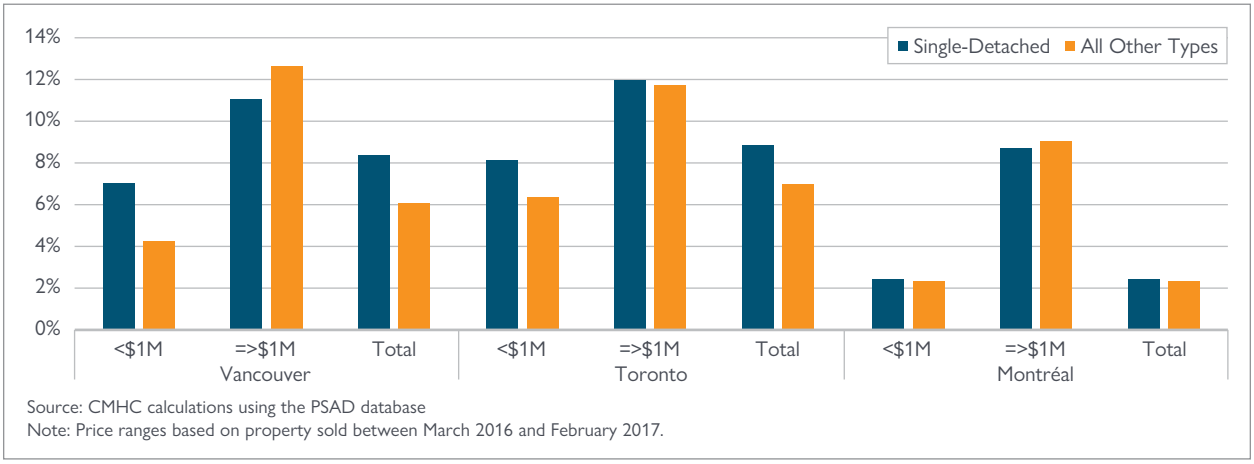
Meanwhile, the million-dollar market for homes in Calgary and Montréal showed little or no movement over the period. In 2016, the shares of high-end homes sold in these cities remained at 3 per cent and 2 per cent, respectively.

This was enough to lift overall prices in Canada's high-end sales market by a solid 10 per cent over the 2010-16 period. Figure 5 illustrates the pace of home price appreciation. When the top bracket group is removed from the data, the pace of price growth for single-detached homes declines to nearly 4 per cent.

Over the period, high-end million-dollar homes in major markets outside of Calgary and Edmonton posted the largest gains. Top-bracket single-detached homes posted growth of 12 per cent in Toronto (versus 8 per cent across the remaining segments), 11 per cent in Vancouver (versus 7 per cent), and a somewhat slower 9 per cent in Montréal (versus 2 per cent). The top bracket comprises mostly single-detached homes.

KEY STYLIZED FACT 3: higher prices in Vancouver and Toronto have been driven by more expensive properties

Figure 5: Average Annualized Price Changes, by housing type, by price range



Source: CMHC calculations using the PSAD database
Note: Price ranges based on property sold between March 2016 and February 2017.

2.2.3 New Home Market Sending Mixed Messages

Rising prices and tight resale market conditions created increased demand in the new home market. But what was the reaction from the supply side of new housing? The following analyses show that supply of new housing has tended to be for condominium apartments rather than for single-detached housing, despite greater price increases for single-detached housing (Stylized Fact 2 above). For this, we look at CMHC's Starts and Completions Survey. In this survey, a start has a precise definition: the beginning of construction work on a building, usually when the concrete has been poured for the whole of the footing around the structure, or an equivalent stage where a basement will not be part of the structure (CMHC, 2017c).

KEY STYLIZED FACT 4: There is an increase in the supply of condominium apartments relative to single-detached homes

Trends in supply were mixed. Looking at the total market, Toronto led the way, with total housing starts averaging 37,300 units annually over the 2010-16 period. Meanwhile, Vancouver starts climbed to new consecutive highs through the first three quarters of 2016, while averaging 19,800 units per year over the period. Elsewhere, total starts averaged 19,500 units in Montréal, 12,500 units in Edmonton and 11,900 units in Calgary. (Figure 6.)

These numbers represent the total number of starts, and unsurprisingly, Toronto has more starts since it is a larger city. In order to compare apples to apples, these numbers can be corrected in a number of ways, usually by correcting for population differences. Here we concentrate on separating starts into those for condominium apartments and those for single-detached housing.

These data show how the types of starts evolved over time, with housing markets in Toronto and Vancouver reflecting a greater tendency toward the supply of condominium apartment units. Unlike the single-detached housing sector, supply of condominiums is not limited and units are available at various price points, which appeals to first-time homebuyers.

In very broad strokes, condominium apartment starts in Toronto have been on an upward trend for about two decades. More recently, the condominium apartment market in Toronto has shown marked strength. Altogether, condominium apartments represented 31 per cent of starts in 2001, 40 per cent in 2010, and 47 per cent in 2016.

A slightly different picture appears in Vancouver with a consistently higher level of apartment starts than starts for single-detached homes. The pace of starts exceeded its 20-year average in 7 of the past 10 years, and continues to account for a growing share of total starts with 25 per cent of starts in 2001, 38 per cent in 2010, and 45 per cent in 2016.

Figure 6: Total Annual Housing Starts

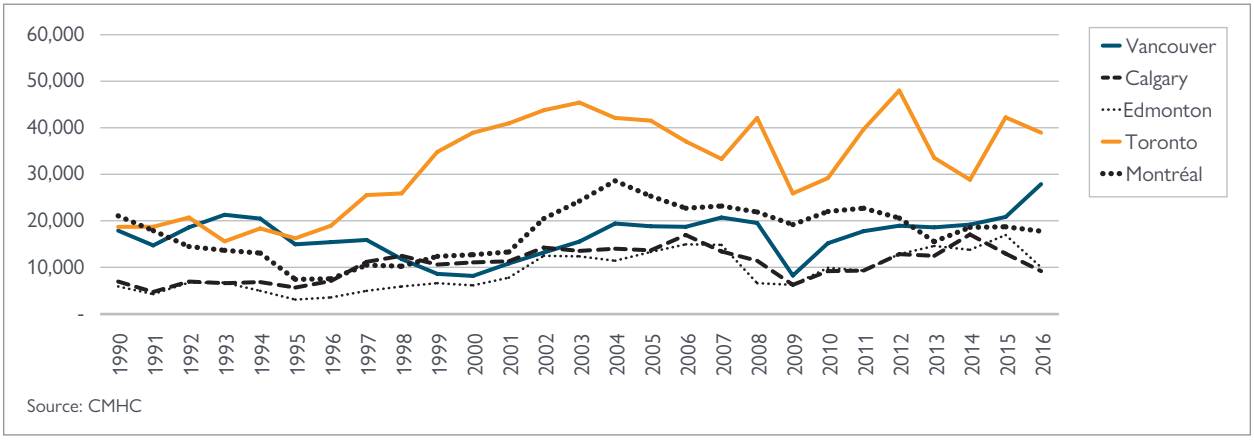


Figure 7: Toronto housing starts (units)

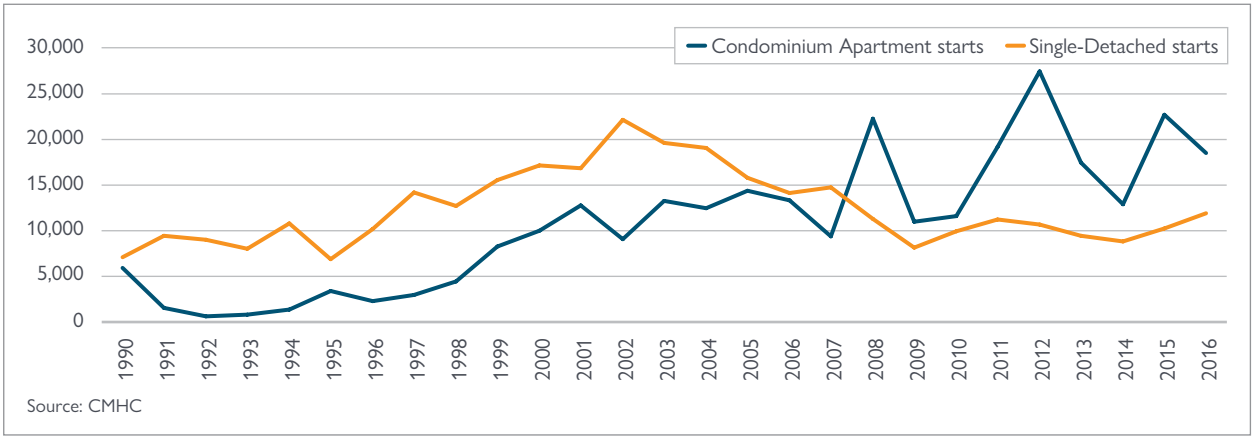
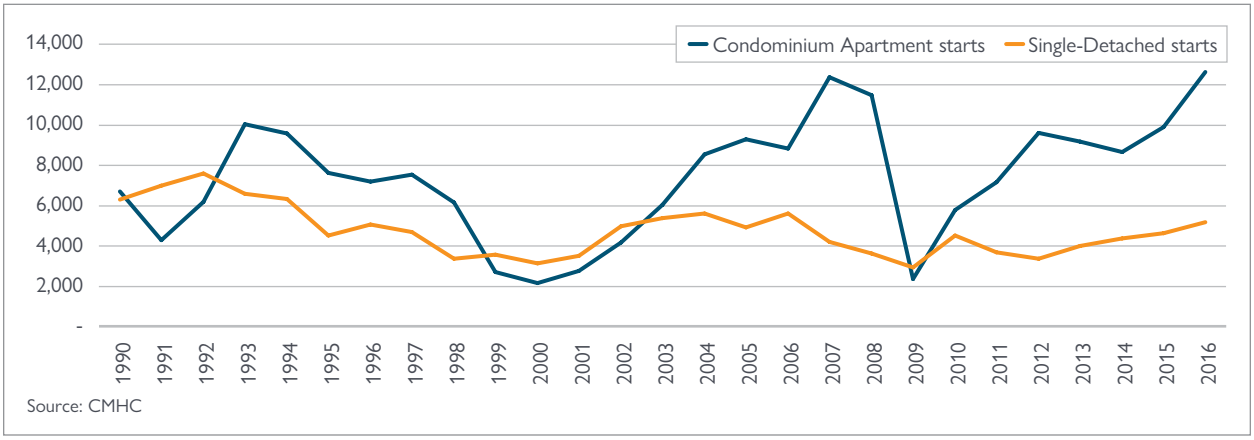


Figure 8: Vancouver Housing Starts (units)

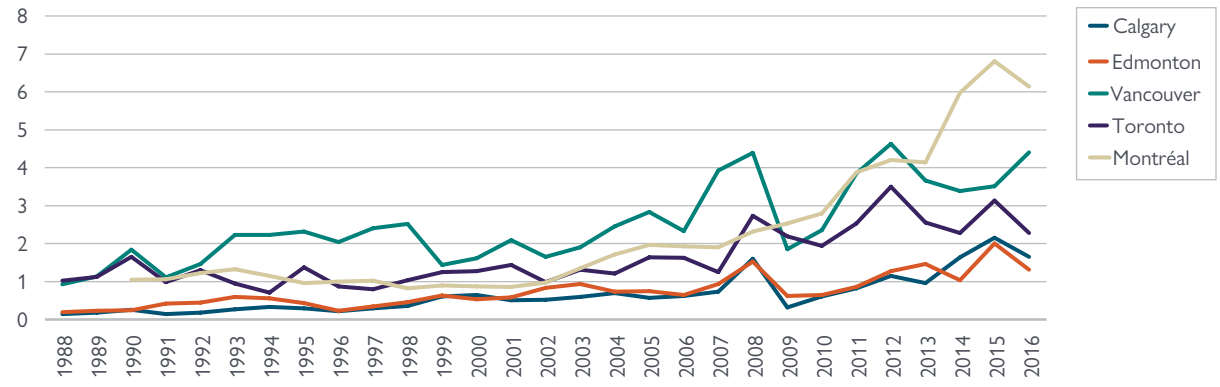


Meanwhile, single-detached housing starts in Canada's major centres remained generally flat over the 2010-16 period. Single starts in Toronto reflected a decreasing share of total starts, at only about 30 per cent of housing construction totals in 2016, down from 34 per cent in 2010. Quarterly figures for the Vancouver market suggest similar conditions, with single-detached starts ranging from 30 per cent in 2010 to 19 per cent in 2016. Elsewhere, total housing starts remained relatively stable in Montréal, and generally strong market conditions boosted total starts in Edmonton and Calgary.

The multiple-to-single-starts-ratio is a summary indicator of whether supply is tightening in the single-detached home market relative to the condominium apartment market. The generally rising ratios observed in Toronto and Vancouver were the result of sustained growth in starts of condominium apartments, suggesting that their continued evolution plays a predominant role in overall activity (Figure 9).

The 2016 ratio was well above historical norms in all five CMAs. The ratio for Montréal has increased significantly over recent years. In 2012, Montréal changed its zoning regulations on height to encourage construction of high-rise residential units to replace vacant lands or parking lots (Ville-Marie, 2011). Since 2012, in the *Arrondissement de Ville-Marie* (where downtown Montréal is located), 37 condominium high-rise apartments were started.

Figure 9: Ratio of Multiple Starts to Single Starts



Source: CMHC. Calculations based on CMHC's Survey of Starts and Completions.

2.2.4 Rent, Investor Demand, and 'Mortgage Helpers'

The focus of this report is on homeownership, but some additional insights can be gained from looking at the rental market as well. Moreover, rental and ownership are becoming increasingly intertwined through investors buying condominiums to rent in the secondary rental market. According to CMHC's *Rental Market Survey*, about one quarter of the condominium apartments in Vancouver and one-third in Toronto are occupied by renters.

The combination of low rental vacancy rates and strong home price appreciation motivated investment in the secondary condominium apartment rental market, particularly in the most expensive homeownership markets of Toronto and Vancouver. Although it has been suggested that these properties are held for speculative purposes, our analysis of the data suggests that this represents a relatively small proportion of the market. In contrast, our data in Chapter 8 suggest that longer-term domestic investors are large in number.

There are significant costs involved in holding property (Realosophy, 2017). Based on tax advice we have received from EY, there needs to be a reasonable expectation of profit in order to deduct these costs for tax purposes; properties cannot be loss-making forever in order to claim tax benefits. Moreover, an investor cannot continually refinance a property for the sole purpose of always having a mortgage charge to deduct from gross income. Hence, to receive the tax benefits of deducting costs, properties have to be rented out.

Also on this front is the emergence of mortgage helpers: dwelling units that have been created within a larger principal residence. This trend makes pricier homes more affordable by enabling homebuyers and investors to qualify for bigger mortgages. This is especially true in the case of Vancouver where single-detached homes average well over $1 million. In fact, the majority of new single-detached homes started in the city have some form of mortgage helper—for every ten single-detached homes started in 2014, there were approximately eight mortgage helpers started alongside (*Housing Market Outlook*, Fall 2014).

The mortgage helper trend is also favoured in other cities and is expected to continue over the next few years. In order to maximize the return on investment in an environment of high land costs, particularly in central areas zoned exclusively for single-detached homes, developers are building larger single-detached homes. These starts often incorporate one or more secondary suites or laneway homes, effectively converting single-detached homes into low-density, multiple-family zones.

These trends could affect home prices, but it is difficult to know how exactly. While investor demand for condominiums has increased, their supply has grown as well, so condominium prices have not increased proportionately. Estimating the impact of mortgage helpers on home prices is much more difficult: on the one hand they may enable a household to buy a home, but some of the debates surrounding Airbnb suggest that they could lower house prices as well.[6]

KEY STYLIZED FACT 5: There is increasing investor demand for properties that is supplying higher-quality rental properties to the market

Another phenomenon that has garnered significant attention is the impact of foreign ownership. Statistics Canada published data in late 2017. These data and survey data from CMHC (which are both on the stock of foreign investment in housing) and data on the flow of investment now gathered in British Columbia and Toronto together suggest a relatively low share of foreign investment. It remains possible, however, that foreign investment could be influencing Canadians' expectations of future house prices, particularly if foreign investors are concentrated on higher-priced properties, as CMHC and Statistics Canada data suggest. Indeed, our survey of homebuyers' motivations (Chapter 9) support the view that Canadians perceive foreign investment as an important factor in driving up home prices. Such arguments are somewhat more speculative, and will need to be analyzed further.

Another concern among Canadians is that foreign investors may be using Canadian real estate to avoid tax liabilities. In further advice from EY, foreign buyers have a legal obligation to pay taxes in Canada on income flow as well as capital gains realized on the disposition of properties held here. While improper paperwork and data recording may help tax evasion, such practices remain illegal. The Canada Revenue Agency monitors non-compliance in the real estate sector (Government of Canada, 2017).

2.2.5 What do we learn from these stylized facts?

Typically, the boost in single-detached home prices can be partially attributed to strong housing demand because of higher income growth, combined with low resale home inventories and a limited supply of land for new development. Single-detached homes attract move-up buyers with families in need of additional square footage. On the other hand, condominiums are typically more affordable, closer to workplaces and urban amenities, and favoured by downsizing empty-nesters. In general, therefore, this pattern of price changes could reflect rising income growth, possibly as families become richer or larger, and moving from condominiums to single-detached units.

So what are we to make of these five stylized facts? This is explored further in Table 1. One of the key lessons is that any robust explanation of higher home prices will have to take into account: i) household income differences; ii) that the properties whose prices have gone up the most have been more expensive ones; iii) relative differences in the supply of condominiums and single-detached homes; and iv) will need, to some degree, a city-by-city explanation.

[6] See an assessment of Airbnb's impact in New York in Sheppard and Udell (2016).

A critical distinction, however, is that while the prices of more expensive, single-detached properties have gone up the most, the supply response has mostly been for condominium apartments that generally have lower price points.

These stylized facts may, however, hide some more general trends. Lower interest rates, for example, increase the affordability of housing across the country. If prospects for economic growth are stronger in Toronto or Vancouver, or supply conditions are tighter in some cities, then the common element of lower interest rates will have differing impacts across cities.

2.2.6 These facts highlight differences with other countries

While the rest of the document tries to bring our analysis of a range of factors to be consistent with these facts, it is worth pausing to suggest that these stylized facts for Canada highlight some important distinctions with the experiences of other countries. Stylized facts 2 and 3 suggest that more expensive homes are the ones going up in price in Vancouver and Toronto. This is an important distinction with U.S. experience prior to last recession. In that case, large price increases were more predominant at the low- to middle-end of the market (Landvoigt *et al.*, 2015, and Mian and Sufi, 2014).

Caution should be taken in drawing too many inferences from the abundance of recent U.S. research on the housing market prior to the last recession.[7] Another example of an international difference is that, according to *The Economist*, prices for apartments have gone up much more in Sweden than have prices for houses, again a different pattern to Vancouver's.[8]

Table 1: Stylized facts, and their implications for explanations of higher home prices

KEY STYLIZED FACT	CHALLENGE POSED TO CONVENTIONAL EXPLANATIONS	POTENTIAL IMPLICATION
1: The Canadian housing market differs by CMA	1. There is a need to go beyond conventional explanations, such as the impact of lower interest rates, because impacts differ by CMA.	1. Need to examine local conditions, e.g., local supply and demand conditions, local amenities, local geography, etc.
2: Higher prices in Vancouver and Toronto have been driven by more expensive properties	1. Home prices are unlikely to be driven by the average new immigrant, as their average income is below an average Canadian-born citizen's. It is unclear whether immigration through programs targeting business people is sufficiently large in scale. 2. Explanations that do not take distributional implications or household heterogeneity into account will be difficult to reconcile with this.	1. Could be driven by the rise in income and wealth inequality, and by economic growth. 2. Suggests shortage of supply of expensive properties.
3: Higher prices in Vancouver and Toronto have been driven by higher prices for single-detached properties compared to condominiums	1. Difficult to reconcile with arguments on investor-driven demand for housing as a driving force for higher prices. Historically Canadians tended to rent apartments, and condo prices have not been appreciating as much as prices for detached houses.	1. Suggests higher-income households moving out of condominiums and purchasing single-detached homes. 2. Suggests shortage of supply of single-detached homes, but not of condominiums.
4: There is an increase in the supply of condominiums relative to single-detached homes	1. That there is purely a demand effect at work, otherwise prices would increases to a similar extent for both types of dwelling.	1. That returns on producing single-detached homes are lower than for condominiums.
5: There is increasing investor demand for properties that is supplying higher-quality rental properties to the market	1. Again, difficult to reconcile with the price of single-detached housing increasing.	1. Shortage of supply in the purpose-built higher-quality rental market. 2. Normal effects of lower interest rates.

[7] Indeed, it is possible that the analysis of Poterba (1984, 1991) looking back to the 1970s is more relevant to the current Canadian situation.

[8] http://www.economist.com/news/finance-and-economics/21677671-house-prices-sweden-continue-soar-regulators-despair-home-where November 7, 2015

2.3 WHAT WAS THE STRATEGY FOR ANALYZING THE CAUSES OF HIGHER HOME PRICES?

In this analysis, the bar for the analysis was high. We were asked not only what factors could influence house prices, but also which were the most important. We approached this challenge by pursuing multiple lines of evidence to gain a greater understanding of what is happening to home prices across Canadian cities. Our main approach—discussed in Chapter 3—was to examine the macroeconomic relationship between average home prices in a city with variables such as interest rates, population flows and disposable income. We also undertook additional steps to look at the impact of increased credit supply. We found that these variables played a sizable role in explaining home prices in Canada. We also found, however, that an important gap remained, including the need to delve deeper into the supply side of housing.

To assess what factors could explain that remaining gap between the price predicted by our model and the actual change in price, we adopted a battery of approaches. Those factors that could impact the demand for housing are discussed in Chapter 4 and evaluated statistically in Chapter 5, while those that could affect the supply side or for which we only have limited data are explored in Chapter 6 and 7.

2.4 WHAT WERE SOME OF THE CHALLENGES IN UNDERTAKING ANALYSIS?

The task of analyzing the effect of these factors proved challenging for several reasons. First, although the analysis pursued here was based on microeconomic theory, there is no settled theoretical model that explains all aspects of house prices in every city.

In their review of the intense macroeconomic research on housing since the crisis, for instance, Piazzesi and Schneider (2016) state that "A major outstanding puzzle is the volatility of house prices—including but not only over the recent boom-bust episode". In some cases, there are theoretical structures that could have been used, but they suggested particular forms of data that are lacking in Canada.

Dupuis and Zheng (2010) examine Canadian housing markets at the national and provincial levels; their approach, however, requires data on the stock of housing, for which there is no robust annual data at the CMA level. CMHC is working to address this problem, and indeed we have developed a close proxy for the work in this report.

Data gap: Stock of housing

Prices are the focus of our analysis. Many insights can be gained from having lengthy historical and detailed data on the prices of different types of dwellings. Lengthy data are also necessary for statistical robustness. This is an important data gap that has hindered, to some extent, these analyses. We are also concerned that this data gap may be exacerbated as households bypass traditional realtors to undertake transactions, so that the quality of data sources may decline in the future.

Data gap: Historical price data series with a sufficient number of time periods for statistical analysis

Over the course of our analyses, we have adapted measures supplied by the Canadian Real Estate Association (CREA) database in order to better integrate with geographical boundaries reported at the CMA level. More specifically, municipalities that are considered part of Greater Metropolitan Areas, as defined under Real Estate Boards, do not fall within Statistics Canada's Census Metropolitan Areas (CMAs) boundaries.

Although geographical boundaries can be similar, they are not exactly the same. Both CMHC and Statistics Canada report their measures based on CMA-level boundaries. In contrast, CREA defines respective boundaries in terms of Greater Metropolitan Areas. This is the case particularly for Vancouver.

Data gap: lack of consistency across reported geographic boundaries

Other relevant data gaps for prices include:

1. The extent of homeowners' efforts to improve the quality of their homes through renovation. Renovations will increase the price of a home, but that higher price comes from improved quality rather than from general market conditions. Adjusting for quality may lower house price increases over time. Separating such price differences would give a more precise understanding of underlying market conditions; and
2. Suggestions that, to appeal to investors of condominium units, average sizes of condominiums have declined over time. Hence, quality-adjusting condominium prices may lead to a higher trend over time.

Data gap: Complete indexing of quality in home prices

From a statistical perspective, we are also inherently limited in Canada by the relatively small number of cities in this country compared to the U.S. Establishing statistical robustness is easier with a larger number of observations, as is afforded by the sheer number of cities in the U.S.

2.5 APPENDIX: DISTRIBUTION OF PRICE INCREASES

Important information that could help explain the evolution of home prices is contained in the distribution of prices. To this end, we have explored transaction data from Teranet for Ontario and Alberta, JLR for Montréal, and Landcor for British Columbia. For simplicity of exposition, we present data for 2008, 2012 and 2016. We look at the distribution of prices for single-detached houses and apartments, and for the total (which would also include other housing types such as row houses).

In our preliminary analysis, we looked at two approaches to looking at price changes: 1) pooling all record-level data for a city, and 2) applying the Case-Shiller weighted repeat-sales price-index method to estimate the house price between two sale periods. In the first approach, there are different types of houses being sold each year. The Case-Shiller method controls for different types of houses being sold so that house quality is maintained. In principle, the Case-Shiller approach means that the distribution of houses will be kept the same over time. In our final results, however, we did not find significant differences between the two approaches. Consequently, because the sample size is large enough, we concentrate on results from the first approach.

Based on these data, we undertook kernel density estimation to examine whether the patterns of home prices have changed over time. Our results are presented in the following pages. The clearest implication of the data is that the distributions of prices for single-detached homes in both Toronto and Vancouver have shifted to the right. As a result, the distribution of prices for all properties has also shifted to the right. Distributions of prices have been relatively constant in Calgary and Edmonton, although the medians did fall back after the collapse in the oil price.

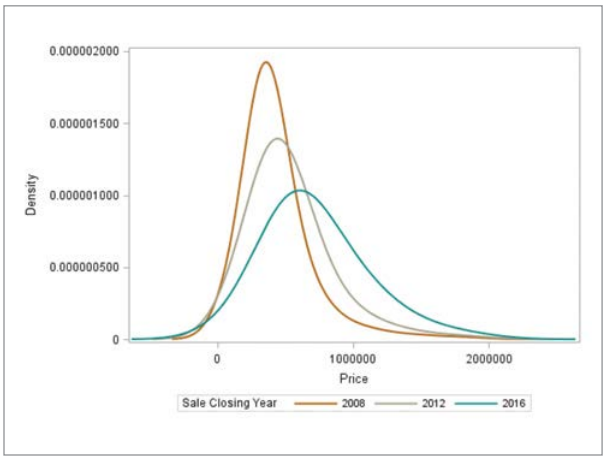
Table 2 shows further analysis of the raw data, including the average annual price growth at various points in the distribution of home prices, by type of dwelling, for both Toronto and Vancouver. The increases in prices have been relatively constant across dwelling types, although increasing by somewhat more at the top end of the distribution for apartments in Vancouver. A more striking feature of the data is that the price distribution of single-detached homes has gone up more than the distribution of apartment prices. In technical jargon, this suggests that single-detached homes and apartments are not perfect substitutes.

Table 2: Average price increase, by distribution, by building type, Vancouver and Toronto

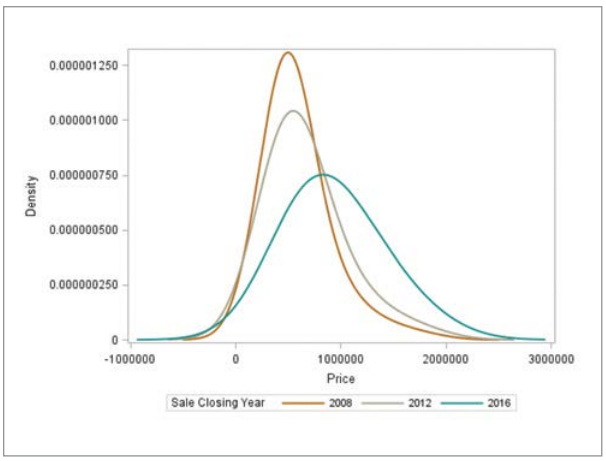
	DWELLING TYPE	AVERAGE ANNUAL PRICE GROWTH, 2008-2016		
		10TH PERCENTILE	MEDIAN	90TH PERCENTILE
Toronto	Single-detached	9.0%	9.0%	9.3%
	Apartment	5.7%	5.6%	6.1%
	Total	7.0%	8.6%	9.8%
Vancouver	Single-detached	9.3%	8.8%	10.7%
	Apartment	0.4%	2.3%	3.9%
	Total	2.3%	7.2%	10.4%

Source: CMHC calculations based on Teranet, JLR and Landcor

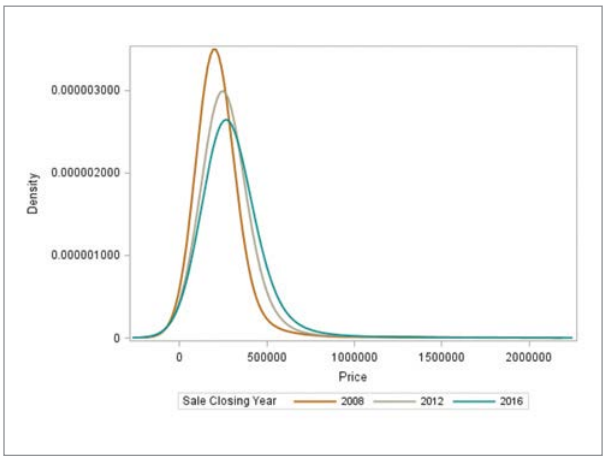
Toronto Single-Detached Home Prices



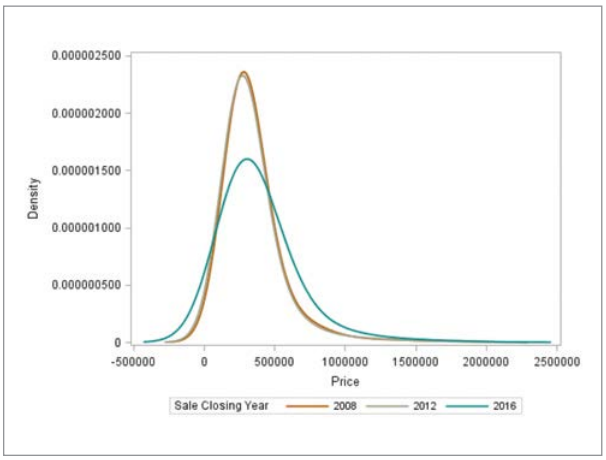
Vancouver Single-Detached Home Prices



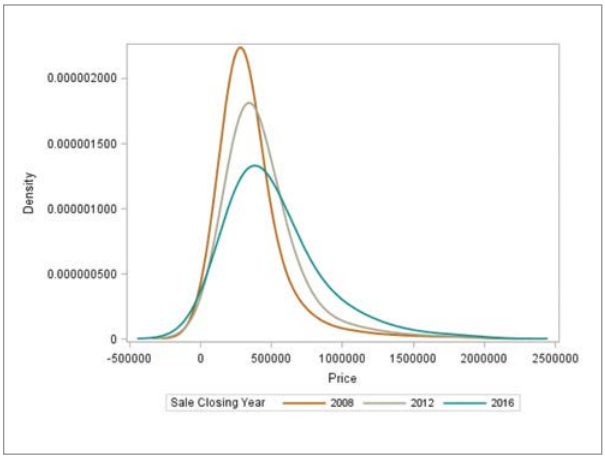
Toronto Condominium Apartment Prices



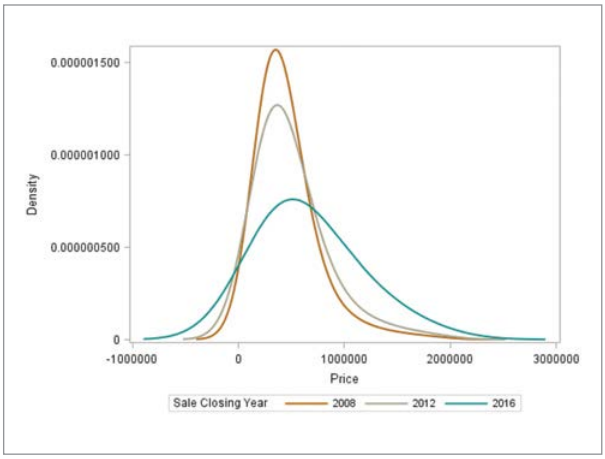
Vancouver Condominium Apartment Prices



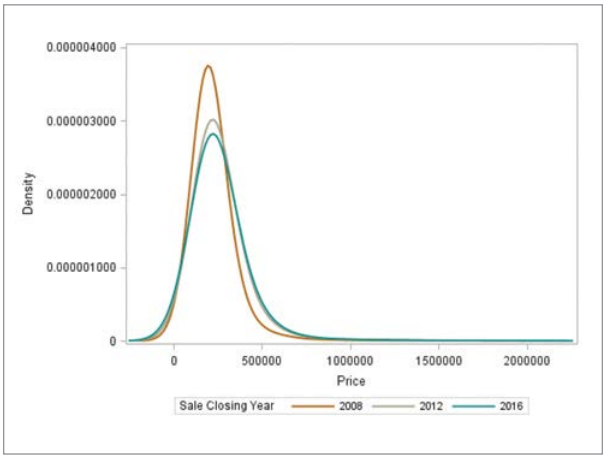
Toronto All Property Prices Vancouver



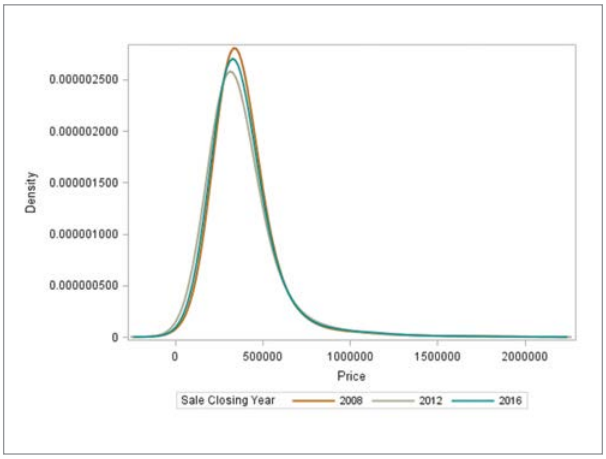
All Property Prices



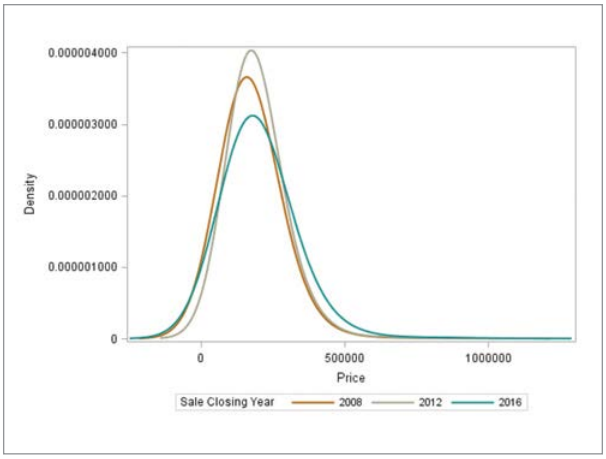
Montréal Single-Detached Home Prices



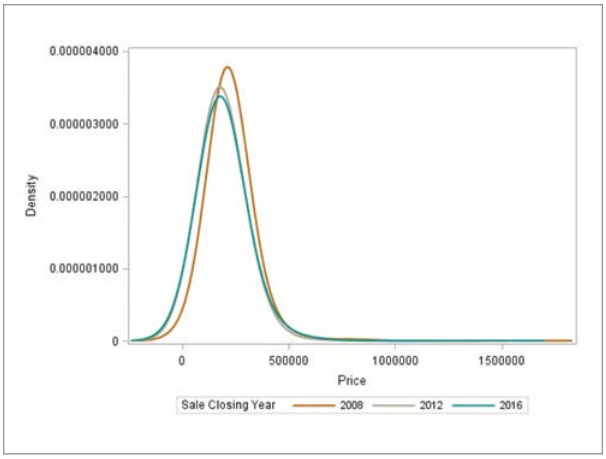
Calgary Single-Detached Home Prices



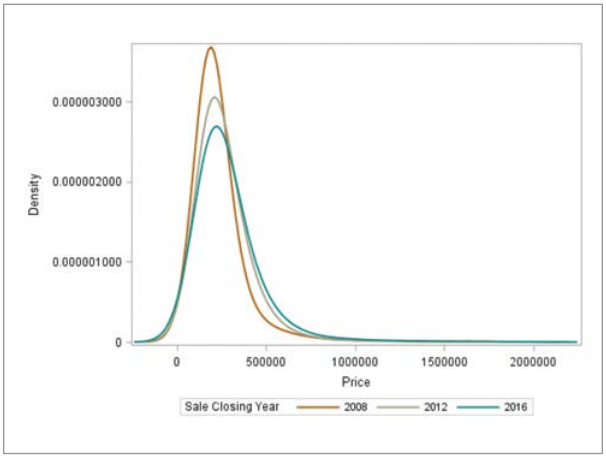
Montréal Condominium Apartment Prices



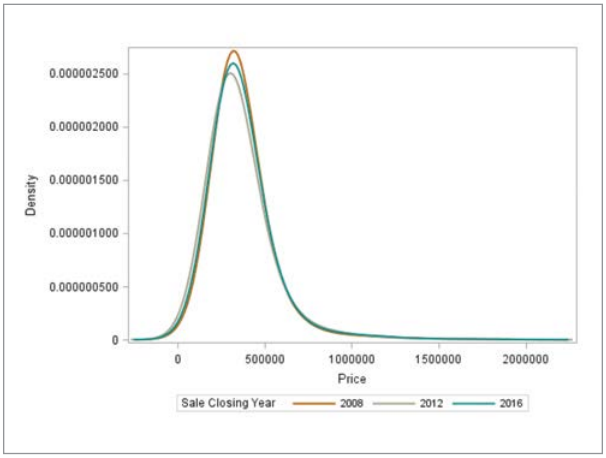
Calgary Condominium Apartment Prices



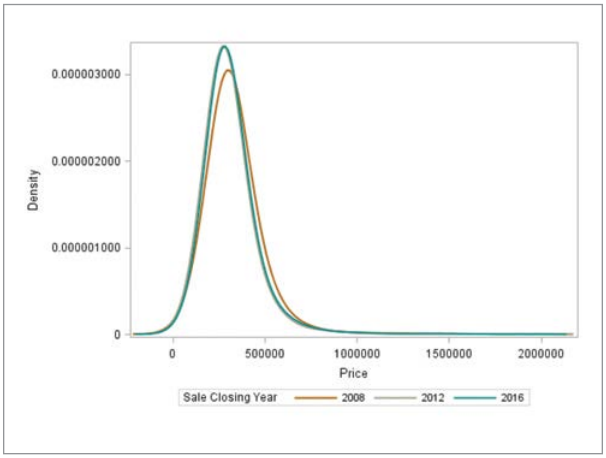
Montréal All Property Prices



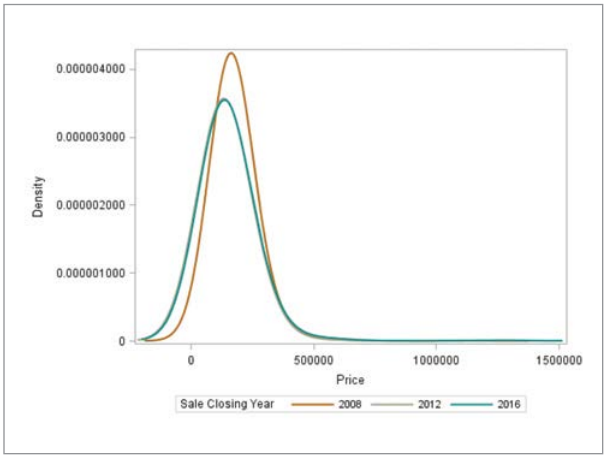
Calgary All Property Prices



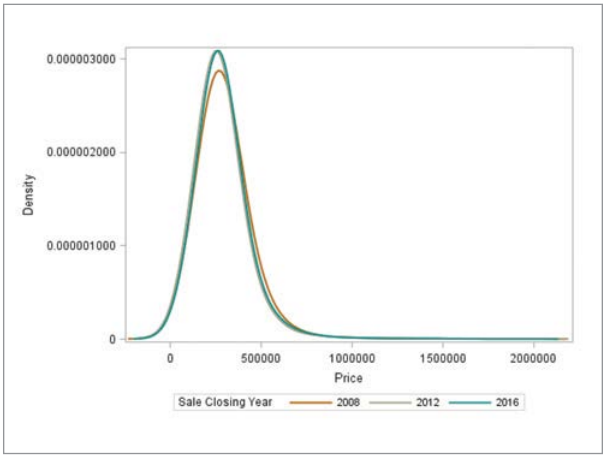
Edmonton Single-Detached Home Prices



Prices Edmonton Condominium Apartment Prices



Edmonton All Property Prices



3 Econometric Approaches to Housing Prices

CHAPTER OBJECTIVES:

- Discuss modelling and estimation approach with associated strengths and weaknesses.
- Present and estimate standard stock-flow model to study housing prices of the five CMAs.
- Highlight similarity of results across estimation methods.
- Construct instrumental variables (IV) to identify real disposable income and young adult population, addressing potential endogeneity problem. IV estimation suggests that housing prices are explained by income, young-adult population, mortgage rate, and local amenities.

KEY FINDINGS:

- The parsimonious specification adopted in this study is robust because the cointegration estimation is consistent with long time-series data.
- We therefore believe that city-level estimation of macro trends is broadly robust.

3.1 INTRODUCTION

In this chapter, we explore the general approach to econometric estimation of housing prices in Canada. Although a variety of econometric methods are available in theory, we are in fact constrained by the availability of data and the questions we pose. For our analysis, we were asked specifically to look at what happened to price levels in several Canadian cities over time (not growth rates). Note also that extending to more CMAs imposes more constraints from the availability of data. By statistical standards, we are therefore inherently constrained to look at a relatively small number of CMAs but for which we have a relatively long period of observations (also known in the jargon as small N and large T).

This structure of the data generally drives us to adopt 'time-series' methods of estimation as opposed to 'panel-data' approaches (where there may be a much larger number of observations but generally shorter time periods). For many years, CMHC has published the results of its *Housing Market Assessment* (HMA) based on the time-series method. In future, the new Canadian Housing Statistics Program from Statistics Canada holds out the prospect of moving to panel-data approaches. New technologies also suggest that more 'big-data' approaches could also be used. Building up a sufficient data history will take time, however, so using time-series methods remain indispensable.

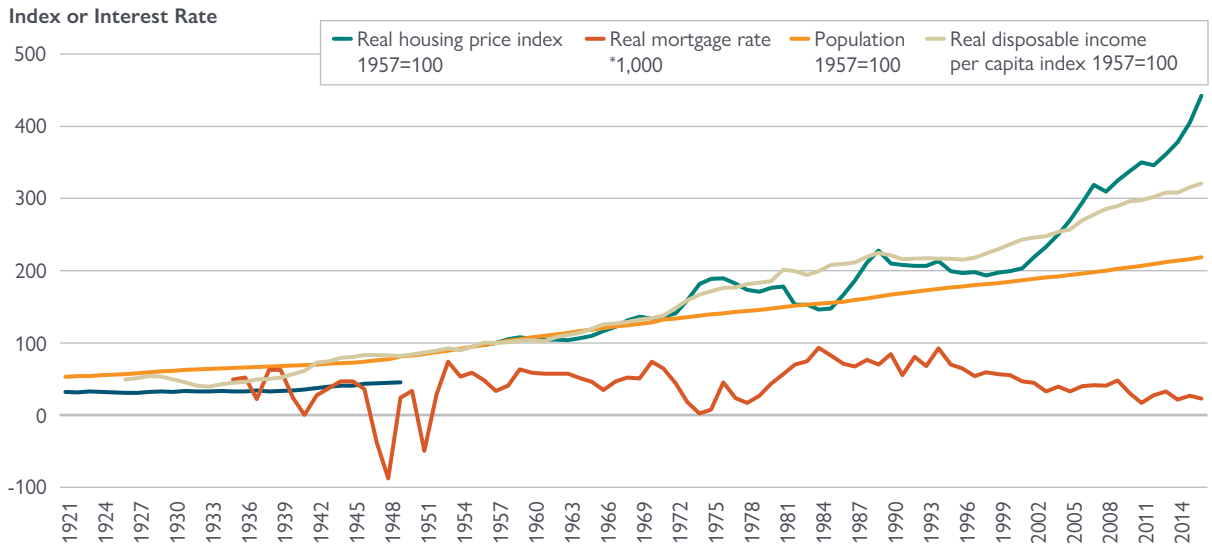
Despite the time-series approach being the main estimation method that we can implement practically at the moment, we prepared this chapter to establish its credibility and robustness, and to prepare the ground for analysis in the remainder of this report. However, as a robustness check, main results from panel analysis are reported as well.

Notably, we start by looking at the history of housing price data in Canada. Indeed, if there is a price as old as the hills, it is the housing price! We examine the statistical properties of basic estimation techniques. We then develop a comprehensive approach to look at both the supply and demand of housing simultaneously, and establish the robustness of our approach by using panel-data techniques to the extent we can. This gives us confidence that a simplified version of these models do provide valid results, and we use this approach in the remainder of our report.

3.2 UNDERSTANDING HOUSING PRICES IN CANADA: A HISTORICAL PERSPECTIVE

Historical records on house prices can show some key characteristics to consider when making econometric modelling choices. Through revisiting old publications, we collected almost a century of historical data on housing prices and some related indicators. Figure 10 shows home prices, disposable income per capita, mortgage rates, and population in Canada. When relevant, data are corrected for inflation.

Figure 10: House price, population, income and mortgage rate, Canada, 1921-2016



Data sources: Statistics Canada, CMHC, and CREA. For illustrative purposes, real housing price, population, and real disposable income are rebased so that the value in 1957 is 100, and real mortgage rate is augmented a thousand fold.

Various data sets are used to construct the historical house prices. Home price data for Canada between 1921 and 1949 are from Firestone (1951).[9] These data points are not the actual sales price, but rather the estimated replacement value. Price data from 1956 to 1980 are from Annual Reports (1977, 1980) of the Canadian Real Estate Association (CREA). Note that prices from 1956 to 1975 cover all MLS® transactions. The breakdown to residential properties was only made available from 1975. Price data for MLS® residential properties from 1980 to 2016 are provided by CREA.

CMHC published several reports studying historical housing prices. Firestone (1951) provides a detailed analysis for the period from 1921 to 1949. Miron and Clayton (1987) studies housing prices for the period from 1945 to 1985, while the *Renter to Buyer* report (1998) provides some analysis for the period from 1970 to 1997. This report focuses on the 2010-2016 period, but historical data are largely used.

Figure 10 illustrates several key features to consider when modelling Canadian housing markets:

1. Home prices in Canada exhibit a distinct upward trend. Similar to the study of economic output (GDP), it is of central importance to distinguish the long-run trend from short-run fluctuations when studying house prices. The long-run trend in house prices is likely determined by real factors such as income, population, and mortgage rates, while the short-run fluctuations are more likely affected by expectations, demand shifts, and some temporary shocks;

[9] Data points are from Table 18 on page 99 of Firestone (1951).

2. There is a long-run relation between home prices and population, income and mortgage rates. Incorporating house prices into a real business cycle model, such as in Iacoviello (2005), and allowing positive population growth shows that, in the long run, the growth of home prices can be affected by income, population and mortgage rates when the supply of land is fixed. Moreover, that these variables share a common trend implies that cointegration exists. Consequently, cointegration analysis is the major approach used in this report while population, income and mortgage rates are used to explain housing prices in the long run;
3. Housing prices fluctuate around the trend, and any deviation too far from fundamental variables often indicates overvaluation. Unlike housing prices in the U.S., there are no hump-shaped price adjustments of more than 30 per cent in Canadian housing prices. This may result from the combination of the unique adjustment process in Canadian housing markets and macroprudential policies; and
4. The deviation of housing prices from the fundamental variables seems to have increased since 2010. Before the urbanization rate reached 76 per cent in the early 1970s, housing prices moved in tandem with fundamental variables. As a rule of thumb from developed countries' experiences, when a country's urbanization reaches 75 per cent, it is a turning point for the end of "big cycles" in housing prices. It is also the point where the peak is reached for the compound annual growth rate of housing prices. Between 1980 and 2000, housing prices fluctuated within the bands of disposable income and population. Since 2004, housing prices have departed from the higher band of disposable income, and the deviation has become larger, especially since 2010. In fact it is the largest deviation we have ever observed since 1921. This observation shows why focusing on the period between 2010 and 2016 is of central importance.

Though historical data series are shorter for the five major CMAs in Canada, these key features still hold. To reflect these main characteristics, we use cointegration analysis to study the long-run trend in housing prices, and error-correction models (ECM) allowing for disequilibrium in housing markets, to study the short-run fluctuations. In addition, we present a stock-flow model as our analytical framework to capture some unique characteristics of housing markets. This model serves also as a starting point for econometric estimations.

3.3 A STOCK-FLOW MODEL

The housing market is fairly unique with several important characteristics to consider when modelling it. Firstly, houses are very durable: a house can last for decades or centuries. Thus, one of the key determinants of housing supply is the stock of existing houses. In Canada, housing starts represent only 1.4 per cent of the total housing stock in 2016, and home sales represent 3.8 per cent.

Second, houses are dual: a house is a consumption good as well as a capital good. As a consumption good, the use of real estate matters, while as a capital good, the ownership of real estate is important. The market for the use of real estate is the property market, similar to markets for other goods and services, while the market for the ownership of real estate is similar to asset or capital markets.

Analyzing the housing market therefore requires looking at both stocks and flows. The standard theory of the stock-flow model is as follows. In the property market, demand comes from the occupiers or users of space, whether they be tenants or owners. In contrast, the supply of housing is given by the asset market, consisting mainly of the housing stock, and the cost for the use of housing is rent. The demand for space depends on rents, income levels, the number of households, etc. In the asset market, the price of houses depends on how many households wish to own units, and how many units are available for ownership. The willingness to own a unit is jointly determined by the expected stream of rents or rent-to-price ratio, and alternative expected returns.

Let S denote the stock of house units, P the real price level of housing, and X_1 the vector of exogenous variables affecting demand for housing services (or the use of housing). Equilibrium in the property market is obtained when demand for housing services, (X_1, P), is equal to supply, S, as expressed by

$$D(X_1, P) = S \qquad (1)$$

The housing stock slowly expands and gradually depreciates. New development is costly, time-consuming, and subject to supply constraints (*e.g.*, regulatory and/or geographic constraints, labour costs). The supply of new real estate assets comes from construction, $C(X_2, P)$, which depends on the price of those assets relative to the replacement or construction costs, X_2. How construction reacts to price changes is determined by construction bottlenecks, scarcity of land, and other impediments to development. Let δ denote the depreciation rate of the stock of houses. The stock of house units evolves according to the law of motion as follows:

$$\Delta S = C(X_2, P) - \delta S \qquad (2)$$

The standard stock-flow model that has been largely estimated in the literature consists of a system of two equations (1) and (2) (see below). While most studies simultaneously estimate both equations, some studies estimate a single reduced-form equation derived from them. Equating equation (1) and (2) does tend to create confusion, however. Some studies consider $D(X_1, P)$ as the demand for housing, while $C(X_2, P)$ is seen as supply, but this approach is somewhat problematic because the demand is for both existing and new houses, while $C(X_2, P)$ is the supply of new houses only. $C(X_2, P)$ is equal to δS only at the steady state when depreciation is equal to completions. In this case, the general-equilibrium equation (when $\Delta S=0$) is:

$$D(X_1, P) = \frac{C(X_2, P)}{\delta} \qquad (3)$$

Otherwise it would be:

$$D(X_1, P) = \frac{C(X_2, P) - \Delta S}{\delta} \qquad (4)$$

Thus, without imposing steady sate, equation (4) is the general-equilibrium equation derived from (1) and (2).

3.4 A GENERAL DISCUSSION ON ECONOMETRIC METHODOLOGIES

The existing literature provides three main approaches to estimating a stock-flow model:

1. Estimate a stock-flow model simultaneously with a demand equation and a flow equation, *e.g.*, Case (1986), DiPasquale and Wheaton (1994), and Caldera and Johansson (2013);
2. Estimate a single demand equation by controlling for supply factors such as starts, housing stock and construction costs, *e.g.*, Mankiw and Weil (1989), Hilber and Vermeulen (2016), and Monnet and Wolf (2017); and
3. Estimate a structural vector autoregression (SVAR) or vector error correction model (VECM) framework (Tsatsaronis and Zhu, 2004).

Each approach has its own strengths and weaknesses. The first approach requires data on housing stock, construction costs and housing starts. Studying the dynamics of housing prices in a macro framework requires yearly or quarterly data, but some data can only be found from Censuses that are gathered at lower frequency. For instance, housing stock by CMA in Canada is only available from the Census with an interval of five years. Estimating a demand equation by controlling for supply factors—the second approach—is an alternative if some variables are not available.

Nevertheless, the common issue with both approaches is the simultaneous-equation bias that may arise if housing prices feed back to income and population structures. One way to solve the endogeneity problem is to identify some exogenous shocks or to use instrumental variables (IV). Identifying exogenous shocks is desirable but the challenge remains of determining whether they are really exogenous. Another option is to use structural VARs or vector error correction methods (SVAR or VECM). Their advantage is that they solve the simultaneous equation bias without seeking IVs, but a weakness is that they require identification hypotheses.

Our modelling strategy consists in adopting the appropriate approach considering the main characteristics of housing markets. Canadian CMA housing prices exhibit long-run relationships with these three fundamental variables: disposable income, young-adult population, and mortgage rates. Cointegration regression is the natural best choice for our analysis in this instance, as it exploits these long-run relationships between fundamental variables. Statistically, the cointegration estimation is consistent if the number of periods is large, and we have a panel with a small N but large T. Meanwhile we should note that cointegration regression limits the number of variables in the regression because variables have to be cointegrated to be included; adding more variables risks causing multicollinearity issues. Model selection has to be carefully conducted, and a parsimonious specification is preferred to deliver reliable results.

Having said this, we conduct robustness checks in three ways. First, we estimate the stock-flow model simultaneously by constructing housing stock series. Second, we address the endogeneity problem on personal disposable income and young-adult population using IVs. Lastly, we highlight the issues with the validity of the overidentification test for the exogeneity of IVs. These analyses show that the parsimonious specification we adopt in subsequent analysis is robust.

3.5 DATA

Data on demand factors are discussed at greater length in the next chapter. Here we concentrate on discussing data on supply factors. Housing starts and completions are available back to 1972. They are surveyed monthly by CMHC for CMAs with populations of over 50,000, and quarterly for centres with populations below that.

Statistics Canada provides several series on construction costs. Residential construction costs are estimated in the New Housing Price Index (NHPI). In its method, Statistics Canada surveys selling prices of new single-detached homes, semi-detached homes, and row houses. Weights are estimated for the house component and the land component with the house component referring to construction costs. (Non-residential construction costs are constructed by asking builders directly about the costs of building, including material costs and labour costs.) Statistics Canada also provides the Construction Union Wage Index, computed from collective bargaining contracts negotiated in the construction sector.

Because residential construction costs are computed in the NHPI, they exhibit similar trends and dynamics. In general, construction costs declined during the 1980s, increased in the 2000s, but declined after 2008. As a component of construction costs, Construction Union Wage Index shows a similar trend to disposable income. While directly collected from builders, non-residential construction costs show trends similar to those of residential construction costs.

Data on housing stock by CMA are limited in Canada with no quarterly or yearly series. Censuses provide some measures of housing stock with an interval of five years. We construct housing stock series by combining census, completions, conversions and demolitions data. More specifically, the stock is constructed with the following inventory accumulation equation, using a base (starting) level of the housing stock provided by the 2011 Census.

$$HSTOCK_{i,t} = HSTOCK_{i,t-1} + COMPLETIONS_{i,t} + CONVERSIONS_{i,t} - DEMOLITIONS_{i,t}$$

where $HSTOCK_{i,t}$ is housing stock for a CMA i at time t, $COMPLETIONS_{i,t}$ completed residential units, $CONVERSIONS_{i,t}$ converted residential units, and $DEMOLITIONS_{i,t}$ demolished residential units. The prior three Censuses (2001, 2006 and 2011) provided two measures of private dwellings: total private dwellings and private dwellings occupied by usual residents. And all previous Censuses only had measures of occupied dwellings, which were exactly equal to the total number of households. As a supply-side measure, we used the total private dwellings, which include both occupied and vacant units. The constructed stock is validated by previous Census data.

3.6 ECONOMETRIC MODEL

To take into account the feedback between demand and supply in housing markets, we estimate the stock-flow model using the seemingly unrelated regression (SUR) approach as follows.

3.6.1 SUR estimation

For the demand equation, we use the following form:

$$PRICE_{i,t} = \beta_0 + \beta_1 INCOM_{i,t} + \beta_2 YPOP_{i,t} + \beta_3 MORTGAGE_{i,t} + \beta_4 (POP_{i,t-1} - HSTOCK_{i,t-1}) + \beta_6 CMA_i + \varepsilon_{i,t}$$

where $PRICE_{i,t}$ represents housing price of CMA i at time t, $INCOM_{i,t}$ real personal disposable income, $YPOP_{i,t}$ young-adult population aged 24 to 35; $MORTGAGE_{i,t}$ is the real 5-year mortgage rate, $POP_{i,t}$ total population, and $HSTOCK_{i,t}$ housing stock. Except for mortgage rate, all other variables are in logarithms. Thus, $POP_{i,t} - HSTOCK_{i,t}$ is the ratio of population on housing stock, a control variable to capture the size effect of houses such as the decline in average household size over many years, and CMA_i is CMA-level fixed effects to capture local amenities.

Our supply-flow equation takes the form:

$$STARTS_{i,t} = \alpha_1 + \alpha_2 PRICE_{i,t-1} + \alpha_3 CCOST_{i,t-1} + \alpha_4 SALES_{i,t-1} + \alpha_5 (POP_{i,t-1} - HSTOCK_{i,t-1}) + \alpha_6 CMA_i + v_{i,t}$$

where $STARTS_{i,t}$ represents housing starts, $CCOST_{i,t-1}$ construction costs, and $SALES_{i,t-1}$ sales. All of these variables are in logarithms. Lagged variables are used to capture the decision process for housing starts based on information from the previous period (results are robust when contemporary variables are used instead). The sample period is from 1992Q1 to 2016Q2. The starting year is chosen from 1992Q1 because Census data in 1991 are used to construct IVs, and some data points in 1991 are dropped when converting yearly data to quarterly data (see more details in the next subsection).

3.6.2 Results

For comparison purposes, we estimate the stock-flow model with the simple ordinary least squares (OLS) and the seemingly unrelated regression (SUR) approach. Heteroscedasticity and arbitrary serial correlation in the residuals are corrected. However, the t-statistics do not differ from the ones based on regular OLS standard errors.

The main results from separate OLS estimation and SUR estimation are reported in Table 3. Several observations can be made:

1. Long-run explanatory variables have signs as expected. Housing prices are positively correlated with income and the young-adult population, but negatively related to real mortgage rate. Housing starts positively depend on lagged housing prices and sales, but negatively on lagged construction costs;
2. The long-run estimated elasticities are very similar between the OLS estimation and SUR estimation, and are in the range of the existing literature; and
3. There is no multicollinearity, a common concern when estimating a reduced form of the stock-flow model.

Table 3: Separate OLS estimation and SUR estimation

(Dependent variables are logged real average MLS house price for demand-stock equation and logged total housing starts for supply-flow equation, 1992Q1-2016Q2, five CMAs)

INDEP. VARIABLE	PRICE (OLS)	HOUSING STARTS (OLS)	PRICE (SUR)	HOUSING STARTS (SUR)
Income	1.55*** (18.49)		1.56*** (18.86)	
Population 25-34	0.72*** (11.89)		0.70*** (12.27)	
Mortgage rate	-0.02*** (-6.09)		-0.02*** (-6.61)	
Lagged house price		0.65*** (5.69)		0.74*** (6.58)
Lagged construction costs		-1.61*** (-5.99)		-1.66*** (-6.34)
Lagged sales		1.05*** (15.92)		1.04*** (16.13)
Lagged population to housing stock ratio	-3.91*** (-11.67)	2.00** (2.32)	-3.85*** (-12.44)	2.34** (2.74)
CMA fixed effects	Yes	Yes	Yes	Yes
Sample period	1992Q1 2016Q2	1992Q2 2016Q2	1992Q1 2016Q2	1992Q1 2016Q2
R-squared	0.94	0.82	0.94	0.82

Sources: Statistics Canada, Conference Board of Canada, and CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent

** Significant at the 5 per cent

*** Significant at the 1 per cent

A common second approach is to estimate a single demand equation by controlling for supply factors. In the previous specification, we employ lagged price and lagged housing stock in the flow equation to avoid any contemporaneous endogeneity issue because housing starts could feed back to affect house prices. If we assume, however, they are determined simultaneously within the system, then housing stock and price could be treated as endogenous variables.

Solving the system of simultaneous equations, we obtain the housing price equation as follows:

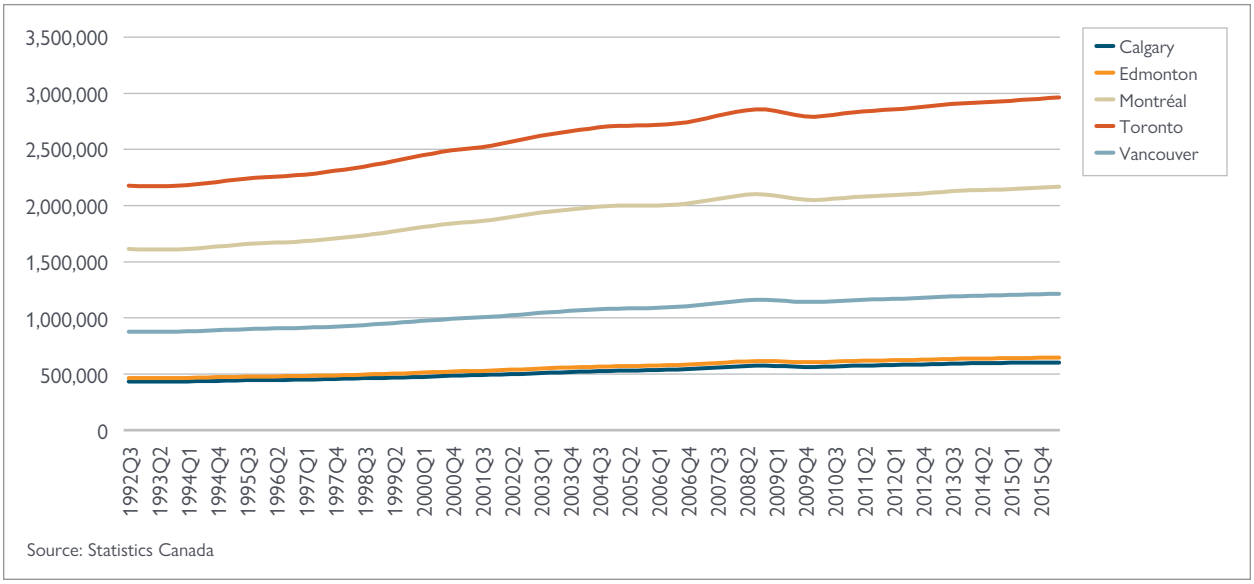
$$PRICE_{i,t} = \gamma_0 + \gamma_1 INCOME_{i,t} + \gamma_2 YPOP_{i,t} + \gamma_3 MORTGAGE_{i,t} + \gamma_4 STARTS_{i,t} + \gamma_5 CCOST_{i,t} + \gamma_6 CMA_i + \sigma_{it}$$

The main issue when estimating the above equation is multicollinearity. In our data, construction costs are highly correlated with income and housing starts. The resulted multicollinearity may inflate other estimates. We do not pursue this approach further. Simultaneous estimation of the stock-flow model allows us to take into account supply factors without causing multicollinearity.

The third approach is to try to control directly for endogeneity. Housing prices may affect income and population structure. In this subsection, we use IVs to tackle the potential endogeneity problem that would result in biased estimates. To resolve the potential endogeneity issue, following Bartick (1991), we construct IVs for real disposable income and population 25-34, named as $\boldsymbol{EMP\_Shock_{i,t}}$ and $\boldsymbol{Pop\_Shock_{i,t}}$, respectively.[10]

The shock of labour demand, $\boldsymbol{EMP\_Shock_{i,t}}$, used to identify income (Figure 11), is the weighted employment for a CMA $\boldsymbol{i}$ at time $\boldsymbol{t}$ if the initial local industry composition of employment in 1991 had grown at the rate of the national level. More specifically, we multiply a CMA's employment by industry in 1991 (including agriculture, mining, manufacturing, construction, utilities, and service) by the growth rate of employment by industry at the national level from 1991 to 1992 to obtain its employment level in 1992. We construct a CMA's employment by industry recursively had it grown at the national rate. The sum gives employment at the CMA level.

Figure 11: Employment shock



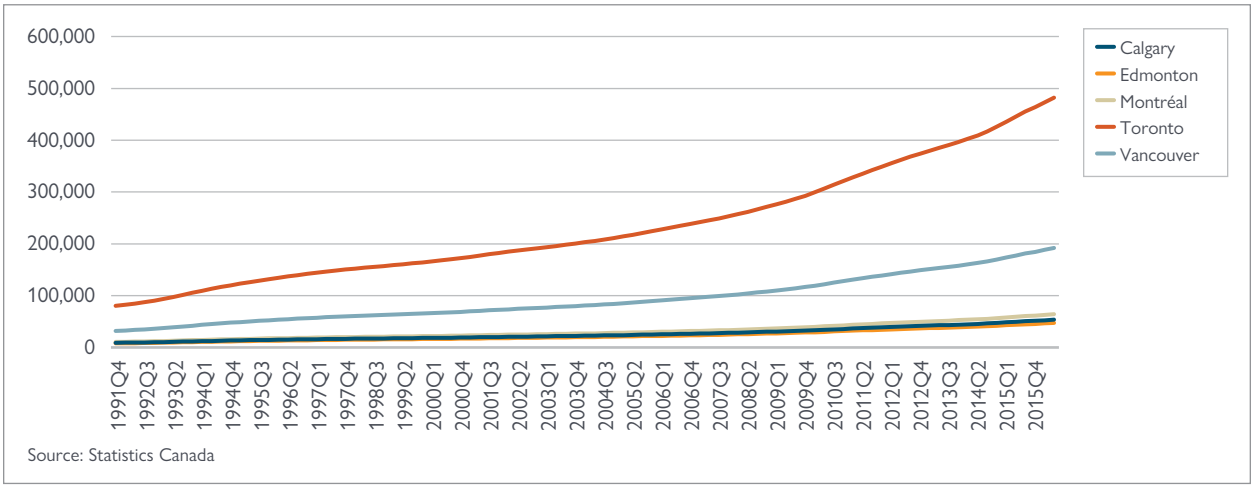
Source: Statistics Canada

We construct a shock of population, $\boldsymbol{Pop\_Shock_{i,t}}$, to identify the young adult population (Figure 12). $\boldsymbol{Pop\_Shock_{i,t}}$ is the number of immigrants from the Republic of the Philippines for a CMA $\boldsymbol{i}$ at time $\boldsymbol{t}$ if its Filipino immigrants in 1991 had grown at the rate of the national level.[11] The selection of immigrants by source country to construct IVs is mainly determined by whether they belong to the top ten immigrants by source country for all five CMAs. We project the series up to 2016 by using the growth rate of total national immigrants from the Philippines to Canada. As we only have the annual data of Filipino permanent residents, we convert the series into a quarterly frequency using a cubic spline.

[10] We thank Professor David Green at the University of British Columbia for suggesting these two IVs.

[11] As a robustness check, we also constructed a similar IV using immigrants from the People's Republic of China. The IV estimation gives similar results.

Figure 12: Population shock



Source: Statistics Canada

Before proceeding to IV estimation, we conduct weak instrument tests. We use a robust Wald Test to test the joint significance of our instrumental variables in the first-stage equation. Results are reported in Table 4. Instruments are significantly correlated with income and young-adult population. The F-statistics for the weak instrument test in the first stage equations are much larger than the critical values suggested by Stock and Yogo (2005). Our instruments are strong.

Table 4: First-stage regression

INDEP. VARIABLE	REAL DISPOSABLE INCOME	POPULATION 25-34
Employment shock	0.54*** (7.45)	-0.17*** (-2.74)
Population shock	0.02 (1.3)	0.1*** (7.33)
Mortgage Rate	0.004*** (2.87)	0.01*** (6.65)
Lagged construction costs	0.005 (0.14)	-0.01 (-0.21)
Lagged house price	0.12*** (8.85)	-0.05*** (-4.18)
Lagged sales	0.03*** (3.35)	0.3*** (-5.45)
Lagged population to housing stock ratio	0.15* (1.84)	1.51*** (11.42)
CMA fixed effects	Yes	Yes
Weak instrument test (Robust F-Statistic)	71.68	28.95
Sample period	1996Q1 2016Q2	1996Q1 2016Q2
R-squared	0.91	0.99

Source: Statistics Canada, Conference Board of Canada, and CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

The main results from IV estimation are reported in Table 5, together with the previous results estimated from simple SUR (from Table 3). All the coefficients have the expected signs with simple SUR and IV estimation. Compared to the simple SUR, IV estimation produces smaller coefficients for income, but larger coefficients for young-adult population. Other long-run coefficients are quite similar. The IV results suggest that housing prices in the five CMAs are explained by real disposable income, young-adult population, mortgage rates, and fixed effects. Lastly, the magnitude of coefficients with both estimations is in the range generally found in the literature.

Table 5: SUR and IV estimation results

INDEP. VARIABLE	PRICE (SUR)	HOUSING STARTS (SUR)	PRICE (IV)	HOUSING STARTS (IV)
Income	1.56*** (18.86)		0.98*** (4.62)	
Population 25-34	0.70*** (12.27)		1.57*** (9.41)	
Mortgage rate	-0.02*** (-6.61)		-0.02*** (-4.28)	
Lagged house price		0.74*** (6.58)		0.65*** (5.70)
Lagged construction costs		-1.66*** (-6.34)		-1.60*** (-5.99)
Lagged sales		1.04*** (16.13)		1.05*** (15.92)
Lagged population to housing stock ratio (lagged)	-3.85*** (-12.44)	2.34** (2.74)	-4.92*** (-10.83)	2.00** (2.32)
CMA fixed effects	Yes	Yes	Yes	Yes
Sample period	1992Q1 2016Q2	1992Q1 2016Q2	1992Q1 2016Q2	1992Q1 2016Q2
R-squared	0.94	0.82	0.91	0.82

Sources: Statistics Canada, Conference Board of Canada, and CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Several precautions are required, however, when interpreting the IV results. First of all, the over-identification test suggests that IVs may not be exogenous. The Sargan statistic is marginally larger than the corresponding chi-squared critical value at 1 per cent level, which rejects the null that instruments are uncorrelated with error terms or instruments are exogenous. In other words, while our instruments are strong, they may be invalid because of possible correlations with error terms. One may advance that the validity of instruments is of concern because each CMA in our analysis is relatively large and important for the national level.

On the other hand, we are not convinced that the over-identification tests are applicable to our study. The main reason, overlooked by the literature, is that the Sargan statistic is computed when there is a risk of running spurious regressions. More specifically, we regress the residuals from the two-stage least squares (2SLS), I(0) if there is cointegration, on exogenous variables in level that are I(1).

Second, there is no evidence that the predicted variable using the IV approach are cointegrated with housing prices. While there is no theory to support the existence of cointegration between these predicted variables and housing prices, Table 6 also shows that the error correction term (ECT) in the short-run regression or in the error-correction model (ECM) is not significant, indicating the lack of cointegration between predicted variables and housing prices. In addition, IVs become weak when instrumenting the short-run equation with variables in first difference.

Because of these uncertainties, IV estimation results seem to suggest income, young-adult population, and mortgage rates explain housing prices in the long run, but further research efforts are required on overidentification tests with cointegration to validate the IV estimation results.

Table 6: IV estimation in an ECM

INDEP. VARIABLE	PRICE (IV)	HOUSING STARTS (IV)
Price ECT	0.01 (0.299)	
ΔIncome	0.34*** (6.13)	
ΔPopulation 25-34	0.72 (1.13)	
ΔMortgage rate	0.49 (0.68)	
Supply ECT		-0.31*** (10.14)
ΔLagged house price	0.36*** (6.13)	0.75** (2.36)
ΔLagged construction costs		1.18** (1.88)
ΔLagged sales		0.50*** (7.14)
CMA fixed effects	Yes	Yes
Sample period	1992Q1 2016Q2	1992Q1 2016Q2
R-squared	-0.08	0.27

Sources: Statistics Canada, Conference Board of Canada, and CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Lastly, contrary to the IV estimation results, simple OLS and SUR estimations on short-run model confirm the existence of cointegration between housing prices, income, young adult population, and mortgage rate, as shown in Table 7. Results from OLS and SUR estimations are quite similar. Thus results from separate OLS estimation of a simple demand equation are robust.

Table 7: Separate OLS and SUR estimation in an ECM

INDEP. VARIABLE	PRICE(OLS)	HOUSING START(OLS)	PRICE(SUR)	HOUSING STARTS (SUR)
Price ECT	-0.03** (-3.08)		-0.03*** -3.31	
ΔLagged price	0.32*** (7.42)		0.26** (6.20)	
ΔIncome	0.09 (1.60)		0.07 (1.25)	
ΔPopulation 25-34	0.65*** (3.00)		0.73*** (3.37)	
ΔMortgage Rate	0.005*** (4.11)		0.004*** (3.62)	
Supply ECT		-0.32*** (-10.17)		-0.31*** (-10.27)
ΔLagged house price		0.78*** (2.40)		0.61** (1.96)
ΔLagged construction costs		1.23* (1.96)		0.80 (1.30)
ΔLagged sales		0.50*** (7.25)		0.50*** (7.52)
CMA fixed effects	Yes	Yes	Yes	Yes
Sample Period	1992Q2 2016Q2	1992Q2 2016Q2	1992Q2 2016Q2	1992Q2 2016Q2
R-squared	0.17	0.28	0.13	0.27

Sources: Statistics Canada, Conference Board of Canada, and CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

3.7 CONCLUSION

In this chapter, we presented almost a century of data on house prices, mortgage rates, population, and income. The historical data demonstrate some important characteristics of house prices in Canada, and also highlight its large deviation from fundamental variables since 2010. We provided a theoretical framework to study housing prices of the five CMAs. The stock-flow model was presented, and the strengths and weaknesses of different estimation methods were discussed. We simultaneously estimated a stock-flow model. The results are quite similar with separate OLS and SUR estimation.

To tackle the potential endogeneity problem, we constructed instruments to identify real disposable income and young-adult population. The results seem to support that housing prices of the five CMAs are explained by income, young adult population, mortgage rates, and fixed effects. While over-identification tests cast doubt over the validity of instruments as exogenous variables, the validity of the test itself is uncertain because of the existence of cointegration, an econometric question requiring further research. We therefore view the parsimonious specification used in the rest of this report as reliable because the cointegration estimation is consistent with long time-series data (large T).

4 What Are the Drivers for Demand?

CHAPTER OBJECTIVES:

- List factors that influence the demand for homes, and explain how Canadian and global trends are changing these factors.
- Look at different aspects of the "real" economy on housing (population flows, industrial activity, commodity production, etc.).
- Because of the absence of detailed data at the CMA level, explore what is happening in the economies of Canadian cities based on available — albeit disparate — data, while remaining consistent with the stylized facts of Chapter 2.
- Look at the impacts of the financial economy on housing (interest rates, the availability of credit, etc.).

KEY FINDINGS:

- There is a wide array of factors that could be explaining higher home prices. These require evaluation using more sophisticated statistical tools, which are used in Chapter 5.
- While the statistical analyses concentrate on average levels of key variables, it is likely that the distribution of these variables is becoming more important in understanding our cities, including the distribution of income, industries and locations.

4.1 INTRODUCTION

While households are influenced by their own circumstances in deciding whether to buy a home, as described in Chapter 2, they are also impacted by wider dynamics affecting the broad swathe of the economy, such as overall economic growth or lower interest rates. This chapter outlines briefly these economic factors that influence demand for housing, some of them driven by the global changes described in Chapter 1. This chapter also highlights important changes in the patterns of some of these variables across Canadian cities. Concentrating on average levels of these variables may mask the importance of their distribution—the distribution of incomes may be as important as the average level of income in explaining the evolution of prices, for example. As discussed in Chapter 6, these patterns of increasing demand can combine with different supply responses to lead to variation in the local responses of house prices. Since homes are seen as a financial asset, changes in financial markets are also discussed.

4.2 FUNDAMENTAL FACTORS DRIVING HOME PRICES

Traditionally, the fundamental factors for driving home prices higher include growth in disposable income and population, and lower interest rates. These are the core building blocks of our Workhorse model to account for home price growth, which will be elaborated on in the next chapter. In our analysis of this model, we have gained many insights into what has driven home prices, but we also feel that some elements are missing from that model. This chapter elaborates on what those might be.

4.3 ECONOMIC GROWTH IN CITIES

4.3.1 Income and Employment Growth

Growth rates of the economy and employment are central variables influencing growth in house prices. A stronger economy with more jobs enables more of those who work to purchase suitable, bigger homes. But experience around the world suggests that the types of industries in cities also matter.

Some large cities tend to have a concentration of service or manufacturing industries that have particularly potent impacts on productivity and employment growth. In particular, information technology and financial services industries have powerful agglomeration effects, which means that other businesses benefit from co-locating with them. Firms benefit from being close to other firms that provide specialized inputs, or having access to a pool of specialized talent. Barr documents how over many decades the financial services industry remained on Wall Street while the population found housing further up the island of Manhattan. It was only after a significant period of elevated costs that a second business district in midtown Manhattan developed (Barr, 2016).

This effect may be becoming more important globally. Chapter 1 discussed some of the global changes that are taking place, one of which is the increasing pace of technological change. Industries that develop these new technologies tend to be concentrated in key cities such as San Francisco and Boston in the U.S., so technology change is having profound impacts directly on these cities. Another industry experiencing similar concentration is financial services, which tended to become concentrated in London and New York. As the importance of industries such as these has become greater, and commensurately higher salaries are paid, cities where these industries are located tend to have high home prices. This may be happening, albeit to a smaller extent, in Canadian cities.

Academics have laid out the path of what can happen to households (and hence homes) with technology change (Black and Henderson (1999) and Puga (2010)). Because of their access to highly skilled workers, breakthrough innovation tends to be located in cities. This innovation drives higher wages because of productivity and agglomeration gains in these cities—growing businesses attract businesses that supply them, for example.

This growth not only increases income levels of residents in particular cities, but also leads to the migration of domestic and international workers to those cities. This 'selection effect' can amplify the impact on local income levels, as those individuals who are attracted to growing industries in those cities can be more highly educated, and thus earn higher wages (Behrens *et al.*, 2014). Significant wealth may be created that affords even greater opportunity to buy larger homes. These patterns have been explored for the U.S. in Enrico Moretti's *The New Geography of Jobs*, but he finds that this pattern is not reflected in all cities (Moretti, 2012). Indeed, he finds that some cities cannot take advantage of the opportunities afforded by technology, and fall behind. The question broached in this section is whether similar trends promoting growth and wealth are manifesting themselves in Canada, and particularly in our large cities.

Another implication of the trend is that attracting highly paid workers will tend to increase inequality over time. Such income (and wealth) inequality could lead to higher home prices because of the greater ability of richer households to pay for homes, the greater ability to borrow in order to pay for homes, and the greater desire to purchase more "housing services".

In the U.S., van Nieuwerburgh and Weil (2010) find that the distribution of house price increases matches the increase in wage dispersion. They look at the impact of different economic growth patterns when workers can move between cities and there are sluggish housing supply responses. The dispersion of productivity differences across cities and abilities across individuals lead to greater dispersion of house prices across cities. High-ability individuals will move to cities with increasing demand and increase property prices there.

Similar analysis emerges in Gyourko *et al.* (2013). As the aggregate number of high-income individuals increases across the United States, prices in 'superstar cities' increase. In turn, this increases inequality further as low-income individuals move out of expensive cities. "Mere [U.S.] population growth forces residency in preferred cities and towns effectively to be auctioned off to the highest bidder with existing landowners in those places benefitting from the rise in prices." Their data suggest that as much as two thirds of the growth in dispersion in house prices can be explained by the increase in high-income households at the national level.

The rise in income and wealth has a self-reinforcing effect through the housing market. Those fortunate enough to have homes in fast-growing cities benefit from both higher incomes there, and higher property prices that increases their wealth. This tendency has morphed into the ongoing debate about income inequality. Thomas Piketty gained fame for drawing attention to the increased concentration of wealth, but has been criticized for neglecting to mention that much of that wealth is concentrated in housing (Piketty, 2014). Rognlie (2015), for example, shows that the share of net income generated by housing has risen in all seven large developed economies (Canada, France, Germany, Japan, Italy, U.K. and U.S.) since data became available. La Cava (2016) further finds that the long-run rise in housing capital income share is "fully concentrated in states that face housing supply constraints." Joseph Stiglitz notes that some greater wealth can be transformed into productive capital: "The most important source of the disparity between the growth of wealth and the growth of productive capital is the growth in the value of land" (Stiglitz, 2016a).

4.3.2 What are the Patterns of Economic and Population Flows in Canada?

Canada as a whole has benefited from strong economic and employment growth over the last two decades, affording Canadians the opportunity to buy a home. Economic growth rates have differed across regions because of differences in the industrial structure. Rapid growth in commodity prices promotes growth in rural Canada and in cities where such resources predominate, such as from the impact of oil in Alberta, Saskatchewan and Newfoundland & Labrador.

4.3.2.1 Average Income and its Distribution

While there is much data available for provinces, there are limited economic data at the CMA level in Canada.[12] Hence, this section draws inferences about what is happening in Canadian cities from disparate data sources and from available academic research in Canada. Notable insights are gained from the papers of Mike Veall and his various coauthors on the distribution of incomes in Canada (e.g., Veall, 2012). Some of these findings include, for example, Murphy and Veall's (2016) research showing that the national surge in top incomes from 1982 to 2010 can be disproportionately attributed to cities, with two cities—Calgary and Toronto—contributing more than half.

Data gap: Detailed economic statistics by CMA (particularly on the industrial and economic output side)

The pattern may have changed for the period under study here. Figure 13 shows this result at work. The figure shows the level of income required to be in the top 1 per cent for cities in Canada, including inside and outside Census Metropolitan Areas (CMAs). Clearly there is a significant level of income in some Canadian cities that enables some to purchase expensive homes.

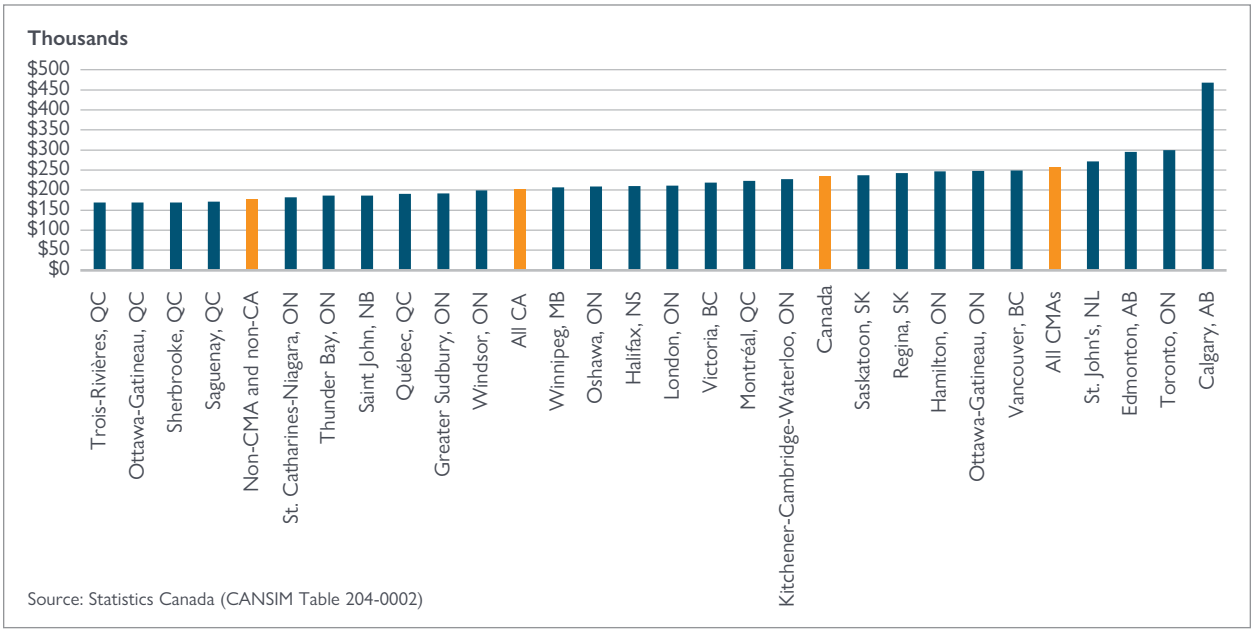
These data suggest that the local economy—notably, the types of industries in the local economy—can have an impact on the distribution of income in a CMA. Fortin and Lemieux (2015) examine Canadian labour data at the provincial level from 1997 and 2013. They found that the faster increase in the level of wages and the decline in wage dispersion in Newfoundland & Labrador, Saskatchewan and Alberta are a major difference between provinces. Moreover, they found that these trends are accounted for by growth in the extractive resources sectors, which benefited less-educated and younger workers the most.

[12] The importance of cities suggests that Statistics Canada's efforts to produce GDP statistics by CMA are to be welcomed (Statistics Canada, 2014).

Given the importance of resource industries in those provinces, we would expect the same pattern to hold for Calgary and Edmonton. In addition, given their statement about income inequality, we would not expect much dispersion in price increases in those cities—all prices for different types of properties are likely to rise in tandem. The flip side of this observation is that those markets are likely to display much tighter links to any cycles in commodity prices.

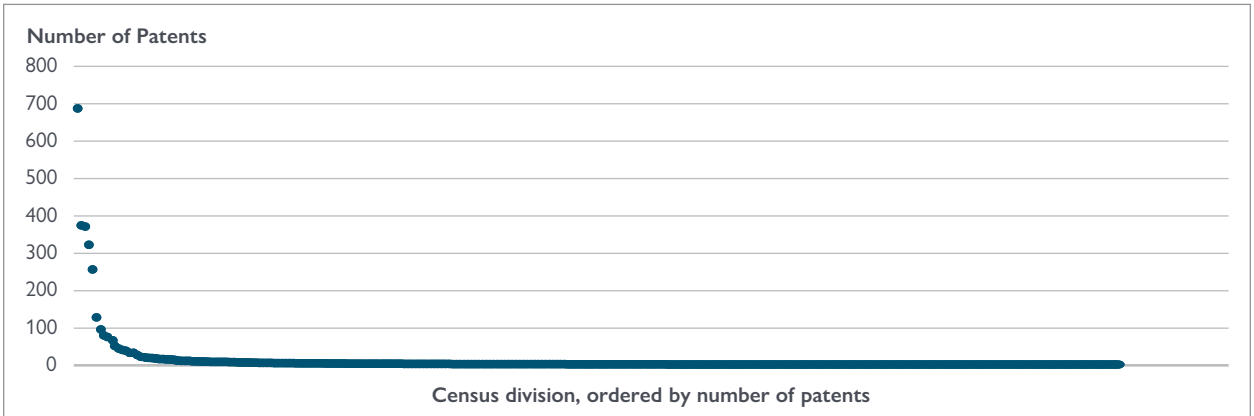
As discussed above, technology changes could also be an important driver of income growth, but the gains from inventing technology may accrue to a small number of people and firms. A source of data on this is the location of where patents are granted. Figure 14 shows the distribution of patents across regions of Canada in 2013. The region with the greatest number of patents generated is Toronto, followed by Vancouver and Montréal. The fact that most regions have close to zero patents indicates how concentrated innovative activity is, a pattern reflected in other countries as well (CCA, 2013). And again, this pattern is likely to reflect where higher earnings for the skilled workers and firms that produce patents are located.

Figure 13: Thresholds of top 1 per cent total incomes by geography (2014)



Source: Statistics Canada (CANSIM Table 204-0002)

Figure 14: Number of patents per census division, 2013



Source: OECD

Turning to other data, Labour Force Survey data on employment can also provide insight on what is happening in Canadian cities. Employment in manufacturing increased by 14 per cent in Vancouver since the beginning of 2010, compared to a 17-per-cent increase in overall employment in Vancouver. Employment in information, culture and recreation increased by 30 per cent. Employment increases in manufacturing are rare given heightened competition with low-cost sources of manufactured goods in Asia. Therefore, a rise in manufacturing employment suggests that the goods being produced are high-end products in perhaps communication equipment or pharmaceuticals.

Labour Force Survey data also show that employment in finance, insurance, real estate, rental and leasing increased by 20 per cent in Toronto since early 2010, compared to the total increase in employment of 10 per cent. The results above suggest that if particularly high-paying industries are located in a CMA then there is likely to be a high level of income in that CMA as well, creating the capacity in that CMA to buy bigger and better homes. Another factor at work is what is happening within those industries.

Looking at the wage profile of industries gives some indication of underlying economic trends at work, but disentangling what is going on is more challenging. Rising wages over time suggest a need for more skills to work in that industry. Within industries, jobs for those with fewer skills became less prevalent. In the financial services industry, for example, there were proportionately more jobs that would be classified as occupations requiring high skill levels than ten years previously (see survey in ab Iorwerth, 2016).[13]

There have been differing patterns of wage growth across the Canadian population, and these differences in trends will affect Canadian cities differently depending on the prevalence of certain occupations and industries in those cities. Morissette *et al.* (2013) look at these trends in detail for Canada up to 2011. This paper also finds that pay rates grew substantially in the resource sector. There were also substantial increases in the financial services industry, which were associated with upskilling in that industry as well. Murphy and Veall (2016) found that the top 5 per cent of all wage earners working in the Finance & Insurance industry in Calgary earned over 40 per cent of the wages in that industry.

These patterns of income growth in cities have been captured in a range of analysis conducted by Statistics Canada, although their data predate some of the recent technology changes. Beckstead *et al.* (2010) explore urban-rural wage differences. Earnings in large metropolitan areas in 2000 were 25-per-cent higher than rural counterparts (and recall the difference between CMAs and non-CMAs in Figure 13). Up to a half of the difference between urban and rural earnings is explained by a greater number of skilled workers being in cities than in rural areas. They also find strong evidence of higher productivity among skilled workers if they co-locate in cities (i.e., of agglomeration effects).

Brown and Scott (2012) look at the location choices of people moving jobs in Canada. Degree-holders are more likely to move to locations that are specialized in their industry, and they are willing to move longer distances. They find this "consistent with specialized workers seeking out thicker labor markets." Brown and Newbold (2012) found that in-migrants to Toronto received an immediate jump in earnings, exceeding what they would have obtained had they stayed where they were or moved to another city.

Although imprecise, and sometimes somewhat dated, all these analyses point to substantial gains from moving to larger Canadian cities, and that these gains are increasing over time. This leads to incentives for population movements.

[13] Aled ab Iorwerth, 2016, "Financial Services Intermediation, and its Role in Economic Growth and Stability", *mimeo*, Department of Finance Canada.

4.3.2.2 Population Flows

Demographic fundamentals suggest steady population growth, fuelled by natural increases as well as international arrivals. Canada's population profile indicates annual growth averaging nearly 1.1 per cent between 2010 and 2016, in line with the 20-year national average of 1 per cent.

Figure 15 shows average population growth rates across CMAs in Canada, and for Canada as a whole since 2001 as well as since 2010. Cities that experienced booming economies from higher resource prices, and larger cities tended to show large population growth. Of the five cities we concentrate on in this report, only Montréal had population growth below the Canadian average. CMAs that showed strong population growth, both above the Canadian average and at a higher pace since 2010, included some areas surrounding Vancouver and Toronto such as Barrie, Kelowna, Abbotsford-Mission and Kitchener-Cambridge-Waterloo.

This population growth comes from natural changes through births and deaths, in- and out-migration from the rest of Canada, and net immigration from the rest of the world. There has been an ongoing shift in immigration policy over the past fifteen years, aimed at helping to improve outcomes for new immigrants. Immigration has tended to be two to three times greater than the level of natural population growth (births less deaths) in Montréal, Toronto and Vancouver. All three cities have tended to show net out-migration to the rest of the country. By contrast, the composition of population growth in Calgary and Edmonton has been split relatively equally, with in-migration from the rest of Canada occasionally exceeding net immigration inflows and natural growth, particularly for Edmonton.[14]

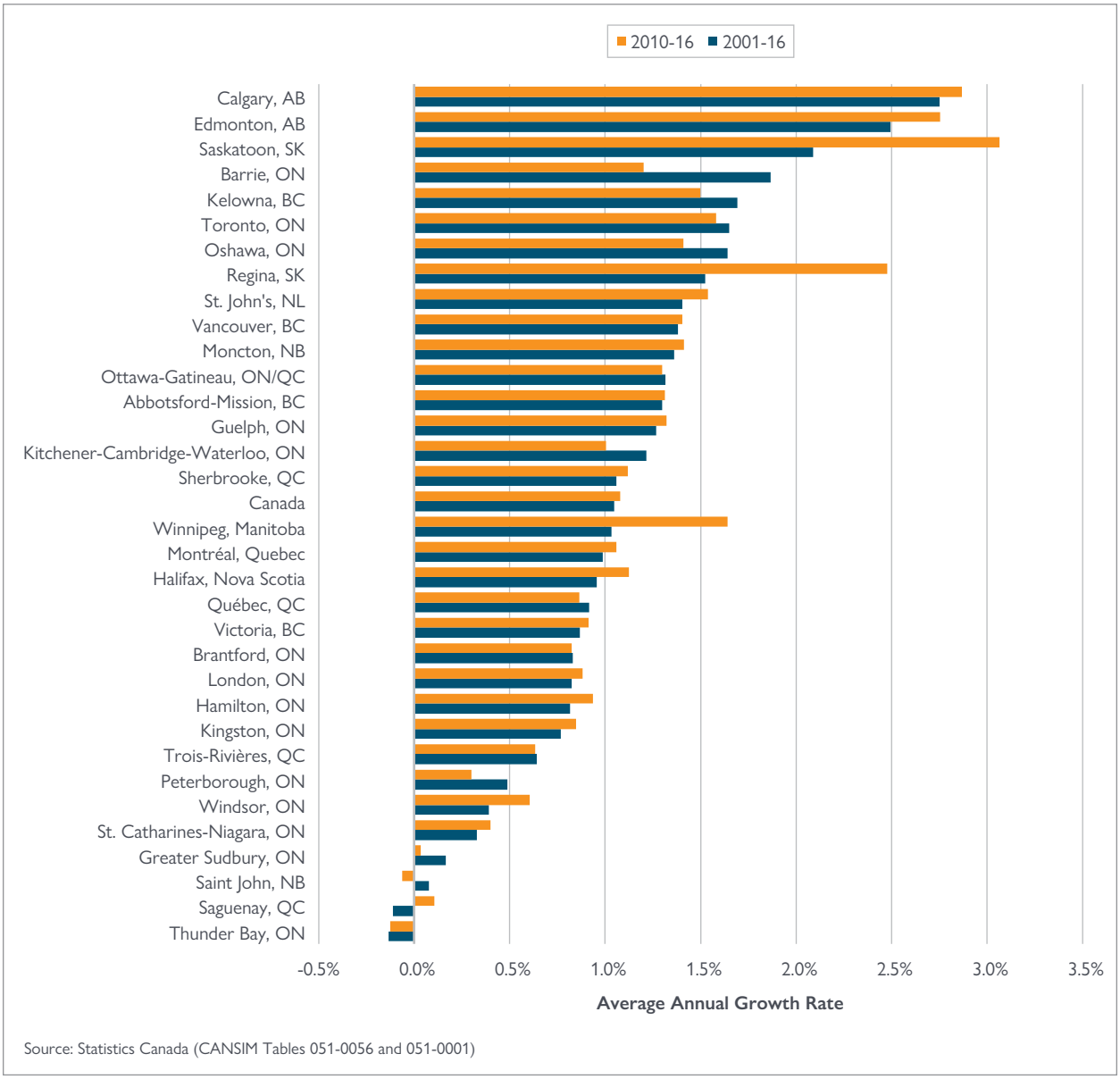
These data again suggest that large cities are pulling people in, as they respond to incentives to move there. But, while coarse data such as these give some indication of potential pressures on housing prices, they must be treated with caution. Immigrants, on average, tend to have lower labour income than native-born Canadians, and thus may not immediately put upward pressure on house prices.[15] Immigrant incomes are lowest on entry and then rise rapidly with the time spent in Canada, especially for economic immigrants. Homeownership rates increase along with incomes, and the overall homeownership rate for immigrants ends up being similar to that of non-immigrants. Geographic differences in the homeownership rates of immigrants further obscure the impact that immigrants may have on house prices. For instance, in the Vancouver CMA, the immigrant homeownership rate is five percentage points higher than the rate for native-born Canadians while in Montréal, it is five percentage points lower.

Another potential impact of immigrants is the wealth that they bring with them, giving them the opportunity to buy homes, and put upward pressure on home prices, but there do not appear to be robust data on this issue, although Statistics Canada is now producing data on non-resident owners of residential properties (Gellatly and Morissette, 2017). It is also important to bear in mind that, although some immigrants may have such wealth, many other immigrants do not: older research by Zhang (2003) found that wealth among recent immigrants in 1999 was lower than for native-born Canadians, but the distribution of wealth of immigrants who arrived between 1976 and 1985 was similar to that of Canadians by birth.

[14] Data in this paragraph draw on CMHC analysis of Statistics Canada (051-0057).

[15] Skuterud and Clarke (2013) review evidence on immigrants' performance in the Canadian labour markets.

Figure 15: Average annual growth in populations, CMAs and Canada



Source: Statistics Canada (CANSIM Tables 051-0056 and 051-0001)

Pavlov and Somerville (2016) finds a price premium in Vancouver neighbourhoods favoured by immigrant investors. There was a significant drop in that price premium following the announcement to cancel the Immigrant Investor Program in 2012. The drop in the price premium persisted while the flow of immigrants through the program faded out. Two years after that, the premium had returned to those neighbourhoods, possibly because many of the would-be immigrant investors would also qualify under programs like the Provincial Nominee Program. The authors did not find evidence that the price premium had spread to other neighbourhoods or market segments, possibly because of the relatively small size of the Immigrant Investor Program (Table 8).

Table 8: Total permanent immigrants, and number of immigrants admitted through the Business Immigration Program

	TOTAL PERMANENT IMMIGRANTS, 2007-2011	BUSINESS IMMIGRATION PROGRAM (BIP), 2007-2011
Canada	1,265,601	12,402
Atlantic	33,280	124
Ontario	546,620	4,527
Manitoba	67,463	37
Saskatchewan	31,811	25
Alberta	135,689	347
British Columbia	203,365	7,317
Territories	1,620	-

Note that Québec has a separate immigration policy. Source: CIC, Evaluation of the Federal Business Immigration Program (2014).

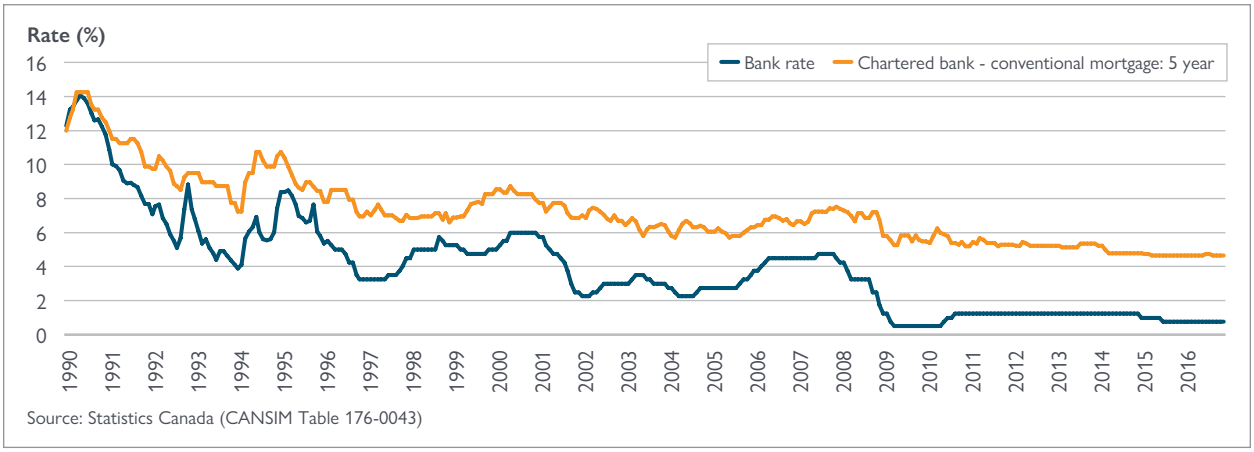
4.4 FINANCIAL FLOWS

This section starts by looking at the conventional determinants of financial flows: interest rates and credit availability. These are the powerful forces influencing housing markets. But another lesson from the last financial crisis is that even small segments of housing markets can push up prices. Piazzesi and Schneider (2009) explain how a small number of optimistic buyers can push up prices, for instance. Consequently, we outline the arguments why investors, both foreign and domestic, in properties could push up housing prices, and how having different beliefs about future house price gains could develop into a bubble.

4.4.1 Interest Rates

Mortgage rates have been trending down over many years (Figure 16). This trend makes it easier for a household to buy a home. With lower interest rates for all Canadians collectively, this would increase total demand for housing and for credit—a trend that happened in most developed economies.

Figure 16: Interest rates and mortgage rates in Canada, 1990-2016



Source: Statistics Canada (CANSIM Table 176-0043)

In making decisions about whether to purchase a home with a mortgage, households must have one eye on the future of interest rates. Over recent years, expectations regarding the trajectory of future interest rates have likely declined, possibly encouraging greater borrowing. There has been much debate over whether low interest rates are a temporary phenomenon, reflecting perhaps the debt overhang from the last recession as households continue to rebuild their balance sheets, or whether there are longer-term structural issues at play. This latter concern has been dubbed 'secular stagnation' by Harvard economist Larry Summers.

The Governor of the Bank of Canada outlined three reasons why interest rates have stayed low in line with the decline in the real neutral rate (Poloz, 2016).[16] Firstly, there may have been a decline in the potential growth rate of the economy, mainly driven by an aging population that lowers growth in the labour force. Secondly, there may be rising global savings rates while investment remains subdued (usually associated with the 'savings glut' hypothesis of the former head of the Federal Reserve, Ben Bernanke (Bernanke, 2005)). And thirdly, a slower pace of technological change may be weakening potential world economic growth (associated with an economist at Northwestern University, Robert Gordon).

While low interest rates make financial assets more attractive, they could also lead to more savings being necessary to obtain a given level of income retirement. This "hunt for yield" could encourage investment in ownership of properties to obtain income, putting upward pressure on home prices, or that low interest rates (at close to zero) may have non-linear effects on asset prices (Hubbard and Mayer, 2009).

4.4.2 Credit Availability

While lower interest rates will encourage purchases of homes and increased credit in the economy, the amount of credit in the economy could also increase because of financial innovation (Wachter, 2015). Financial institutions would want to increase credit to households if they found it more profitable, or believed that mortgage lending is more secure than lending to firms.

Interest rates are also only one element limiting people's ability to borrow; there are other conditions that financial institutions attach to receiving those loans (Stiglitz, 2016b). Over the last decade, it transpired that in the U.S. those conditions had become too lax, and excessive borrowing pushed up property prices. Favilukis *et al.* (2016) took a look at the lessons of the U.S. housing crisis prior to the last recession. They found that relaxation of credit constraints accounted for nearly two-thirds of the increase in the price-to-rent ratio. In the U.S., Favara and Imbs (2015) found similar results.

For the U.S., Mian and Sufi (2009) find that house price growth had been greater in areas where more individuals had been shut out previously from credit markets. Financial liberalization had eased their credit constraints. Chambers *et al.* (2009) found that the most important factor (56 to 70 per cent) explaining homeownership rates in the U.S. from 1994 to 2005 was the introduction of new mortgage products; demographics only accounted for 16 to 31 per cent of the change.

The latest research argues, however, that there was an across-the-board increase in debt (Adelino *et al.*, 2016). Mortgage originations increased for borrowers across all income and creditworthiness levels. In turn, borrowers defaulting on bigger mortgages were responsible for a greater dollar amount in defaults. These results suggest that debt among all income groups should be of concern to governments, and not just among those with low income.

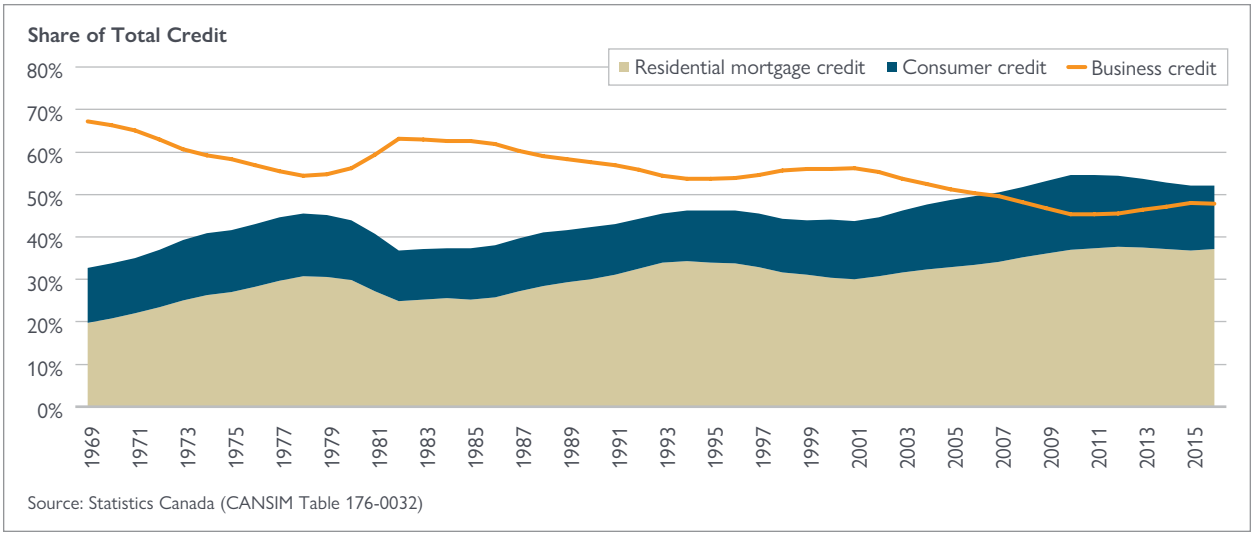
[16] Technical discussion for the U.S. in Hamilton *et al.* (2016).

To the extent that financial institutions do not fully bear the burden of debt defaults, there may be incentives for banks to lend excessively to households. As noted by Beck *et al.* (2012), there is a global trend for banks to rely on lending to households for a greater part of their lending. Data show that this trend holds in Canada as well, with lending to households now more important for Canadian banks than lending to firms (Figure 17). Residential mortgages rose from 20 per cent of total credit in 1969 to 37 per cent in 2015 while other forms of household credit have remained relatively unchanged.

While patterns in Canada are different from those in the U.S. in that the lending system is more tightly regulated and homeowners have greater amounts of equity in their homes, concern remains over the role of credit because of its historical role in aggravating crises. Jordá *et al.* (2015), for example, analyze the role of interest rates and credit in driving house price booms and busts. Using data spanning 140 years of modern economic history in the advanced economies, they showed that loose monetary conditions lead to booms in real estate lending and house price bubbles.

Setting interest rates too low will tend to increase overall asset prices, and encourage households to purchase those assets. In turn, Wachter and Herring (2003) explored relationships between real estate bubbles and banking crises.

Figure 17: Share of total credit, by type of credit



Source: Statistics Canada (CANSIM Table 176-0032)

4.4.3 Income Inequality (financial effects)

In reviewing the impacts of the last recession, Piazzesi and Schneider (2016) suggest that one of the key insights from the new post-crisis macroeconomic literature on housing is that heterogeneity of households matters. Models with heterogeneous households and frictions introduce powerful new amplification and propagation mechanisms. In particular, they provide more scope for effects of shocks to the financial sector, which have become important in accounts of post-war U.S. history, to propagate throughout the economy.

Because of this effect, the role of credit in different segments of the population—rather than its overall level—becomes important. Landvoigt *et al.* (2015) find, for example, that cheaper credit at the low end of the market was a major driver of home prices in San Diego. Krueger *et al.* (2016) find that wealth inequality can significantly amplify the impact of an aggregate shock if a sufficiently large fraction of households have little net wealth. Although there is limited historical data in Canada on wealth inequality, monitoring the evolving patterns of wealth may yield insights into the housing market, and to any risks that are in it.

4.4.4 Investment in buy-to-rent housing

Lower interest rates, the prospect of capital gains from rising property prices, and income from renting out properties can make owning real estate attractive to investors. In the short term, such investments could put upward pressure on home prices, particularly if there is no supply response. Quantifying this impact is challenging because data on foreign and domestic investment activity is sparse. New research on the scale of domestic investment in the buy-to-rent market is discussed in Chapter 8.

Haughwout *et al.* (2011) explore this issue in the U.S., although they face data challenges there as well. They classify investors into three types: those who buy properties in order to rent; those who buy properties as a vacation or future retirement home; and those who buy properties to flip the house, hoping for capital gain. After mining debt data, they estimate that the investor proportion increased from 20 per cent of the market in 2000, to a peak of nearly 35 per cent in 2006 in the U.S. They also found that investors were more prominent in the markets that experienced the greatest "bubble" conditions. The authors conclude that the large influx of investors is likely to have amplified the upward pressure on house prices during the boom.

As the savings for such investment can come from anywhere, the housing market in Canada cannot be examined in isolation from global changes, including the international flows of capital (see Chapter 1.) Lower global interest rates and large pools of savings could increase direct investment by foreigners in Canadian property. Inflows of foreign capital are not restricted to the housing market, however. There has been an upsurge of foreign investment in Canadian debt, which would push Canadian interest rates down, and encourage Canadians to invest in higher-risk equity and housing investments as well. But Favilukis *et al.* (2013) argue that "changes in international capital flows played, at most, a small role driving house price movements in this episode [prior to 2008] and that, instead, the key causal factor was a financial market liberalization and its subsequent reversal that took place in many countries largely independently of international capital flows." There has, however, been a significant upswing in foreign investment overall in Canada since 2010, so it is certainly possible that some of those funds have entered the housing market.

At this stage, we have not undertaken comprehensive research to evaluate the impact of foreign investment on housing prices, mainly because these data were not available. New data from Statistics Canada became available shortly before the publication of this report at the end of 2017, and we look forward to analyzing these data in 2018. The absence of such data prior to a policy change, however, makes it difficult statistically to evaluate the impact of the change in policy.

The new data from Statistics Canada, reported in Gellatly and Morissette (2017), show that non-residents owned 3.4 per cent of all residential properties in Toronto, and 4.9 per cent in Vancouver. The non-resident ownership share was more prevalent for condominium apartments (at 7 to 8 per cent) than for single-detached housing (at 2 to 3 per cent). Although we do not have historical data to correlate changes in foreign ownership with increases in housing prices, the prevalence of the stock of non-resident investment in condominium apartments makes it difficult to state that foreign investment is a major causal factor in driving prices higher, given that the prices of condominium apartments declined relative to single-detached homes.

With the introduction of taxes on foreign investment in housing by both British Columbia and Ontario, additional data have become available on the flow of foreign investment.

After Ontario introduced its non-residential speculation tax, individuals who are not citizens or permanent residents of Canada, or foreign corporations, accounted for 3.2 per cent of home purchases across the Greater Golden Horseshoe Region between May 27 and August 18 of 2017, down from 4.7 per cent in the month to May 26 (Ontario, 2017b). For Toronto, the comparable proportions had dropped from 7.2 per cent to 5.6 per cent.

It is difficult to evaluate the impact of foreign investment based on these numbers. At first blush, the shares of both the stock and the flow appear to be low. Nevertheless, they represent incremental demand to purchases by Canadians, and will therefore have played a role in pushing prices higher. As discussed in the previous section, short-term bursts of concentrated buying could be sufficient to spark broader price increases. As discussed below, it is also possible that the potential role of foreign investment has fed into expectations of domestic homebuyers regarding future demand. In this regard, the introduction of policies to curtail foreign investment may have played an important role in curtailing excessive optimism.

4.4.5 Differences in Price Expectations

In making their decisions to invest in homes (as discussed in Chapter 2), a critical factor that would encourage households to make a purchase is optimistic expectations about the path of future home prices. Hopes of future gains effectively lower the cost of purchasing a house today. While differences in opinions about valid prices are omnipresent in market economies, it appears that expectations about home prices can be subject to fads, and bouts of extreme optimism or pessimism. Shiller (2007) went as far as suggesting that other factors beyond psychology were irrelevant in explaining house price increases over the last decade in the U.S., and Granziera and Kozicki (2012) examined the development of bubbles in the U.S. when expectations of future prices are not fully rational.

That such an important decision can reflect more psychological forces means that house prices in the overall market can also become subject to collective mania. The risk then is compounded when irrational expectations by one segment of the population spills over onto others. Shiller (2007) has defined bubbles as: "a feedback mechanism operating through public observations of price increases and public expectations of future price increases. The feedback can also be described as a social epidemic, where certain public conceptions and ideas lead to emotional speculative interest in the markets, and therefore to price increases; these, then, serve to reproduce those public conceptions and ideas in more people." As these different viewpoints play out, and if a significant part of the population moves to having exuberant expectations, then cycles in housing prices become extended (Burnside *et al.*, 2016).

Much of the focus in explaining rising prices in the Vancouver market, for example, is the influence of foreign investors. Despite the absence of any concrete evidence, Angus Reid (2015) reports that 64 per cent of those living in Vancouver believed that "foreigners investing in the real estate market" is one of the "main causes of high housing prices in Vancouver". It is possible that the narrative around foreign investment in Vancouver with an endless flow of funds has created a compelling story encouraging residents to enter the market. The actual size of foreign investment in Vancouver would therefore not matter if the narrative were compelling enough to alter households' beliefs, and therefore encourage exuberant expectations of future prices.

The role of expectations can be important in housing markets, as they can reverse quickly. Head and Lloyd-Ellis (2016) show explicitly how a shift in expectations magnifies the effect of a given reduction in interest rates for 11 Canadian metro areas. The effects, relative to cases in which interest rates are expected to revert to their mean relatively quickly, are substantial.

It is hard to measure speculation in the housing market, but a survey developed in the U.S. by Karl Case and Robert Shiller has proved to be an interesting reference point (e.g., Case and Shiller, 2003). To this effect, CMHC developed a similar survey in Canada, and its results are explored in Chapter 9.

4.4.6 Consumption Wealth Effects

It has been argued that since housing is such an important part of household wealth, changes in the perceived value of their home would change household consumption patterns, and also encourage some households to use gains from appreciating house prices to invest further in housing.

There is debate about this effect. Buiter (2010) and Carney (2011) share the view that a rise in house prices today means that the cost of housing increases tomorrow as well; hence, there should be no impact on consumption since households realize that the cost of housing has gone up as well. By contrast, Calomiris *et al.* (2013) suggest this argument is not as valid, however, when looking at those who have limited capacity to borrow—they may be housing rich but cash-flow poor—and those who can cash out of the housing market. In this case, rising home prices enables people to borrow more, or makes them richer when they cash out. Abdallah and Lastrapes (2013) find that spending in those U.S. states with greater opportunity for home-equity borrowing is more responsive to housing demand shocks. These wealth effects are particularly pronounced at peaks and troughs in housing cycles, exacerbating cycles.

There is limited capacity to link data on home prices, wealth and consumption patterns in Canada. Instead, CMHC has undertaken preliminary analysis of debt patterns in Vancouver and Toronto. In particular, we parse the data according to whether consumers have a mortgage or not. A first limitation of the data is that we do not know if those who do not have a mortgage own a house or not: they may have paid the mortgage off. The data do suggest, however, that growth in non-mortgage credit has been greater for those without a mortgage than for those with a mortgage. If the majority of homeowners have a mortgage, then this finding would suggest that they are not increasing non-housing credit significantly in response to home price gains in order to boost consumption. In fact, there is some evidence that non-mortgage debt is being reduced in response to higher prices.

Other analysis by CMHC of Equifax data looks at the share of consumers with more than one mortgage. It is possible that another mortgage has been taken out to increase consumption, but also to invest in other property. Since 2014, the share of consumers with more than one mortgage has risen from 4.5 per cent to 4.9 per cent in Vancouver, and from 3.3 per cent to 3.7 per cent in Toronto. The proportion for Toronto is lower than the Canadian average.

4.5 CONCLUSIONS, AND LIMITS TO DEMAND-SIDE EXPLANATIONS

Many of the arguments in this chapter could play a role in accounting for house price increases, and are explored further in Chapter 5, but they have been questioned (Shiller (2007) and Mayer (2007) debated the importance of psychological factors, for example).

Another counter-argument is developed in Glaeser *et al.* (2013), which found that lower interest rates can only explain one-fifth of the rise in U.S. house prices from 1996 to 2006. The core of their argument is that prices are more likely to rise when the supply response is limited, and consequently cities with more restricted land supply may be more prone to bubbles. The usual way that bubbles deflate is when supply of the factor thought to be in short supply actually materializes, but if supply is thought to be restricted, then people may be more willing to believe that prices can only go up. Glaeser *et al.* (2008) show that price run-ups in U.S. cities during the 1980s were more prevalent in cities with smaller supply responses. Park and Xiao (2010) look at the impact of restrictive land supply leading to a bubble in Seoul, Republic of Korea.

These arguments motivate us to look at the supply side of housing in Chapter 7.

5 Results From CMHC Model Estimation

CHAPTER OBJECTIVES:

- Outline the approach taken in the identification of key contributors to long-term trends in house prices.
- Report on the contribution of those key factors to both long-term price trends as well as changes in house prices since 2010.

KEY FINDINGS:

- Macroeconomic variables—including population trends, interest rates and disposable incomes—play an important role in accounting for the steady rise in house prices witnessed in Canada's major centres. Nevertheless, there remains a gap between predicted and actual prices.
- In an extension of the Workhorse model, we examine one additional factor that could account for this gap—the role of higher income and wealth inequality across major metropolitan centres in Canada. We find that changes in these factors play an important role in explaining accelerating house price growth in urban locations.
- We also examine the role of greater credit supply for national home prices. We find that growth in credit increases house prices, but not vice versa.
- The Canadian housing market is marked by significant regional contrasts. For this reason, we analyze local variations underpinning each CMA in order to fully understand market dynamics.

5.1 INTRODUCTION

This Chapter elaborates on long-run house price trends across major centres in Canada. The Workhorse model specification explores the historical relationship between house prices and fundamental factors—including income, the young-adult population, and mortgage rates. After carefully specifying the model and performing model-selection procedures, we conclude that fundamentals do play a sizable role in accounting for the long-term upward movement in house prices.

Additional factors reflecting local conditions may also be required in order to provide a complete picture. We evaluate one such factor—the impact of income and wealth inequality—and, while we cannot always precisely identify its magnitude, we find that it largely explains growth in home prices.

As house prices tend to fluctuate around an upward trend, studying house prices in Canada requires a dynamic perspective using macroeconomic tools. In this chapter, the approach we take first identifies the key factors behind long-run trends in house prices, and we follow with the determinants of short-run fluctuations in the next chapter.

5.2 CORE DATA AND RESULTS

Prior to explaining our methodology, we outline the data underlying fundamental factors and highlight the key results output from our modelling. Table 9 shows the core data used for the macroeconomic modelling, the pattern of price increases we are trying to explain, and the price changes predicted by the model over the period from 2010 to 2016.

As is standard in the literature, we approximate the impact of first-time homebuyers—who represent incremental demand to the market—by the 25- to 34-year-old population. Because of the increase in home prices, however, it is possible that first-time homebuyers in Toronto and Vancouver may be better represented by an older demographic. We will examine this issue further in future research.

A look at economic fundamentals suggests that housing activity in Edmonton was linked to the strongest drivers among the five CMAs. Despite the negative impacts of the recent shock in oil prices, market activity in the CMA was boosted by a solid 29.7-per-cent increase in the size of the young-adult population and 15.2 per cent in disposable income. This was followed by Calgary with growth of 21.4 per cent in the young-adult population and 15.5 per cent in disposable income. Gains in Vancouver were more moderate, with still healthy growth of 9 per cent in the young-adult population and 11.5 per cent in disposable income. Results in Toronto were mixed, with a drop of 1 per cent in disposable income, but decent growth of 11.6 per cent in the young-adult population. Montréal continued to strengthen, but at a slower pace, posting gains of 4 per cent in the young-population and 4.6 per cent in disposable income.

While the fall in nominal mortgage rates was uniform across Canada, we use mortgage rates adjusted for local differences in consumer price inflation, so that our model would capture such variations in mortgage rates across these cities. This pattern of change in economic fundamentals provides clearer indication of prices predicted by the model.

Table 9 offers a foretaste of our modelling results. Price changes predicted by the model are reported in the bottom row of the table, with actual changes in house prices over the 2010-16 period reported in the penultimate row. After adjusting for inflation, actual house prices increased by 48 per cent in Vancouver, by 41 per cent in Toronto, and 11 per cent in Montréal, while remaining nearly flat in Calgary and Edmonton. Figure 18 illustrates the long-term trends in home prices across Canada's major census metropolitan areas.

Model results show that house price growth in the five CMAs (Vancouver, Toronto, Montréal, Calgary, and Edmonton) was largely explained by fundamentals, but significant regional differences played out against this backdrop. Over two thirds of price growth in Vancouver was explained by fundamentals, while only one third was explained by these factors in Toronto. Meanwhile, the Workhorse Model overpredicts price growth in Montréal, Calgary, and Edmonton. A different modelling approach was pursued by Head and Lloyd-Ellis (2016), but they also reached very similar conclusions.

While price increases in Vancouver have been largely supported by economic fundamentals, a more puzzling result points to the state of the Toronto market, where fundamentals have not been as strong. In interpreting the results for Calgary and Edmonton, it is important to bear in mind that the model was estimated using data prior to 2010. Therefore, the recent volatility in oil prices was not captured in the data. This issue is discussed further in Section 5.5.

It is important to note that the model is being placed under the heavy burden of forecasting prices six years into the future. In this sense, the relative accuracy obtained for price predictions underscores the conclusion that the empirical specification is robust.

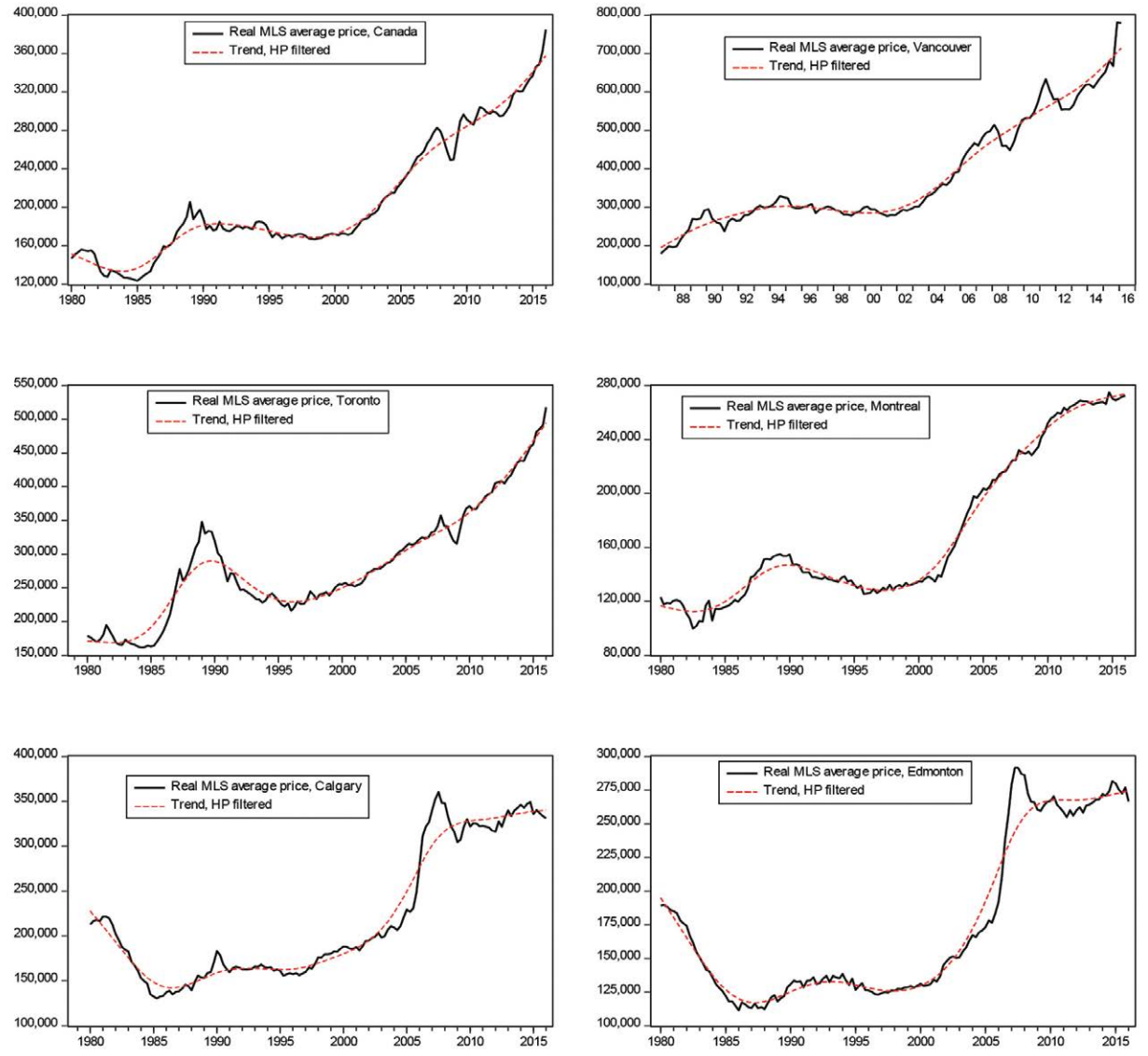
Table 9: Changes from 2010 to 2016 in house prices, fundamental factors, and predicted prices
(All variables, except population, are deflated by CPI at CMA level.)

VARIABLE	VANCOUVER	TORONTO	MONTRÉAL	CALGARY	EDMONTON
Disposable income	11.5%	-1%	4.6%	15.5%	15.2%
Population 25-34	9%	11.6%	4%	21.4%	29.7%
Mortgage rate	-229 BP	-161 BP	-120 BP	-224 BP	-195 BP
MLS® average price	48%	41%	11%	0.4%	0.11%
Predicted price	36%	16%	19%	7%	22%

Note: BP stands for basis points.

Sources: Statistics Canada, CREA, Institut de la Statistique du Québec, Québec Federation of Real Estate Boards, Conference Board of Canada, CMHC calculations.

Figure 18: House Prices and Long-Term Trends



Sources: CMHC calculations based on Canadian Real Estate Association, Québec Federation of Real Estate Boards.
Notes: Hodrick-Prescott Filter applied to obtain trends.

5.3 CMHC MODELLING

To account for price increases over the 2010-16 period, we first evaluate model selection. This section describes our approach to determine the appropriate model—which, in turn, resulted in the adoption of the 'Workhorse model' as our baseline specification.

Factor identification follows a modified out-of-sample forecasting approach of Wheaton and Nechayev (2008).[17] First, we estimate the Workhorse model using historical data prior to 2010. Second, we forecast house prices over the 2010-16 period. Finally, we assess the extent to which movements in the price of resale homes are explained by fundamentals over the period. This last step is based on the Shapley value decomposition (Shorrocks, 2013), which attributes the change in the variable of interest to each underlying factor. Hence, the method suggests the following multi-step approach:

1. Adopt a particular modelling structure (several can be evaluated);
2. Regress house prices on fundamentals and evaluate statistical properties using data through to 2010;
3. Evaluate the economic significance of these factors;
4. Forecast the equation over the 2010-16 period to assess the collective role of these variables in accounting for price growth, as well as recover forecasting errors; and
5. Regress forecasting errors on idiosyncratic factors.

In this section we concentrate on the first four steps (the fifth is discussed in greater detail in Chapter 6). In summary, this sequence of steps suggests that model specification is formed on the basis of economic theories, statistical properties are determined on a range of tests, and economic significance is based on the Shapley Value decomposition. Even if a factor shows statistical significance, it will be discarded if Shapley Value decomposition show its contribution to explaining house prices is negligible. This rigorous model specification process aims at minimizing the presence of potential biases.

5.3.1 Step 1: Modelling Structure

We are interested in explaining CMA-specific house prices on an inflation-adjusted basis. In the model, key independent variables include real personal disposable income per capita, the young-adult population aged 25-34 years old, and real five-year fixed mortgage rates. More formally, our Workhorse model is specified as:

$$PRICE_t = c + \beta_1 INCOM_t + \beta_2 YPOP_t + \beta_3 MORTGAGE_t + \sum_{i=-k}^{k} \gamma_{1,i}\, \Delta INCOME_{t-i} + \sum_{i=-k}^{k} \gamma_{2,i}\, \Delta YPOP_{t-i} \sum_{i=-k}^{k} \gamma_{3,i}\, \Delta MORTGAGE_{t-i} \quad + \varepsilon_t$$

where

$PRICE_t$: natural logarithm of real house prices;

$INCOM_t$: natural logarithm of real personal disposable income per person;

$YPOP_t$: natural logarithm of the young-adult population aged 25-34 years old;

$MORTGAGE_t$: real five-year fixed mortgage rate;

$\sum_{i=-k}^{k} \Delta$: control vector of leads and lags; and

ε_t: error term.

[17] An alternative approach would have been the user-cost model of Hubbard and Mayer (2009), but this approach is a bottom-up approach and requires much more data. See also Himmelberg, Mayer and Sinai (2005), and Brown *et al.*(2011) for Australia.

5.3.2 Step 2: Estimation and Statistical Properties

We estimated demand over the period from 1988 to 2009 following Stock and Watson(1993)'s autoregressive distributed lag (ARDL) model of cointegrated variables, which adds lags and leads of independent variables as control variables. The specification is statistically sound if variables are integrated of order one and cointegrated; otherwise, there is likely to be a spurious relationship (Granger and Newbold, 1974).

Over the period, model results indicate that real house prices, real disposable income per capita, and CMA-adjusted mortgage rates are integrated of order one, while the young-adult population is integrated of order two, at the margin. Generally, population is integrated of order one, but this statistical property also tends to be sensitive to sample sizes. As the analysis below suggests, incorporating growth rates for the young-adult population would seem statistically appealing at first glance; however, its explanatory power is practically negligible. Therefore, our model incorporates young-adult population levels, instead of growth rates, thereby reflecting greater economic significance, rather than unstable statistical properties.

Detection of cointegrating relationships was performed using Engle-Granger tests (Engle and Granger, 1987) as well as Johansen tests (Johansen, 2000). The interpretation of Johansen tests is conducted sequentially. More specifically, the existence of a cointegration equation first requires the rejection of the null hypothesis of cointegration, and subsequently the non-rejection of the null hypothesis that there is at most one cointegration equation.

Results presented in Table 10 reveal that house prices are cointegrated with real disposable income, young-adult population, and mortgage rates, thereby supporting the conclusion that the specification is statistically reliable. Note that despite variations in trend and lag intervals, cointegration test results generally hold. It is also important to note that, we abstract from non-linear cointegration as in Park and Phillips (2001), largely owing to the lack of evidence of non-linear relations between variables.

Table 10: Johansen Test of Cointegration

HYPOTHESIZED NO. OF COINT. EQ.	VANCOUVER	TORONTO	MONTRÉAL	CALGARY	EDMONTON
Number of coint. eq. at the 5% level	1*	1*	1*	1*	1*
None	47.47	63.63	62.96	61.83	61.17
Critical value 5%	47.86	47.86	47.86	47.86	47.86
At most 1	18.44	25.45	21.25	19.95	16.30
Critical value 5%	29.80	29.80	29.80	29.80	29.80
Lags interval	3	3	3	3	3
Linear deterministic trend	Yes	Yes	Yes	Yes	Yes

* Trace test indicates 1 cointegration equation at the 5% level.

Because the model is not stationary, statistical references based on standard OLS methodologies will be biased (Hamilton, 1994). For this reason, we estimate the baseline specification using dynamic ordinary least squares (DOLS) (Stock and Watson,1993), as it corrects the model by making it variance-stationary. The results from the estimation are reported in Table 11.

Table 11: Regression Results from the Workhorse Model
(Dependant variable is the log of real house price, Dynamic OLS with 2 leads and 2 lags, 1988Q1-2009Q4)

INDEP. VARIABLE	VANCOUVER	TORONTO	MONTRÉAL	CALGARY	EDMONTON
Income	1.42*** (2.51)	1.33*** (2.82)	3.00*** (9.57)	1.32* (1.77)	2.24*** (3.31)
Population 25-34	1.98*** (3.45)	2.72*** (3.63)	2.14*** (5.50)	1.77*** (3.22)	2.42*** (5.48)
Mortgage rate	-0.04* (1.49)	-0.02 (-1.42)	-0.02 (-1.21)	-0.02 (-1.16)	-0.10*** (-5.75)
Constant	-26.51*** (2.53)	-37.79*** (-5.85)	-46.05*** (-6.39)	-22.64*** (-3.99)	-39.19*** (-4.98)
R-squared	0.91	0.88	0.95	0.96	0.94
S.E. of regression	0.07	0.06	0.06	0.06	0.08

Note: t-statistics are reported inside of parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Interpretation is straightforward with double-log models. A look at how fundamentals affect house prices in Vancouver suggests that an increase of 1 per cent in income raises house prices by 1.42 per cent; an increase of 1 per cent in young-adult population increases house prices by 1.98 per cent; and a decrease of 1 per cent in mortgage rate raises house prices by 4 per cent. The magnitudes of these coefficients tend to be similar across the other major CMAs, but generally, an increase of 1 per cent in income would increase house prices by 3 per cent in Montréal, while a decrease of 1 per cent in mortgage rates would increase house prices in Edmonton by 10 per cent.

5.3.3 Step 3: Accounting For Price Changes

The importance of variables included in the model is evaluated using the Shapley decomposition method (Shorrocks, 2013).[18] While the decomposition confirms the importance of key variables in explaining the model, the method also pointed to weakness when the specification incorporated young-adult population in terms of growth rates. This result allowed us to modify the model so that it captured young-adult population levels, rather than growth rates, thus improving its explanatory power overall.

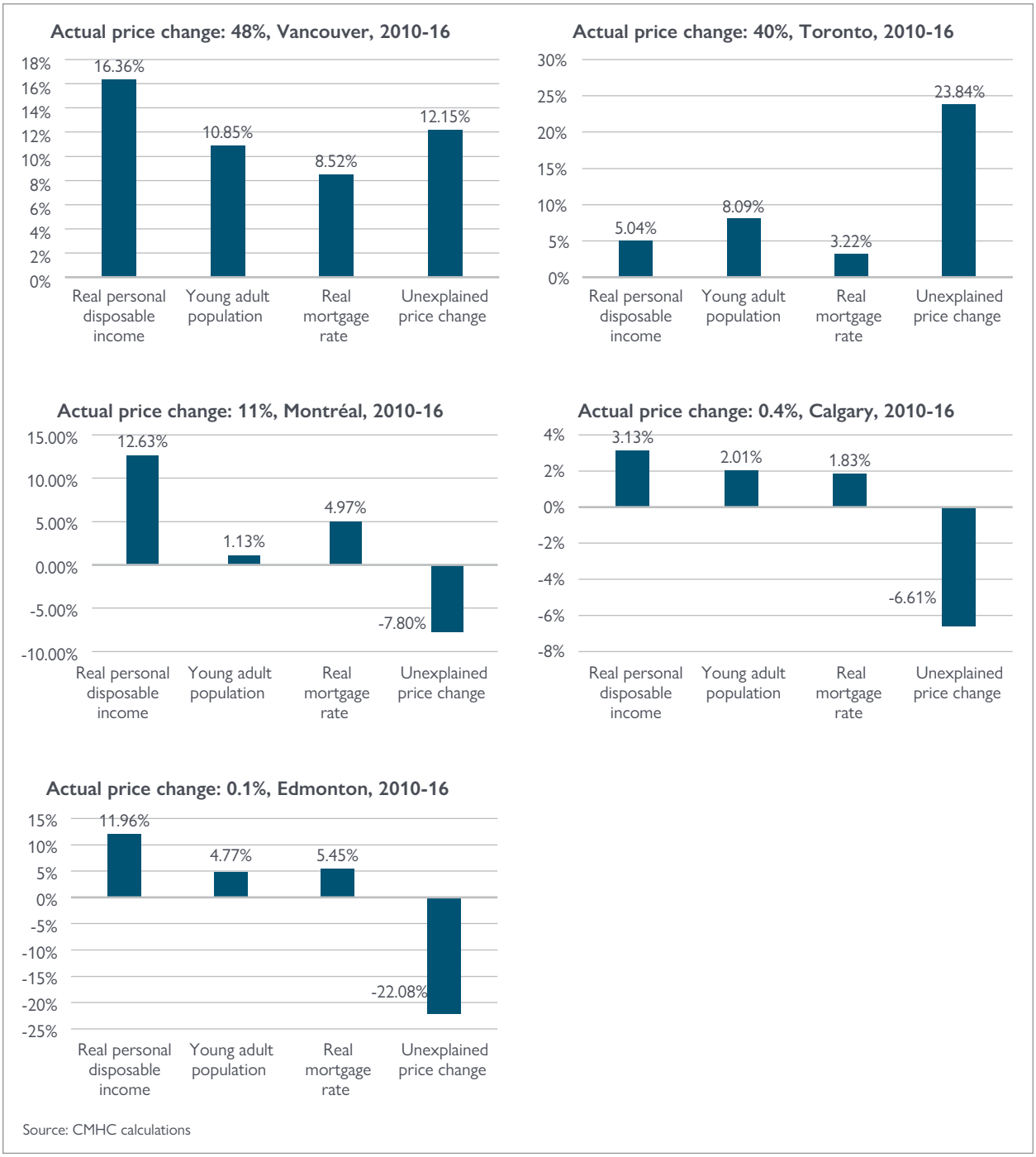
A closer look at the numbers reveals the extent to which movements in the price of homes can be explained by individual fundamental factors. (See Figure 19.) In Vancouver, for example, home prices rose by 48 per cent over the 2010-16 period. Of this increase, 16 per cent was attributed to the rise in real disposable income, 11 per cent to higher levels of the young-adult population, 9 per cent to lower mortgage rates, and the remaining 12 per cent to unobserved factors.[19]

[18] Shapley value is a decomposition method that is theoretically sound. In game theory, the Shapley value is a way to fairly distribute the total gains of a game to players by considering all possible coalitions between players. It is applied to identify how much a particular regressor contributes to the overall explanation of variation in a model. Calculating the Shapley value for a model of pregressors requires the computation of 2^p models.

[19] The contribution is computed by the combination of Shapely value decomposition and the comparison between the actual price changes and the price changes predicted by the model. Thus, if the model underpredicts price increases, the unexplained part is positive, while negative if the model overpredicts price increases.

Results also highlight the importance of accounting for local contrasts when performing price growth attribution analyses (Section 4.4.) In particular, the base case Workhorse model underpredicts price increases in Toronto and Vancouver, while overpredicting gains in Calgary, Edmonton and Montréal. Later on in this chapter and in the next, we turn our attention to competing hypotheses that support the factors explaining heterogeneity, considering local contrasts in income distributions as well as opportunities to increase the supply of housing. It is important to note, however, that these hypotheses are not necessarily mutually exclusive.

Figure 19: Accounting for price changes by CMA, 2010-2016



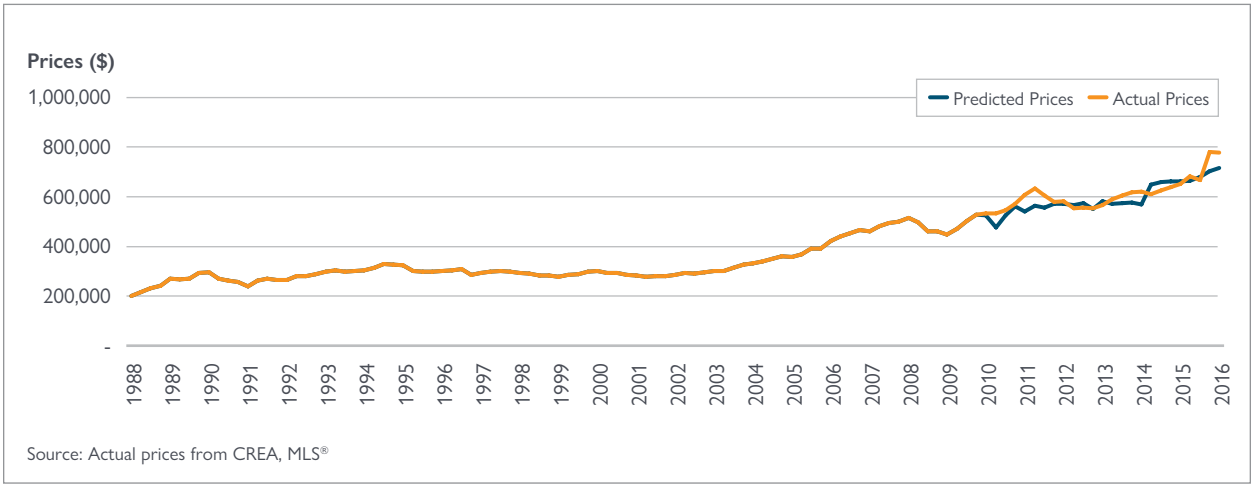
Source: CMHC calculations

5.3.4 Step 4: In-Sample Forecasting

Once the model becomes well-specified, the main question that arises is to what extent model fundamentals explain house prices over the 2010-16 period. To answer this question, the estimated relations between house prices and fundamental factors are subsequently used to predict house prices over the period. Noteworthy is that no structural breaks have been detected among model variables over the period.

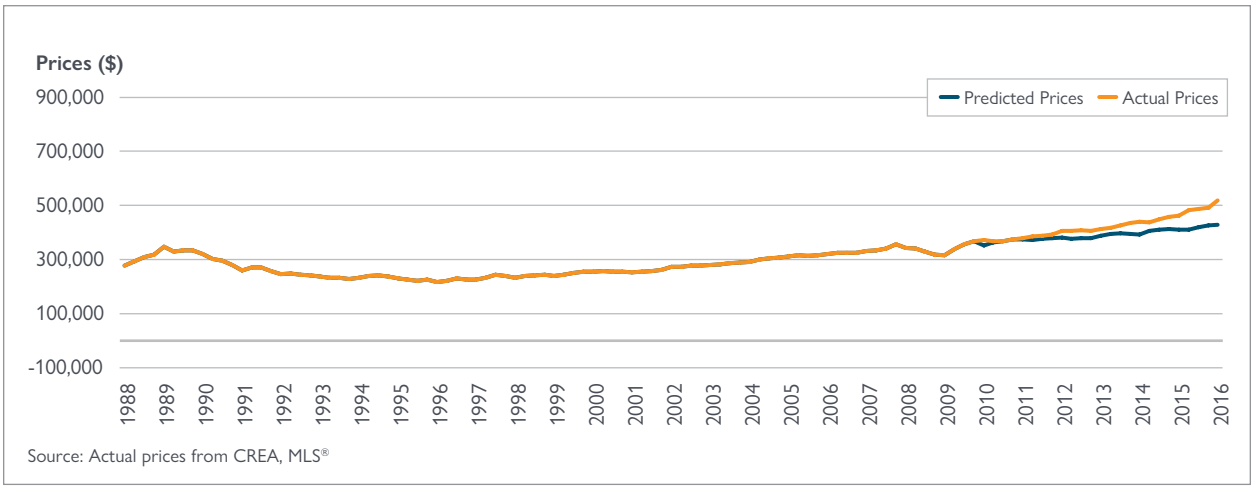
This analysis is illustrated in Figure 20 and Figure 19. (Recall that actual and predicted changes over the 2010-16 period were previously displayed in Table 9.) Once again, the model was first estimated using data from Q1 1988 to Q4 2009. Next, we generated a forecast based on the estimates from the previous stage through to Q1 2016, using actual data on interest rates, the young-adult population and disposable income. Forecasting errors represent the gap between actual house prices and predicted prices.

Figure 20: Actual average price for Vancouver, 1988 to 2016; predicted price from 2010 to 2016



Source: Actual prices from CREA, MLS®

Figure 21: Actual average price for Toronto, 1988 to 2016; predicted price from 2010 to 2016



Source: Actual prices from CREA, MLS®

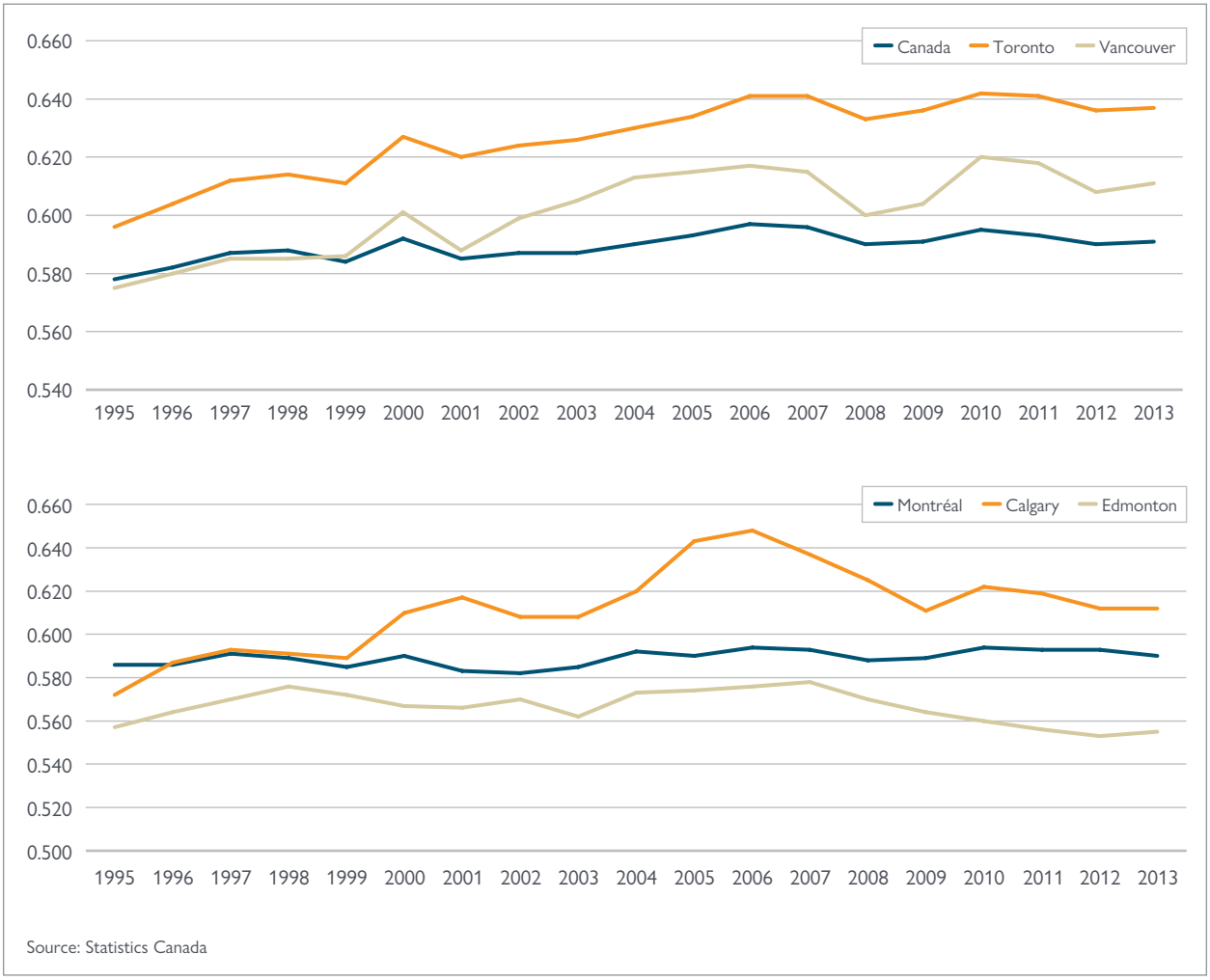
Overall, signs suggest that fundamentals largely explain movements in house prices across Canada's major cities. The model accounts for nearly a third of the price increase seen in Toronto and over two thirds of the growth experienced in Vancouver. (As mentioned previously, economic fundamentals were weaker in Toronto.) Meanwhile, the model overestimates house price predictions in Montréal by 8 per cent. And in line with the strong fundamentals seen in Calgary and Edmonton, predicted house price growth is higher than actual house price growth in these cities.

Generally, overprediction suggests that additional developments emerging locally, and that are affecting the market today, were not foreseen in 2010 (e.g. the expansion of the financial services industry in Toronto, and oil-price shocks in resource-based Calgary and Edmonton).

5.4 EXTENSION 1: EXAMINING THE LINKS BETWEEN HOUSE PRICES AND INCOME AND WEALTH INEQUALITY

As explored previously in Chapter 3, income and wealth inequality could play an important role in explaining accelerating house price growth in urban locations associated with more favourable living conditions. With a growing number of higher-income families, more households are willing and able to afford the premium charged for larger homes that are conveniently located. Therefore, house prices in these cities tend to rise faster, especially when land supply is subject to geographic and regulatory constraints.

Figure 22: Gini coefficient, income including capital gains



Source: Statistics Canada

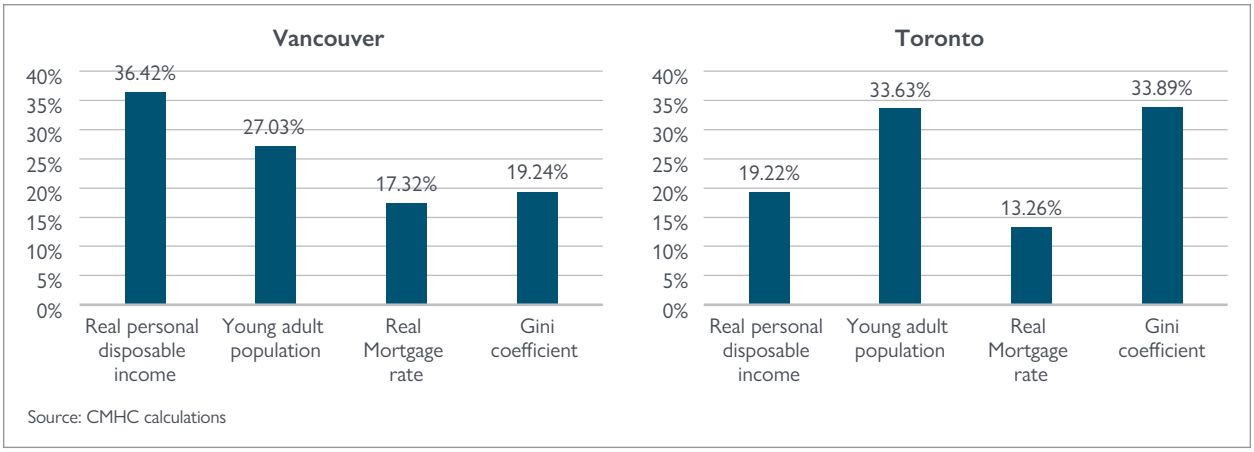
Statistics Canada has provided CMA-level data on the Gini coefficient for the 1995 to 2013 period. Since the latest data were available only through to the end of 2013, our model does not incorporate any recent movements in this measure.

The Gini coefficient is a standard measure of inequality that reflects income trends reported in tax filings. In order to explore potential growth in wealth inequality, our analyses probed returns originating from capital income. It is important to note that capital income is a broad-based indicator representing income from realized capital gains—such as the sale of real-estate properties or the closing a position in stocks and other asset classes—rather than unrealized capital gains. Moreover, as there is no tax on capital gains from the sale of primary residences, this measure does not include capital gains from selling homes.

Figure 22 suggests that income inequality in Toronto and Vancouver has been on the rise since 1995. Income inequality remained nearly flat in Montréal. In Calgary and Edmonton inequality has trended down steadily since 2006. Similar patterns have also been observed when capital gains were excluded from this measure.

Once validated as an economically significant metric through Shapley decompositions, these inequality metrics are incorporated as part of the forecast reflecting the period from 2010 onward.[20] Figure 23 confirms that income inequality has been an important factor in accounting for house price increases in Canada's largest centres over the 1995 to 2013 period.

Figure 23: Shapley value decomposition for demand model with income inequality



Source: CMHC calculations

From 2010 to 2013, average home prices in Toronto advanced by 17.5 per cent (the latest data we have for the Gini coefficient is to 2013). Meanwhile, the Workhorse model suggests a 12 per-cent jump in prices over the same period, and if we include the Gini coefficient, price levels are forecast to increase by 16.4 per cent. The results for Vancouver suggest a correlation between the rise in income and the rise in income inequality. Because of this multicollinearity property observed between income and income inequality, inclusion of the Gini coefficient leads to overpredicted price growth, underscoring the importance of incorporating distributional aspects into the model. In addition, changes in income inequality do not contribute to house price gains in Calgary, Edmonton, and Montréal. Income inequality has eased in Calgary and Edmonton since 2007, while in Montréal it has remained relatively flat since 1995.

[20] Results of Shapley value decomposition for Montréal, Calgary, and Edmonton are available upon request.

5.5 EXTENSION 2: EXAMINING THE IMPLICATIONS OF CREDIT EXPANSION

Studying the impact of credit supply may be hindered by endogeneity originating from potential reverse causality—credit supply changes tend to affect house price changes, while at the same time, house price changes tend to affect credit supply. Solving simultaneous-equation bias has been a long-standing challenge in economics, and this section takes multiple approaches to address this issue. In order to study the relationship between mortgage credit levels and house prices, we concentrate our analyses on estimation results from fitting a structural vector autoregressive model (SVAR).[21] We first look at a "naïve" OLS approach, and we subsequently adopt a vector error correction model (VECM) to account for common trends.

Results indicate that both the impact and interaction of residential mortgage credit levels on house prices are quantitatively important. A one-standard-deviation shock to residential credit supply generates an increase of 4 to 7 basis points in the growth rate of house prices. Alternatively, a one-unit shock to residential credit supply is associated with an increase in the range of 1 to 2 units in the growth rate of house prices. We also find that impacts are persistent and generally last through more than six quarters.

5.5.1 Initial Approach

We estimate models in the presence and absence of error correction terms. Results indicate that growth in mortgage credit affects growth in prices. (Table 12.) Although Granger causality tests do not reject exogeneity (results not shown), concerns over endogeneity are still not allayed. For example, the sign of the coefficient estimate for the growth of young-adult population is negative, while we would expect the effect of young-adult population to run in the opposite direction.

Table 12: House prices and residential mortgage credit
(Dependent variable is growth rate of real house prices of Canada, 1999-2016, Dynamic OLS with 1 lag)

INDEP. VARIABLE	MODEL WITHOUT ERROR CORRECTION	MODEL WITH ERROR CORRECTION
ΔResidential credit	0.79 (4.63)	1.95 (4.26)
ΔIncome	0.15 (1.33)	0.30 (2.31)
ΔPopulation 25-34	-0.48 (-0.41)	-4.57 (-2.72)
Error correction term		-0.34 (-3.14)
Constant	-0.004 (-1.37)	0.02 (2.68)
R-squared	0.19	0.43
S.E. of regression	0.01	0.01

Source: CMHC calculations

[21] To overcome this "simultaneous equation bias", Favara and Imbs (2015) exploit natural experiments from the different implementation of the deregulation process in the U.S., and construct a control group and treatment group. The effects of credit supply on house prices are simply the treatment effect. The lack of a similar deregulation process in Canada limits the application of the same study.

5.5.2 Structural VAR

In order to account for simultaneous-equation bias, we fit a structural VAR specification to the data. In the following structure, price is dependent on credit, while at the same time, credit is dependent on price. The following three-equation system is characterized by a set of covariates that allows for contemporaneous reverse causality:

$$\Delta PRICE_t = c + \beta_1 \Delta RESCRED_t + \beta_2 \Delta INCOM_t + \beta_3 \Delta YPOP_t + \sum_{i=1}^{k} \gamma_{1,i}\, \Delta RESCRED_{t-i} + \sum_{i=1}^{k} \gamma_{2,i}\, \Delta PRICE_{t-i} + \sum_{i=1}^{k} \gamma_{3,i}\, \Delta INCOM_{t-i} + \varepsilon_t$$

$$\Delta RESCRED_t = c + \alpha_1 \Delta PRICE_t + \alpha_2 \Delta INCOM_t + \alpha_3 \Delta YPOP_t + \sum_{i=1}^{k} \varphi_{1,i}\, \Delta RESCRED_{t-i} + \sum_{i=1}^{k} \varphi_{2,i}\, \Delta PRICE_{t-i} + \sum_{i=1}^{k} \varphi_{3,i}\, \Delta INCOM_{t-i} + \vartheta_t$$

$$\Delta INCOM_t = c + \theta_1 \Delta PRICE_t + \theta_2 \Delta RESCRED_t + \theta_3 \Delta YPOP_t + \sum_{i=1}^{k} \delta_{1,i}\, \Delta RESCRED_{t-i} + \sum_{i=1}^{k} \delta_{2,i}\, \Delta PRICE_{t-i} + \sum_{i=1}^{k} \delta_{3,i}\, \Delta INCOM_{t-i} + \mu_t$$

where

$\Delta PRICE_t$: Real house price growth rates for Canada;

$\Delta RESCRED_t$: Residential credit growth rates for Canada;

$\Delta INCOM_t$: Real personal disposable income per person growth rates for Canada;

$\Delta YPOP_t$: Young-adult population (25-34 years) growth rates;

$\sum_{i=1}^{k} \Delta$: Set of control variables in lags;

ε_t, ϑ_t, and μ_t: Error terms and economic shocks, where ε_t: house price shock; ϑ_t: residential mortgage credit shock; and μ_t: income shock.

In matrix form, we have

$$A_0 X_t = C + A_1 X_{t-1} + \cdots + A_k X_{t-k} + B_1 Z_t + \omega_t$$

where,

A_i: 3X3 matrix, i=0,…,k;

X_t: 3X1 vector characterizing endogenous variables, such as $\Delta PRICE_t$, $\Delta RESCRED_t$, and $\Delta INCOM_t$;

B_1: 3X3 matrix;

Z_t: 3X1 vector controlling for observed heterogeneity; and

ω_t: 3X1 vector of error terms or shocks;

The vector of error terms satisfies the following properties:

- $E(\omega_t) = 0$, every error term has mean zero;
- $E(\omega_t \omega'_t) = \sum$, the contemporaneous covariance matrix of error terms is diagonal, which means the structural shocks are not correlated; and
- $E(\omega_t \omega'_{t-k}) = 0$, there is no serial correlation in individual error terms.

In this system, we have six equations but nine unknowns; accordingly, the identification strategy requires three hypotheses. Since contemporaneous changes in house prices and residential credit supply are not expected to affect income, we impose the following assumption: $\theta_1 = \theta_2 = 0$. In addition, we restrict $\alpha_2 = 0$, as contemporaneous changes in income are assumed to not affect residential credit supply.

Table 13: SVAR results

(Dependent variable is the growth rate of repeat sale house prices in real terms in Canada, 2000-2016, SVAR with 4 lags)

INDEP. VARIABLE	ΔHOUSE PRICE	ΔRESIDENTIAL CREDIT
ΔResidential credit	1.03 (3.27)	
ΔIncome	0.14 (1.38)	
ΔPopulation 25-34	-0.65 (-1.08)	-0.09 (-2.72)
Δhouse price		-0.01 (-0.40)
Log likelihood	679.34	

Source: CMHC calculations

Results from the SVAR model confirm that growth in residential mortgage credit affects house prices significantly; however, growth in house prices do not affect mortgage credit significantly. Taking into account possible simultaneous equation bias, estimates suggest that an increase of 1 per cent in the growth rate of residential mortgage rates raises the growth rate of house prices by 1.03 per cent.

Variance decomposition (Table 14) shows that residential mortgage credit explains between 30 and 40 per cent of the variation in house prices, depending on the lag length from the shock.

Table 14: Variance decomposition of house prices in Canada using SVAR (percentage)

PERIOD	S.E.	HOUSE PRICES	MORTGAGE CREDIT	INCOME
1	0.009	100	0.00	0.00
4	0.014	67.37	31.44	1.19
8	0.014	65.33	33	1.67
16	0.015	60.03	38.43	1.53
20	0.016	57.89	40.62	1.49

Source: CMHC calculations

5.5.3 Robustness Check: Vector Error Correction model (VECM) Approach

The above SVAR structure does not account for the possibility of common trends among variables (unlike in the CMHC HMA model where variables are I(1).) In particular, Johansen tests indicate a cointegration relation at 8 per cent. Consequently, we explore a Vector Error Correction model (VECM) that considers the possibility of such common trends. The VECM approach is essentially an extension of the SVAR method, but with the addition of an error correction term.

Compared with SVAR, accounting for the cointegration relation resulted in the reduction of the contribution of mortgage credit shocks to variations in house prices. The contribution of mortgage credit ranges from 18 per cent to 23 per cent, but remains an important factor.[22]

Table 15: Variance decomposition of house prices in Canada using VECM (percentage)

PERIOD	S.E.	HOUSE PRICES	MORTGAGE CREDIT	INCOME
1	0.009	100	0.00	0.00
4	0.013	80.50	18.02	1.48
8	0.013	77.48	18	4.52
16	0.014	73.65	21.54	4.82
20	0.014	72.65	22.56	4.80

Source: CMHC calculations

5.6 EXTENSION 3: EXAMINING THE IMPORTANCE OF LOCAL CONDITIONS

In the above modelling structure, a very parsimonious approach is taken. Clearly, this approach does not reflect the rich set of factors that explain local variations in house price changes. To this end, additional econometric work was undertaken to highlight how knowledge at the local level can further our understanding of housing market dynamics.

Oil prices, for instance, describe one such factor, and it plays an important role in the local economies of resource-based Calgary and Edmonton. To explore this relationship, we incorporated oil prices into the set of covariates specified in the Workhorse model. Results exhibit some subtleties. Under the forecasting procedure laid out in Section 4.3, results suggest that accounting for oil prices did not improve predictive power. (Recall, however, that model estimation was initially based on data through to 2010—prior to the recent vicissitudes in the oil market.) In contrast, estimating the model with the inclusion of oil prices over the full period (from 1988 to 2016) generates predictions of lower price levels, thereby closing the gap between predicted and actual prices. This suggests the model can be sensitive to new economic developments.

[22] The results are robust using total credit rather than residential mortgage credit.

Another factor that can be added to the regional specification is the terms of trade. The terms of trade (ratio of export prices to import prices) are strongly correlated with the real exchange rate. Regionally, the terms of trade are strongly correlated with house prices in Calgary and Edmonton, but less so in Vancouver, Toronto, and Montréal, especially since 2009.

Including the terms of trade in a regression requires caution for two reasons:

1. The terms of trade are strongly correlated with personal disposable income in Montréal, Calgary, and Edmonton. This fact suggests the possible presence of multicollinearity in the model, which would make the results difficult to interpret;
2. The terms of trade are strongly correlated with the real exchange rate. Hence, the effects of the depreciation of the Canadian dollar on house prices may differ across cities. For instance, the weaker Canadian dollar would make Vancouver, Toronto, and Montréal more attractive housing markets to foreign buyers. However, the lower value of the Canadian dollar was due largely to tumbling world oil prices; hence, the impact of the ratio on oil-producer CMAs, such as Calgary and Edmonton, would be more likely negative.

Including the terms of trade in the regression for Vancouver gives a positive relation, and as such it will underestimate fundamental prices forecast by the model. For Calgary, the terms of trade are strongly correlated with personal disposable income, thereby causing multicollinearity problems.

To explain long-run trends in house prices, we opt for a parsimonious specification that balances the trade-off between overfitting the model and its predictive power. As specified, the key fundamentals in the model—disposable income, young-adult population, and mortgage rates—largely explain the long-run trends seen in the five CMAs. Even though the inclusion of additional variables into the specification can slightly increase the R-squared, it can also undermine the predictive power of the model.

5.7 CONCLUSION

We undertook a macroeconomic approach to examine the drivers behind the steady rise in house prices witnessed in Canada's major centres. Through a rigorous process of empirical specification and model selection, we identify the key economic fundamentals—disposable income, young-adult population, and mortgage rates—explaining long-run trends in these markets.

These factors are largely responsible for the upward movement in the price of resale homes, accounting for over two-thirds of the growth experienced in Vancouver, while over-predicting prices in Montréal, Calgary, and Edmonton. However, the fundamentals support only a third of the price increases in Toronto.

These findings are well supported by actual changes in fundamental factors. Despite the negative impact of tumbling world oil prices, Calgary and Edmonton experienced the strongest increases in the young-adult population as well as disposable income among the five CMAs. This was followed by more modest increases in Vancouver, Toronto, and Montréal.

The Canadian housing market is marked by significant regional contrasts. For this reason, modelling efforts take into account the local variations underpinning each CMA. The plunge in oil prices illustrates one such event in terms of its contribution to the modelling specification of oil-dependent regions.

Nevertheless, in this chapter we focus primarily on long-term trends, opting for a parsimonious specification that balances the trade-off between overfitting the model and its predictive power. (Overfitting may artificially inflate R-squared values while undermining its predicting power.) Other factors—such as income distribution, supply constraints, investment-driven demand, speculation, residential mortgage credit, and CMA characteristics—will be studied in detail in the following chapters.

6 The Supply Side of Housing

CHAPTER OBJECTIVES:

- Analyze separately the roles of construction and land in determining the supply response of new homes to the demand pressures discussed in Chapter 4.
- Discuss restrictions on land supply by geography, policy and landowners.
- Outline policy trade-offs in increasing land available for development, and macroeconomic risk from restricting land supply.

KEY FINDINGS:

- There is no evidence that there are construction cost pressures, in terms of higher labour or material costs, pushing home prices higher. An increased share of the economy is taken by ownership transfer costs (federal and provincial taxes, land development costs, etc.).
- Higher land prices indicate a scarcity of land, which can be curtailed by geography, government policy and decisions of landowners. In combination with economic and population growth, these have likely contributed to higher land prices. Higher land prices would lead to either increased densification of cities and/or higher home prices. Intensification will be more likely if the process of redevelopment and rezoning operates efficiently.
- Differences in the ease of increasing supply across Canadian cities imply that responses to macroeconomic events will differ among them. As the share of land value in the total price of a building rises, interlinkages between home prices and macroeconomic variables will increase, creating the potential for greater volatility where land supply is restricted.

6.1 INTRODUCTION

While the previous two chapters laid out how various forces increase demand for housing, this chapter explores the supply side of housing. In well-functioning markets, rising prices signal that more supply is required.

The supply side of housing reflects not only the physical construction of homes, but also the economics of land that homes are built on. While constructing new homes is akin to a manufacturing process, the value of land captures the value of being close to places of work, transit and good schools, and being far from pollution or noise. In turn, the magnitude of land values and its tradability have made it closer to being a financial asset, and hence more sensitive to macroeconomic variables.

Since the cost of constructing a standardized home has not grown as rapidly as home prices, rising home prices mean that a greater part of the price of a property is made up by the price of land. Change in this asset value can have far-reaching consequences for home prices and the types of homes that are built. As a very rough rule of thumb, land prices form roughly 30 per cent of the value a new building sold, so as the value of land rises, so should the value of the structure built on it. Higher land values give incentives to economize on land, and this leads to higher-value properties being built—either more expensive single-detached homes, or denser multi-storey buildings. As cities expand in size, land may not be available for construction because of physical features such as geography, restrictions imposed by government, or decisions by landowners. Anticipation of such future shortages will drive land prices higher today.

Unfortunately, to date there has been little analysis of data in Canada on many of the factors that would enable us to form a robust view of housing supply in Canada. Therefore, in this chapter and the next we examine this issue from multiple perspectives to try to build an understanding of what is happening. We start by laying out the conceptual framework for understanding the supply side of housing.

6.2 THE CONCEPTUAL FRAMEWORK

This section discusses the economics of building new homes. While market dynamics are important in determining the direction of the housing market, they are first attenuated by unavoidable physical realities.

The obvious physical constraint is that development is curtailed by terrain. Land may be too steep to build upon, for instance. Obviously, the value of underwater land close to the shore where high-priced buildings are concentrated would be highly valuable if it could be built upon! These geographical constraints limit the supply response to price changes, and Saiz (2010) in the U.S. finds that most areas in which housing supply are found to be inelastic (i.e., are less responsive to price changes) are constrained by geography. But, as Davidoff (2016) pointed out, supply constraints in terms of mountains and oceans can also be attractive places to live, and be correlated with greater demand; this again argues for looking at both demand and supply.

Another reality of housing supply is that it takes time to plan and build new homes, and develop land to allow construction. Consequently, there is an inherently slow rate of adjustment to prices in the housing sector relative to other industries. Equally, there are lag times if builders want to demolish old houses to build new ones, particularly if they need to assemble different lots in order to build a larger structure. Hence, changing the stock of housing to match uncertain changes in demand is inherently slow. To the extent that this tends to be more difficult, prices will need to rise even further to encourage turnover in the stock of housing. Increasing the uncertainty faced by homebuilders risks lengthening this process further.

The value of a structure reflects its building costs plus the value of the land it sits on, but the economic issues involved in each need to be considered separately. While housing construction is similar to a manufacturing process, the value of land is more closely associated with the value of conventional financial assets—therefore, different economic forces are at play. Moreover, while the economics of construction are generally similar across the country, the greater importance of land in the overall value of buildings in high-priced markets means that the same economic forces across the country can have different effects across cities.

6.2.1 The Economics of Construction

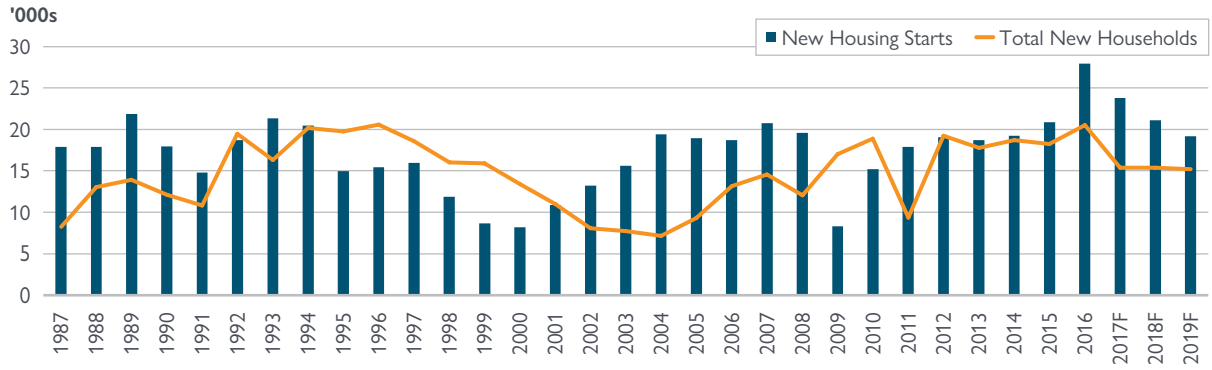
In deciding whether to build new houses, homebuilders make judgments on several factors—including the cost of construction materials and the hiring of skilled workers. These costs weigh against the expected present value of the houses they will build. The choice to build involves significant risk given the time it takes to build new structures, although builders will also pre-sell many to secure their operations. Hence, builders will have to base their decisions on prices they expect to obtain many months, if not years, into the future. These expectations are based on a whole raft of variables including population dynamics, conditions in financial markets, and the evolution of government policies. Figure 24 shows, for example, how housing starts may lead or lag the formation of new households.

As with manufacturing, higher input costs faced by the construction industry would tend to lead to either lower profits or higher prices for new homes.[23] It is therefore possible—in theory—that the recent rise in home prices could be explained by either the construction industry restricting supply of new houses in order to push up prices and profitability, or by the fact that material and labour costs could also be rising. In our following analysis, we find no evidence to support these hypotheses.[24]

[23] Performance could also be boosted by improving productivity, but this is difficult. Analysis of data in Statistics Canada (383-0029) shows that labour productivity in the construction industry increased by 5 per cent between 1997 and 2015 while it increased by 25 per cent in the overall business sector. McKinsey recently reported that the productivity of the worldwide construction industry had lagged that of other industries for decades (McKinsey, 2017).

[24] U.S. research has shown that differences in construction activity are not as important as regulation, geography etc., in explaining differences in housing construction costs across cities (Gyourko and Saiz, 2006).

Figure 24: Total new households and new housing starts, 1987 to 2020, Vancouver



Source: CMHC
Notes: Data for 2016-forward reflect high scenario forecasts of new households. New households include migrant flows. This data does not reflect demolitions and conversions.

These hypotheses can be explored using data from Statistics Canada. While the data reflect the construction industry province-wide rather than at particular cities of interest, they are still informative given the relatively easy movement of workers and capital — both within the sector and the province. The data paint a broad picture of an industry that has not expanded supply significantly, but that at the same time does not appear to have been under substantial pressure to do so because of the following key findings:

- The increase in the number of workers employed in the construction industry has been relatively modest in provinces where house price growth has been strong; (Panel A, Figure 25.)
- Compared to other provinces, wages in British Columbia and Ontario have not increased much more rapidly in the construction industry relative to other industries; (Panel B, Figure 25.)
- There has been no large-scale differential rise in construction costs for apartments across Canadian cities, as shown in Figure 26.[25] While higher growth in costs in Calgary and Edmonton pushed up prices with the resource boom until 2008, the rise in construction costs in Vancouver and Toronto since 2010 has not been out of line with that of other cities (recall that these do not include the cost of land);
- Data comparing the costs of building apartments with apartment prices suggest that the latter have risen relatively more rapidly (Figure 27); and
- Statistics Canada data show that the ratio of operating profit to operating revenues in Canada's overall construction industry (i.e., residential and non-residential construction) has remained relatively constant over the past decade, at around 6 per cent.[26]

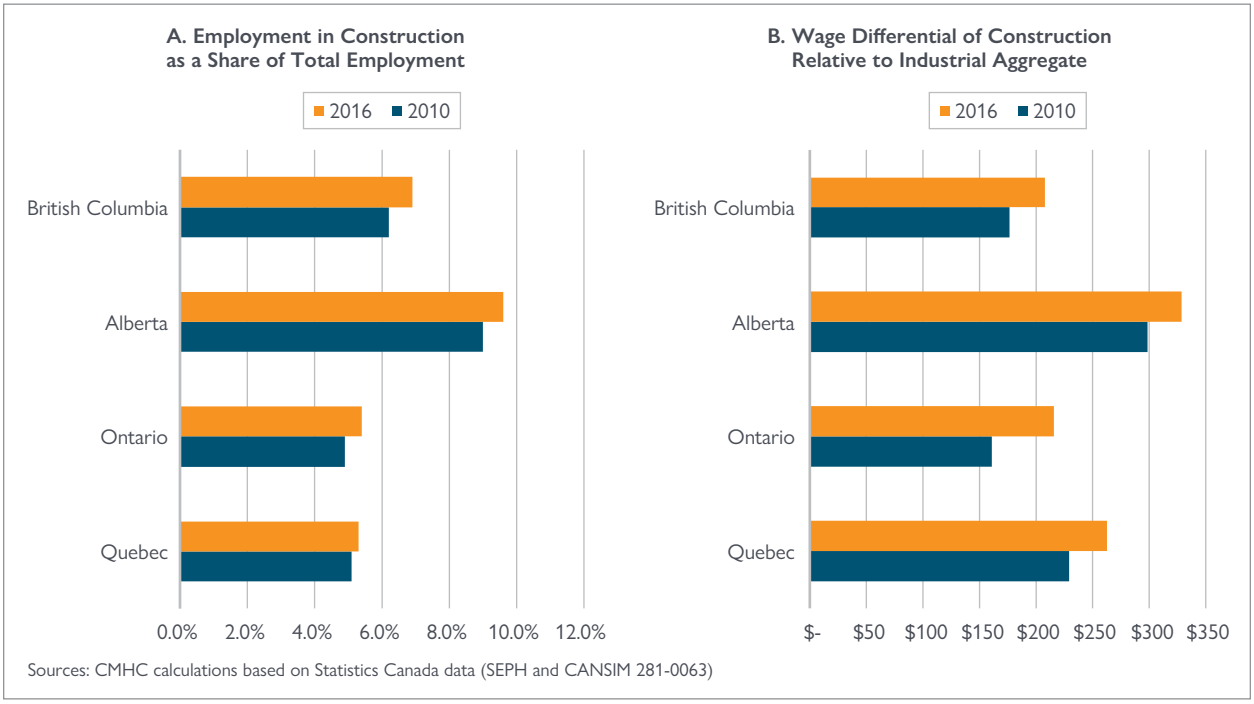
In provinces experiencing rapid growth in home prices, the lack of significant increases in construction sector employment or wages suggests a limited supply response. In an industry that seems to have limited barriers to entry, the construction industry could have expanded employment significantly to meet incremental demand through increasing supply, given the opportunities afforded by higher home prices. If such an expansion had been held back by a shortage of skilled labour, then wages would likely have risen — however, this outcome did not seem to happen.

[25] Construction costs here include costs of materials, labour and equipment, provincial sales taxes where applicable, and contractors' overhead and profit. The costs of land, land assembly, design and development, as well as real estate fees, are excluded. Value added taxes such as the federal goods and services tax and the harmonized sales tax are excluded (Statistics Canada: http://www.statcan.gc.ca/daily-quotidien/161108/dq161108b-eng.htm).

[26] Analysis based on Statistics Canada (187-0001)

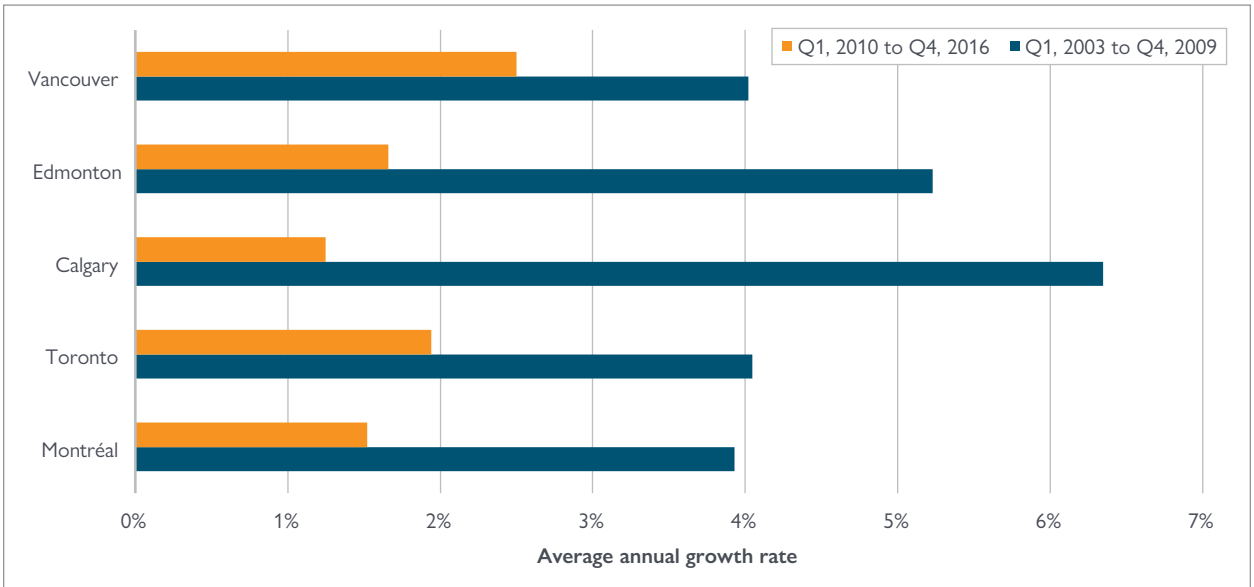
Another possibility—given a shift in the composition of demand—is that construction companies that build single-detached homes would not have the required skills to start building apartment high-rises. Over time, however, these skills could be acquired, thereby implying that such limitation is more likely to be a temporary phenomenon. Moreover, the evidence on the rate of high-rise construction presented in Chapter 2 suggests that there has been a ready supply of such buildings.

Figure 25: Employment patterns in construction, by province



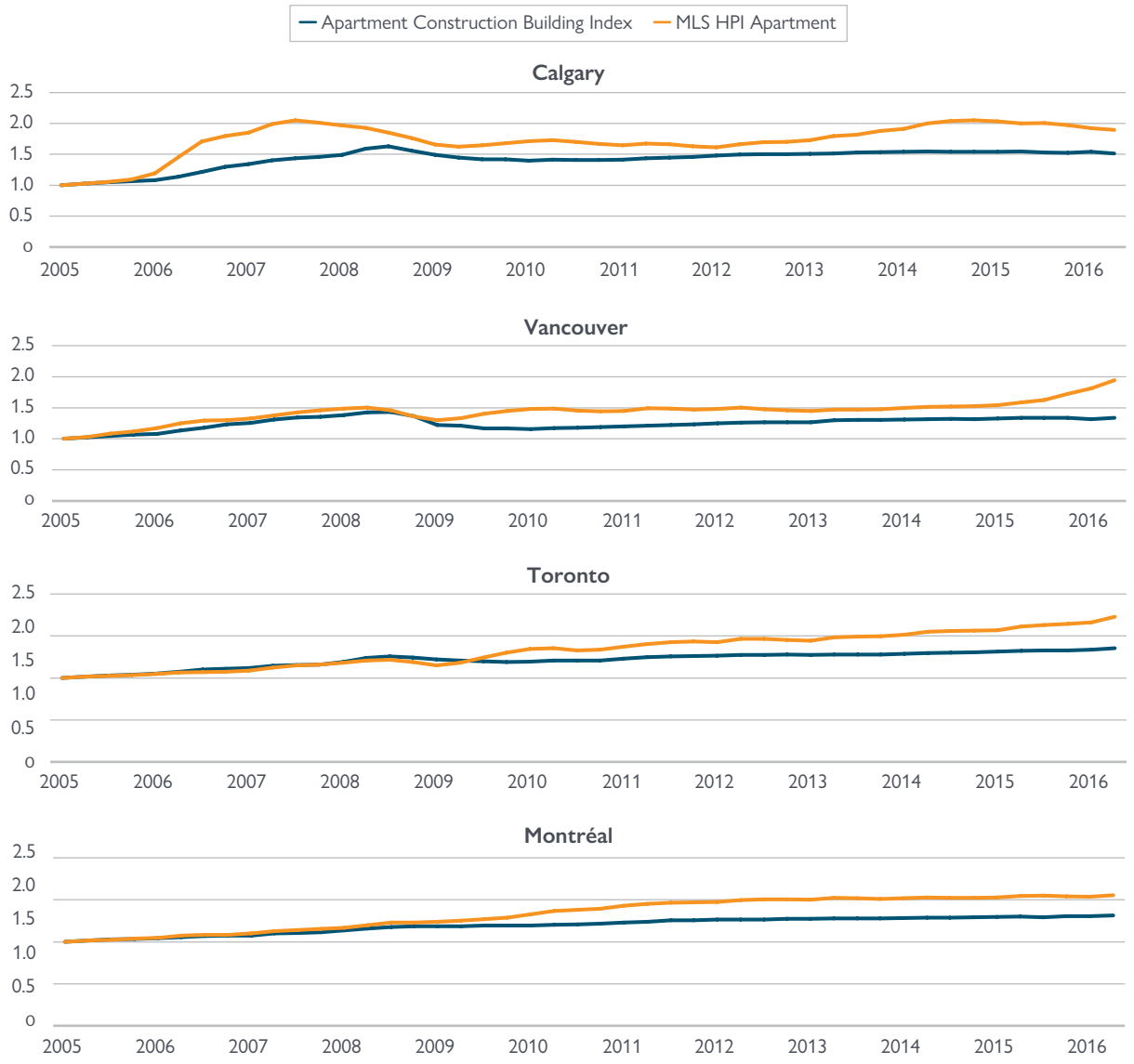
Sources: CMHC calculations based on Statistics Canada data (SEPH and CANSIM 281-0063)

Figure 26: Increases in Apartment Building Construction Costs



Source: CMHC calculations based on Statistics Canada data (CANSIM Table 327-0044)

Figure 27: Apartment Construction Costs and Prices for Select Cities, 2005Q1=100



Sources: Statistics Canada (CANSIM Table 327-0044) and MLS® HPI apartment index

Notes: There is no HPI index for Edmonton. The Apartment Building Construction Price Index measures changes in contractors' selling prices of a representative apartment building. The index relates to both general and trade contractors' work and excludes the cost of land, land assembly, design, development and real estate fees.

6.2.2 Regulations and construction

Urban growth is becoming an increasing feature of economies as many leading industries co-locate in leading cities, as described in Chapter 3. Cities attract more workers from rural areas and immigrants from overseas. In turn, rising incomes lead to greater demand for more and better housing.

But there are policy challenges from this growth as well. While market forces will lead builders to meet rising housing demand, policy makers are confronted with a range of other challenges. As discussed in greater detail in Chapter 12, these challenges include increased congestion, the need to fund and build more infrastructure, whether transit, water supply or new schools, a larger environmental footprint from pollution and greenhouse gases, and concerns over the

increase in home prices.[27] To address these challenges, regulations are imposed by city planners themselves, but they also implement priorities set by other levels of government. These are discussed in greater detail in Chapter 12, but we give some brief highlights here.

Despite the importance of efficient policy design, as advocated by the OECD (Andrews *et al.* 2011), local governments have been limited in the set of policy instruments they deploy, notably to limiting the supply of land. Hence, for example, addressing climate-change implications of cities is highly complex, and many cities around the world have adopted urban growth boundaries (UGBs), but road tolls and carbon taxes are likely to be more efficient policies (Brueckner, 2007; Anas, 2013). Similarly, researchers have argued that development charges could be structured more appropriately to meet planning objectives (summarized in Baumeister, 2012). In turn, regulations on land supply can have significant negative effects.

In other countries, researchers have found links between tighter regulations and higher home prices. For the U.S., some of the leading research papers include Glaeser *et al.* (2005), Glaeser *et al.* (2006), and Mayer and Somerville (2000). Because of the complexity of regulation (Glaeser and Ward, 2009), researchers in the U.S. have surveyed municipalities to try to get a keener understanding of regulatory structures, and summarized results in the Wharton Residential Land Use Regulatory Index (Gyourko *et al.*, 2008). Undertaking this effort in Canada would help understand the challenges faced by planners.

For England, Hilber and Vermeulen (2016) looked at the same issues. In relation to England's affordability challenge, their findings point to "the English planning system as an important causal factor behind the crisis". Moreover, they find: regulatory constraints have a substantive positive impact on the house price-earnings elasticity, the effect of constraints due to scarcity of developable land is largely confined to highly urbanized area, uneven topography has a quantitatively less meaningful impact, and the effects of supply constraints are greater during boom than bust periods.

Home prices have risen significantly in Auckland, New Zealand, and New Zealand's Productivity Commission found that a "major contributor to this price growth has been insufficient supply of land that is ready for housing … Land now makes up 50 per cent of the total value of property in many high-growth New Zealand cities and around 60 per cent of Auckland property" (NZPC, 2015). The Productivity Commission said the following elements caused this shortfall of land: costly rules and restrictions, insufficiently responsive infrastructure provision, a sluggish planning system, and incentives to oppose the growth of cities. Research at the central bank concluded that "Supply conditions – which are influenced by a range of regulatory and geographic factors – are a key determinant of housing market outcomes. Low housing supply responsiveness can result in volatile house price inflation and increases in house prices that appear to be semi-permanent" (Watson, 2013).

Quantifying regulations is hard. Some U.S. academics have resorted to using Google searches for "zoning rules" as a measure of their intensity, with the argument being that more intense regulations will lead to more searches for this term (Gyourko and Saiz, 2006). Another option is a deep dive on regulations in a particular city, but it took the researchers two years to detail the regulatory structure in Boston (Glaeser *et al.*, 2006). Researchers have developed the Wharton Residential Land Use Regulatory Index. This captures the result of a survey of U.S. municipalities on the characteristics of the regulatory process (Gyourko *et al.*, 2008).

Unfortunately, there is no direct analogue to the Wharton Index mentioned above. We found two major studies on measuring land-use regulations across cities in Canada. Realpac (2012)'s survey covers several Canadian cities. It collected information from municipal staff on land development application fees and processing times, infrastructure charges, parkland dedication, and density bonusing and density transfers. The lack of aggregation and uniform measures hampered our use of this survey.

[27] Combes *et al.* (2016) evaluate these costs, where they determine cost to be the share of housing and transport in household expenditure. They find that a 10 per cent increase in the population of a small city generates a cost to the residents of 0.4 per cent while a similar increase in the population of a city the size of Paris would increase costs by 1 per cent. They argue that these costs are quite small, and the costs would be smaller if housing supply were allowed to increase (this would lower the cost of housing).

The Survey of Land-Use Regulation by the Fraser Institute covered 48 municipalities (Green *et al.*, 2016). It collected information from homebuilders and developers (i.e., not from municipalities) on five sub-indices to capture the main dimensions of the land-use regulation: approval timelines: time from filing to the date when construction is allowed; Cost and fees: regulatory compliance costs and fees per dwelling unit built; Council and community: the effect of local council and community groups on residential development; Timeline uncertainty: the effect of uncertainty in approval timelines on residential development; and Rezoning prevalence: the percentage of residential development projects that require rezoning approval. We make use of these data in the next chapter.

Analysis of the index shows that Toronto is the most regulated city. This was followed by Vancouver, Edmonton, Calgary and Montréal. The index also indicated that approval times are longest in Toronto. On the other hand, approval times are shortest in Montréal. Compliance costs and fees are highest in Toronto. Meanwhile, Montréal has the lowest costs and fees.[28] In terms of the percentage of projects that requires rezoning, the share is highest in Vancouver. In comparison, the share is lowest in Montréal. Calgary has the highest time uncertainty and Edmonton the lowest.

We use these data in our statistical tests of factors associated with higher home prices in the next chapter. We stress that we use these data as experimental indicators, as the number of firms in the Fraser Institute's survey is small, and these do not represent any data from the municipalities themselves. In addition, we have heard that the greatest concern among homebuilders is over uncertainty associated with regulation as oppose to the levels of fixed fees.

Figure 28: Fraser Institute's Regulatory Index, select cities, 2016

Source: CMHC calculations based on Green *et al.* (2016)

[28] These data do not conform to the analysis in REALPAC (2015) on fees and taxes. This reflects the lack of consensus of the scale of fees, and motivates our proposed analysis on the extent of development fees.

6.2.3 The Economics of Land

Land prices are high in city centres because businesses find it valuable to be close to one another. There are various benefits from locating business in these settings—including having access to a greater number of service providers, a larger pool of skilled workers, interacting with and monitoring competitors, and being in closer proximity to affluent consumers and large transport hubs, such as airports. Central locations are also at the centre of transit hubs that bring workers to their place of employment.

As discussed in Chapter 3, these forces can be particularly pronounced if city growth is driven by certain industries—such as the high-tech industry in Silicon Valley or the financial services industry in New York—where the value of co-locating is high. In short, businesses are willing and able to pay for central locations; as a result, the price of land is high in city centres. As these cities grow, so will the value of land surrounding city centres.

This trend is widespread in cities around the world, and is reflected in research by economic historians. Knoll *et al.* (2017) find that land prices accounted for 80 per cent of the rise in global house prices since the Second World War, probably reflecting the wider use of cars enabling households to locate further from city centres and raising the value of swathes of land further out in the suburbs. These trends are part and parcel of city growth. Similarly, after estimating the separate value of land and of structures in the U.S., Davis and Heathcote (2007) estimate that the inflation-adjusted price of residential land nearly quadrupled since 1970, while the real price of structures increased cumulatively by only 33 per cent.

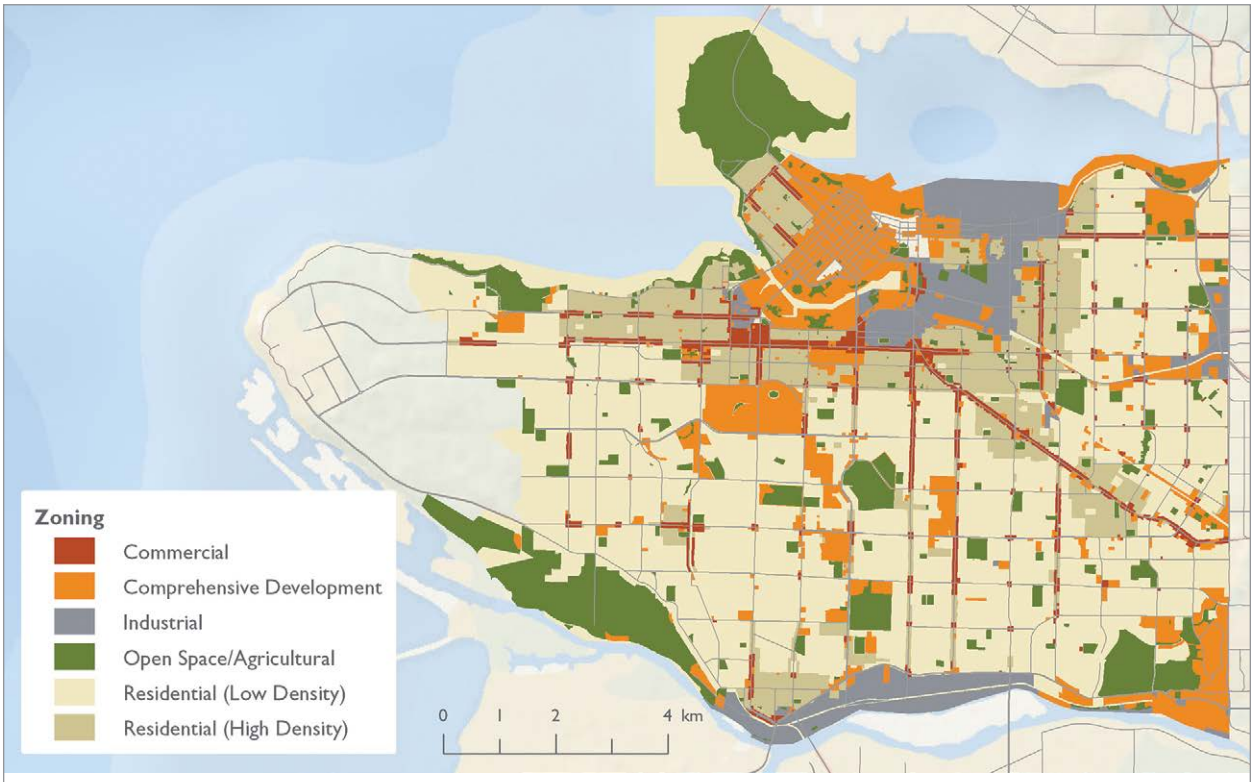
Although there is housing in city centres, they tend to be smaller, more expensive units. Housing tends to be found further out from central locations, largely because of lower land prices associated with locations away from the downtown core. Land prices fall the further away from city centres, but land can be made more valuable away from commercial centres as well, by increasing access to local amenities or services. Not only may proximity to a pleasant public park raise the value of land, but so may a good local school. Indeed, the efforts of city planners to make their cities more livable can increase land prices!

Transit, land, the locations of work and housing are all brought together in this framework.[29] As the cost of commuting to work—both financially and in terms of pure time—is lessened the closer home is to the place of work, the higher land values become. With limited infrastructure, workers live closer to downtown, pushing up land prices there. As pointed out by Arnott and Stiglitz (1979), higher transportation costs will tend to be associated with higher land values in city centres. Further out, being near a station for public transit would also raise land values. Having access to an extensive transit network lowers the imperative of living close to the place of work, and tends to lead to a more even distribution of land prices.

The spread of economic growth from city centres leads to rising land values in neighbouring areas, changing the incentives to build different types of homes, and giving incentives to demolish older single-storey houses to replace them with more expensive homes. As land becomes more valuable, the more value the building on that land must have. The price of land may increase so much that there is an incentive to incur the costs of combining many lots and rip down all structures in order to build multi-storey buildings: adding storeys to buildings economizes on the cost of land. Other forms of denser housing are also possible, as explored in Chapter 10. Over time, and with unabated market forces, single-detached homes only become available further out from city centres. The maps of zoning rules in Toronto and Vancouver (Figure 29 and Figure 30) suggest, however, that significant single-detached housing remains close to the centres of Toronto and Vancouver, which in turn also suggests that the process of densification is not operating efficiently (Lauster, 2016).

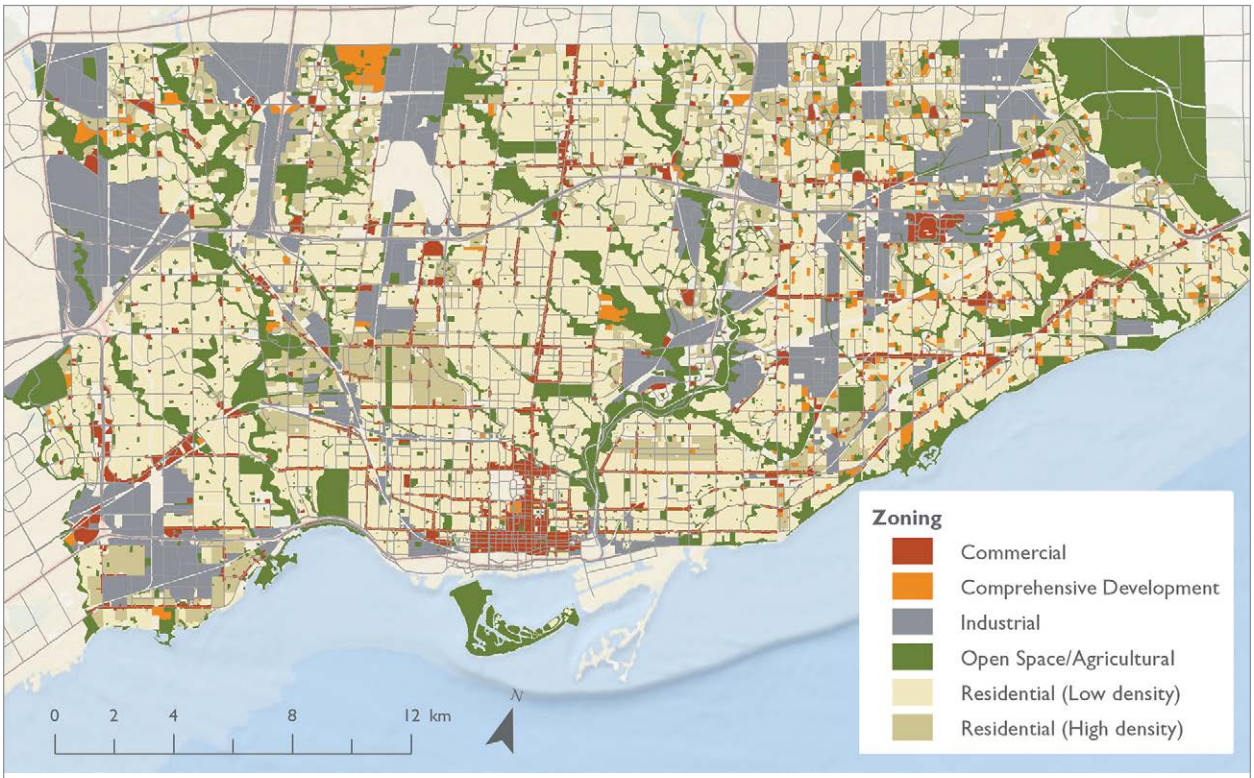
[29] As is done in the classic Alonso-Muth-Mills model of urban growth, based on their research in the 1960s. The story outlined above is clearly over simplified compared to the complex realities of modern cities, but the essential dynamics remain unchanged, as examined by Henderson and Mitra (1996).

Figure 29: Zoning for the City of Vancouver



Source: City of Vancouver (2017)

Figure 30: Zoning rules for the City of Toronto



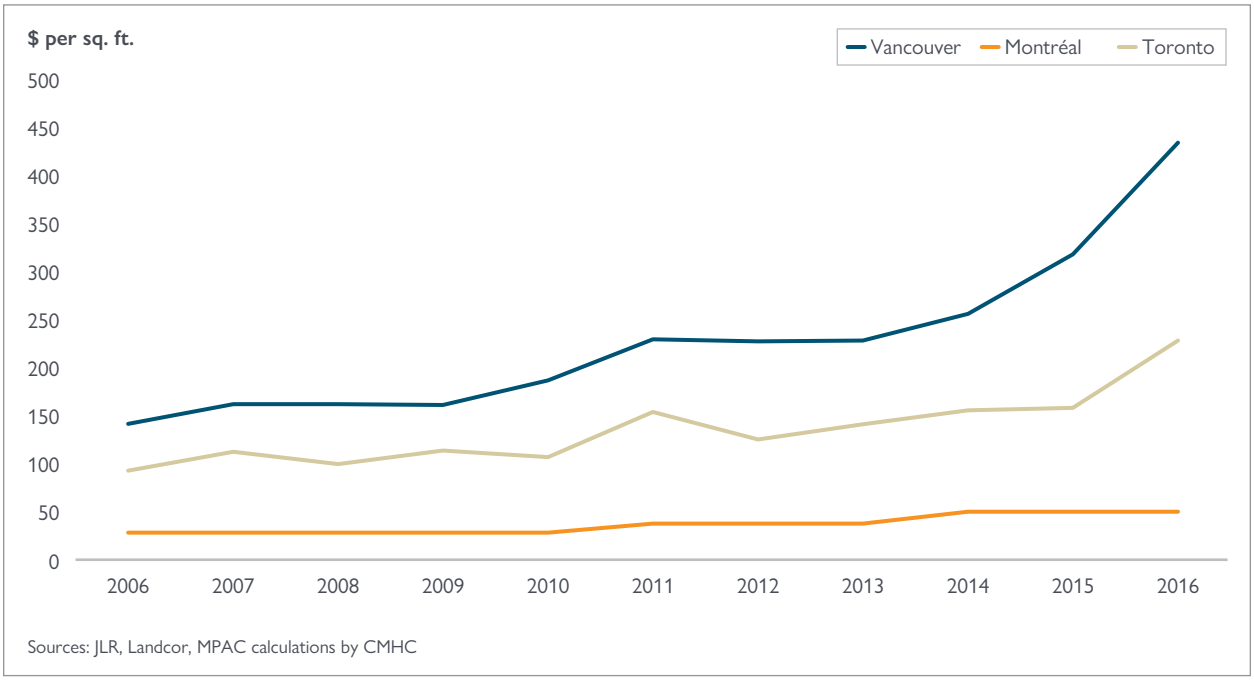
Source: Toronto City Planning (2014)

6.2.3.1 Land prices

While some land price data are currently available, care has to be practised with these data as the precise location of the land and their characteristics are not clear. Land prices may be recorded from sales of empty lots, as is done by companies such as MCAP (2017). Such prices tend to be location-specific, however, as well as sporadic with significant time lags between transactions. Alternatively, econometric techniques can be used to estimate land prices from the value of homes to reflect the actual value of raw land underlying these homes. In principle, the value of land estimated from such hedonic techniques should be related to the value of undeveloped land on the outskirts of cities, after correcting for distance and the availability of infrastructure.

To find out what was happening to land prices in Canadian cities, we obtained data for the cities of Montréal and Vancouver, but obtaining long-dated land-price data for Toronto was not possible from public sources. Consequently, we attempted to estimate land prices for Toronto using hedonic methods. Further refinements of this method will be needed, however. Figure 31 shows the evolution of land prices in Toronto, Montréal and Vancouver over the past decade. While land prices in Montréal have remained relatively constant, land prices in Vancouver and Toronto have risen markedly.[30] The pattern of increasing land prices in Toronto reflects patterns in MCAP (2017).

Figure 31: Land Prices per square feet, by city



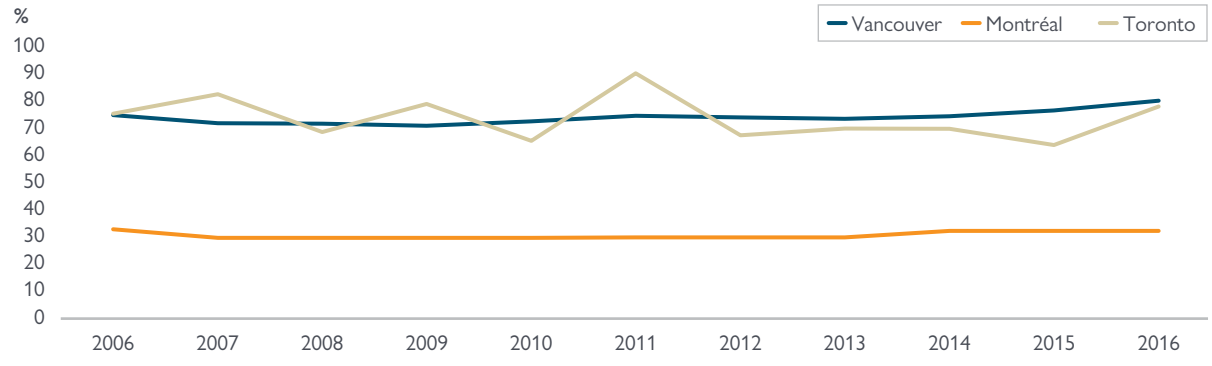
Sources: JLR, Landcor, MPAC calculations by CMHC

As mentioned, the value of a home can be thought of as the value of the land plus the value of the structure put on it. Figure 32 shows that land prices are a major part of the value of homes in Vancouver and Toronto, but much less so in Montréal. This pattern captures multiple effects. First of all, it reflects that there is more density in Montréal overall, so that the value of the structure in Montréal is much higher. Structures in Montréal are more likely to be row housing or low-rise apartment buildings. Secondly, the data reflect that appreciating value of homes has been capitalized into land. Finally, it could reflect a shortage of developable land.

[30] These estimates are reflected roughly in the MCAP analysis that shows land prices increasing in the GTA since around 2014.

As discussed above, with continued economic and population growth, the availability of land to be built upon declines. When the land supply will have been exhausted, its price will obviously be high, but investors will also anticipate such higher future prices and buy land now. Capozza and Helsley (1989) show how this growth premium can easily account for half the average price of land in rapidly growing cities. This is also the logic behind Nathanson and Zwick (2017), which argues that controls by the U.S. federal government on land areas around Las Vegas — even if not binding today — creates a risk that they would be binding in future, and therefore generated an incentive to speculate in land during the 2000s run-up in home prices. A further implication of this argument is that debate over the availability of land may be more concisely resolved by looking at the evolution of land prices as both are so intimately linked.

Figure 32: Land Prices as percentage of total house prices, by city



Source: JLR, Landcor, MPAC calculations by CMHC. Data are for respective cities, not CMAs.

6.2.3.2 Land availability

The amount of land available varies across cities for many of reasons:

1. Geographical constraints vary. In some cities, such as in the Canadian Prairies, there are no obvious physical limits to the land available to be built up. In other cases—the lakeshore in Toronto or the Burrard Peninsula in Vancouver—water is the obvious limit to land supply;
2. Government policies may restrict land supply. First of all, land may be zoned for particular types of dwellings: Figure 29 and Figure 30 showed that large areas of the cities of Toronto and Vancouver are zoned for single-family dwellings. Secondly, many cities around the world regulate the amount of land available for developing new homes. These Urban Growth Boundaries (UGB) produce limits to the physical spread of cities to prevent urban sprawl (as discussed at greater length in Chapter 10); and
3. Land owners may delay developing land as it may have even higher values in the future. Not developing land today has an "option time value": not building today leaves the option open of building tomorrow when pricier structures can be built.

Clearly, as some cities expand they will run into these limits to their growth, and the price of land will rise. This means that the value of land can become disproportionately higher in cities where construction is constrained compared to cities that can expand freely. Deaton and Vyn (2010), used agricultural land prices and found that Greenbelt legislation affected farmland prices with a greater effect closer to the GTA. Vyn (2012) suggests that land prices beyond the greenbelt have increased, supporting the argument of a leapfrog effect whereby construction jumps over the greenbelt and therefore generates even longer commutes. For Vancouver, Eagle *et al.* (2015) find that landowners paid 19 per cent less for the typical improved farmland parcel within the Agricultural Land Reserve (ALR) versus that outside it.

6.3 DATA GAPS

6.3.1 Land availability

A central implication of the above analysis is that the availability and price of land and its regulation are critical to understanding housing dynamics in Canada. Unfortunately, there is a lack of comprehensive data on either land prices or its availability, as discussed further in Chapter 10. The Province of Ontario requires that there be at least a three-year supply of short-term land at all times. Academics at Ryerson University have, however, criticized the incomplete reporting of land supply within the GTA (Clayton and Amborski, 2017).

Determining the importance of land in Canada would require detailed geographic data on:

1. The physical availability of land. We make an attempt at this in the next chapter;
2. Serviced land, *i.e.*, for which there is provision of water and sewage; and
3. Land that is accessible by transit.

Moreover, a breakdown of land by availability for single-detached housing versus denser types of housing would be informative.

6.3.2 Land prices

For economists, the price of land is a central indicator of how well the housing market is functioning, as land prices indicate how well the supply side of the market is operating (Glaeser and Gyourko, 2017).[31] Land prices are affected by regulations, the availability of urban amenities and speculative land hoarding. As pointed out by Cheshire and Sheppard (1993), even vacant land prices will vary by neighbourhood location and the mix of public goods and services provided.

The impacts of regulation can be examined by movements in land prices. Excessive regulation on redevelopment sites, for example, could force the devaluation of land because such restrictions could make it more difficult to build denser structures (Turner *et al.*, 2014). On the other hand, limiting construction of such structures holds back overall housing supply, leading to higher land prices (Kok *et al.*, 2014). Disentangling these effects requires detailed, time-series data on land prices as well as on land-use regulations.

Unfortunately, no accessible and robust land data exist in Canada. A complementary approach to land valuation is gathering detailed data on how much land is available for houses to be built on and that have easy access to the required infrastructure to support housing. Again, such data are not easily accessible to researchers, so resolving some of the housing supply debates is difficult (Neptis (2016) and Malone Given Parsons (2017)). As noted by Knaap (2004), "[w]hile most communities generally agree that Smart Growth goals are laudable, they often find they lack the necessary tools to make sophisticated, well-founded land use decisions that are likely to stand the test of time."—and accurate monitoring of land use is critical in this regard.

6.4 MACRO DATA ON SUPPLY RESPONSES IN CANADA

What has been the supply response to higher home prices in Canada? Figure 33 shows the shares of various components of residential investment and their totals, back to the early 1980s. It provides several insights into the experience of Canada in the housing market. The data suggest in general, that over recent years there has been more economic activity proportionately in the existing home market rather than in constructing new homes.

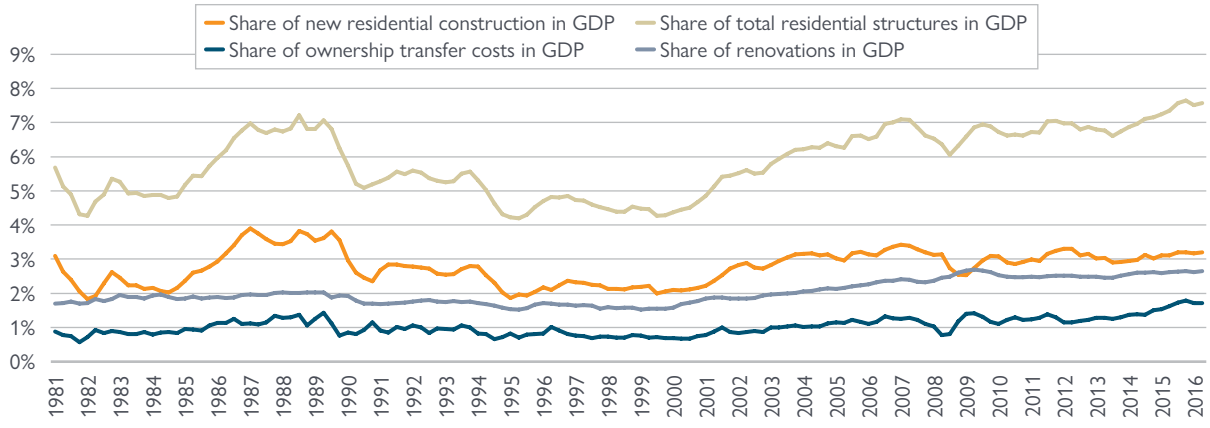
First, the late 1980s was a period associated with a housing-price boom and a construction boom as well, as the share of new residential construction reached almost 4 per cent of GDP (Figure 33). The lingering effects of the early 1990 recession led to an over-supply of housing in the 1990s, which had a lasting effect on the construction sector with limited investment in new homes throughout the 1990s. Now, Canada overall is not experiencing the same type of construction boom.

[31] In principle, the key ratio also incorporates construction costs but is relatively constant in real terms in Canada.

Second, the chart shows Statistics Canada data for ownership transfer costs, which include: real estate commissions, land transfer taxes, legal costs (fees paid to notaries, surveyors, experts, etc.), and file review costs (inspection and surveying) (Statistics Canada, 2008). These have now reached 1.8 per cent, double their level in the early 1980s, and higher than their level of 1.4 per cent of GDP at the height of the boom in the late 1980s. These data are not available at the provincial or more local level.

Incidentally, and thirdly, there is a significant rise in renovation expenditures, which are now higher proportionately by a quarter than at the end of the 1980s. As homeowners spend on or renovate their home, the price of that home will rise. The growth in prices for existing homes is likely overstated without correcting for this type of quality change.

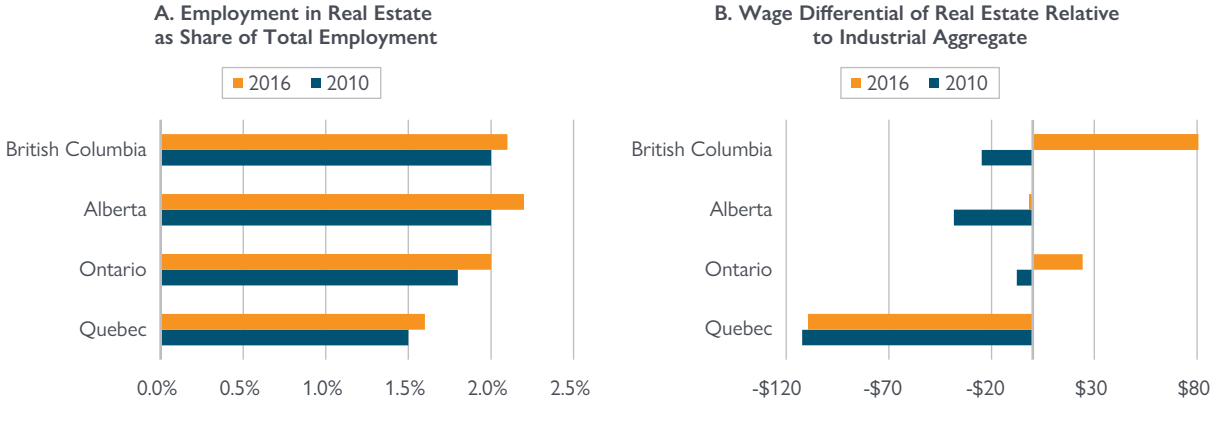
Figure 33: Shares of components of residential investment and their totals in GDP



Source: Statistics Canada (CANSIM Table 380-0068)

Similar to the data in Figure 25 for the construction industry, Figure 34 shows employment and wage data for industries linked to real-estate activity. In this case, there are more obvious pressure points in the labour market. Employment in this industry has grown in Ontario and British Columbia relative to other industries, while wages have also grown strongly, particularly in British Columbia. These patterns suggest that workers have moved into the real-estate industry, attracted by the higher earnings it offers.

Figure 34: Employment patterns in real estate industries, by province



Sources: CMHC calculations based on Statistics Canada data (CANSIM Table 281-0063)

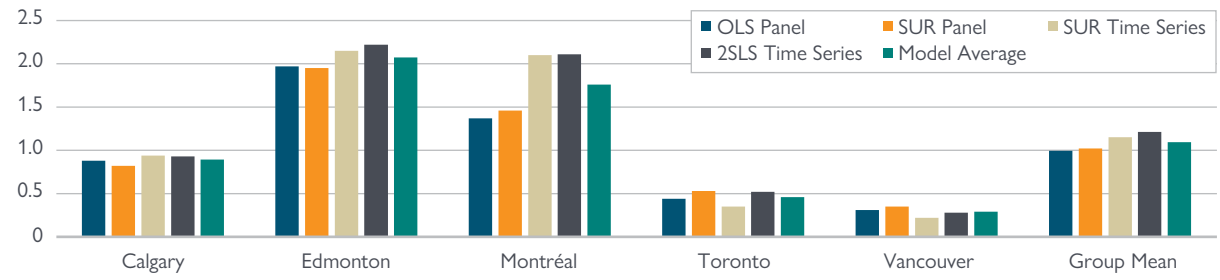
Note: real estate includes firms primarily engaged in renting and leasing of real estate, managing real estate for others, acting as intermediaries in the sale and/or rental of real estate, and appraising real estate.

6.5 HOUSING SUPPLY ELASTICITIES

A key concept that emerges from this report is the responsiveness of supply to prices. This concept can be analyzed more formally through the idea of a *housing supply elasticity*; in other words, what is the percentage change in the stock of housing for any given percentage change in prices. While researchers have investigated this concept in the U.S., there appears to be limited research on it in Canada. Our analysis shows sharp differences across cities in Canada.

We utilize the stock-flow simultaneous-equation models developed earlier in the report (Chapter 3) but on a city-by-city basis. We estimate, simultaneously, an equation for housing demand and an equation for housing starts. We use a variety of statistical methodologies. Before discussing two approaches in detail, we highlight Figure 35, which gives the estimated supply elasticities from all the methods we used. In general, the supply responsiveness in Toronto and Vancouver have been proportionately weaker than in other cities.

Figure 35: Estimated Long-Run Supply Elasticity of Housing Starts from Different Models



Source: CMHC based on data from Statistics Canada, Conference Board of Canada, Canadian Real Estate Association, and CMHC. OLS panel refers to separately estimating a stock-flow model with a demand equation and a supply equation in a panel; SUR panel simultaneously estimating the model in a panel; SUR time series simultaneously estimating the model by CMA; and 2SLS time series simultaneously estimating the model using instrument variables by CMA.

Our benchmark model to examine the relationship between housing supply and prices is as follows. The long-run equation for house prices and starts take the following forms:

$$\text{PRICE}_t = \alpha_0 + \alpha_1 \text{INCOM}_t + \alpha_2 \text{MORTGAGE}_t + \alpha_3 \text{YPOP}_t + \alpha_4 \text{POP/HSTOCK}_{t-1} + \text{ECT}_t^p$$

$$\text{STARTS}_t = \beta_0 + \beta_1 \text{PRICE}_{t-1} + \beta_2 \text{CCOST}_{t-1} + \beta_3 \text{POP/HSTOCK}_{t-1} + \beta_4 \text{SALES}_{t-1} + E\text{CT}_t^s$$

where β_1 is the long-run elasticity of new housing supply. The short-run equation for prices and starts take the form:

$$\Delta\text{PRICE}_t = \phi_0 + \phi_1 \Delta\text{PRICE}_{t-1} + \phi_2 \Delta\text{INCOME}_t + \phi_3 \Delta\text{MORTGAGE}_t + \phi_4 \Delta\text{YPOP}_t + \phi_5 \Delta\text{POP/HSTOCK}_t + \phi_6 \text{ECT}_{t-1}^p + \varepsilon_t$$

$$\Delta\text{STARTS}_t = \delta_0 + \delta_1 \Delta\text{PRICE}_{t-1} + \delta_2 \Delta\text{CCOST}_{t-1} + \delta_3 \Delta\text{POP/HSTOCK}_{t-1} + \delta_4 \text{SALES}_{t-1} + \delta_5 \text{ECT}_{t-1}^S + \upsilon_t$$

In these equations, ECT_t^p and ECT_t^s are the error correction terms in house prices and housing starts equations respectively.

These short- and long-run equations for both demand and supply are estimated on a CMA-by-CMA basis. Results are shown in Table 16 and Table 17. The value of interest is in the first data row of Panel A in Table 17, and graphically in Figure 36. Figure 37 shows the rate of adjustment in each CMA. As a robustness check, we also produce results estimated using Instrumental Variables (Table 18 and Table 19).

Table 16: Estimation results of demand equations, by CMA, 1992Q1 to 2016Q2

Panel A: Long-run house price equations by CMA

INDEP. VARIABLE	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
Real Disposable Income	0.83*** (6.56)	0.73*** (5.63)	1.64*** (12.54)	2.13*** (20.33)	2.09*** (19.48)
5-Year Real Mortgage Rate	-0.02*** (-4.25)	-0.01*** (-3.14)	-0.02*** (-4.60)	-0.01*** (-4.13)	-0.01* (-1.70)
Population aged 25-34	1.16*** (13.89)	0.99*** (11.20)	1.41*** (11.08)	2.49*** (19.81)	1.62*** (12.19)
Population/Housing Stock	-3.10*** (-7.60)	-5.35*** (-10.17)	-4.18*** (-6.44)	-0.29 (-0.67)	-4.34*** (-7.86)
R-squared	0.94	0.92	0.96	0.96	0.95

Source: CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Panel B: Short-run house price equations by CMA

INDEP. VARIABLE	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
Lagged House Price (Diff.)	0.39*** (4.53)	0.37*** (4.33)	-0.10 (-1.17)	0.17* (1.76)	0.16* (1.76)
Real Disposable Income (Diff.)	-0.02 (-0.26)	0.11 (1.09)	0.10 (0.71)	0.57*** (2.95)	0.18*** (1.36)
5-Year Real Mortgage Rate (Diff.)	0.004** (2.02)	0.003 (1.49)	0.003** (2.17)	0.003 (1.43)	0.01*** (3.31)
Population aged 25-34 (Diff.)	0.42 (0.98)	0.84** (2.27)	3.47*** (6.10)	2.19*** (3.13)	0.02 (0.03)
Lagged ECT	-0.06** (-2.57)	-0.05** (-2.15)	-0.10*** (-4.82)	-0.12*** (-3.02)	0.006 (1.25)
R-squared	0.26	0.25	0.32	0.22	0.16

Source: CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Table 17: Estimation results of supply equations by CMA, 1992Q1-2016Q2

Panel A: Long-run housing starts equations by CMA

INDEP. VARIABLE	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
Lagged House Price	0.94*** (3.60)	2.15*** (7.62)	2.10*** (11.85)	0.35* (1.81)	0.22* (1.68)
Lagged Population/ Housing Stock	2.77** (2.24)	7.22*** (4.64)	19.52*** (6.28)	16.04*** (10.00)	-13.67*** (-8.41)
Lagged Construction costs	-2.74*** (-5.25)	-5.09*** (-7.50)	-2.50*** (-2.82)	0.47 (1.26)	-0.10 (-0.29)
Lagged sales	1.04*** (9.64)	1.56*** (11.57)	0.78*** (10.68)	0.40*** (2.78)	0.58*** (6.83)
R-squared	0.76	0.80	0.82	0.73	0.51

Source: CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Panel B: Short-run housing starts equations by CMA

INDEP. VARIABLE	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
Lagged House Price (Diff.)	0.47 (0.78)	2.12*** (2.75)	-0.10 (-0.11)	1.53** (2.24)	0.90* (1.88)
Lagged construction costs (Diff.)	-1.75 (-1.60)	-2.88** (-2.15)	0.77 (0.38)	6.07*** (3.25)	3.33*** (3.50)
Lagged sales (Diff.)	0.78*** (6.26)	0.79*** (4.13)	0.46*** (2.61)	0.32** (2.36)	0.12 (1.12)
Lagged ECT	-0.52*** (-6.25)	-0.38*** (-5.31)	-0.08** (-2.28)	-0.22*** (-4.03)	-0.31*** (-5.36)
R-squared	0.41	0.33	0.10	0.23	0.31

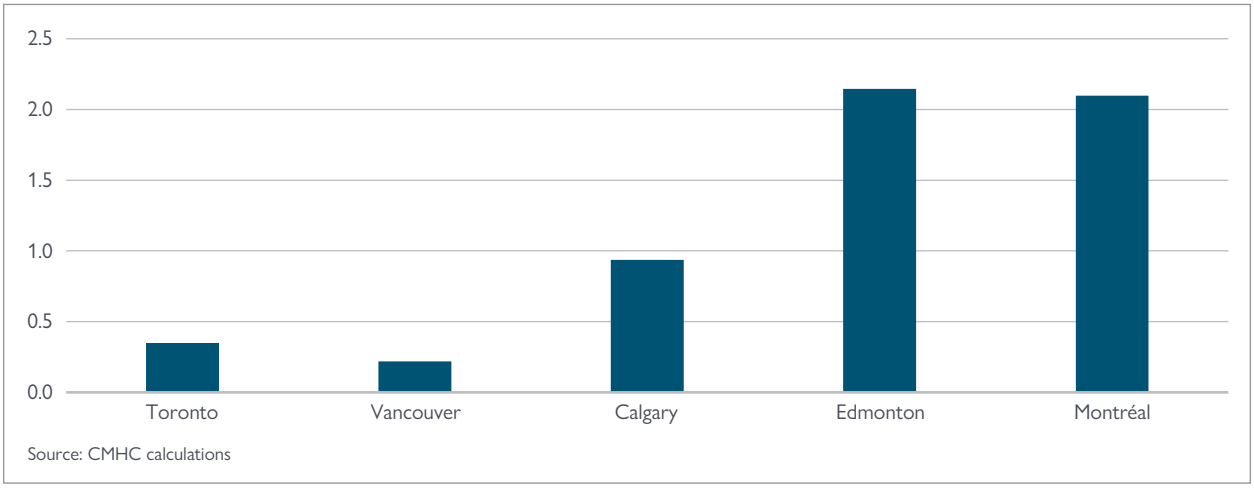
Source: CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Figure 36: Estimates of the long-run price-elasticity of new housing supply



Source: CMHC calculations

Figure 37: Estimates of the speed of new housing supply response to the long-run disequilibrium

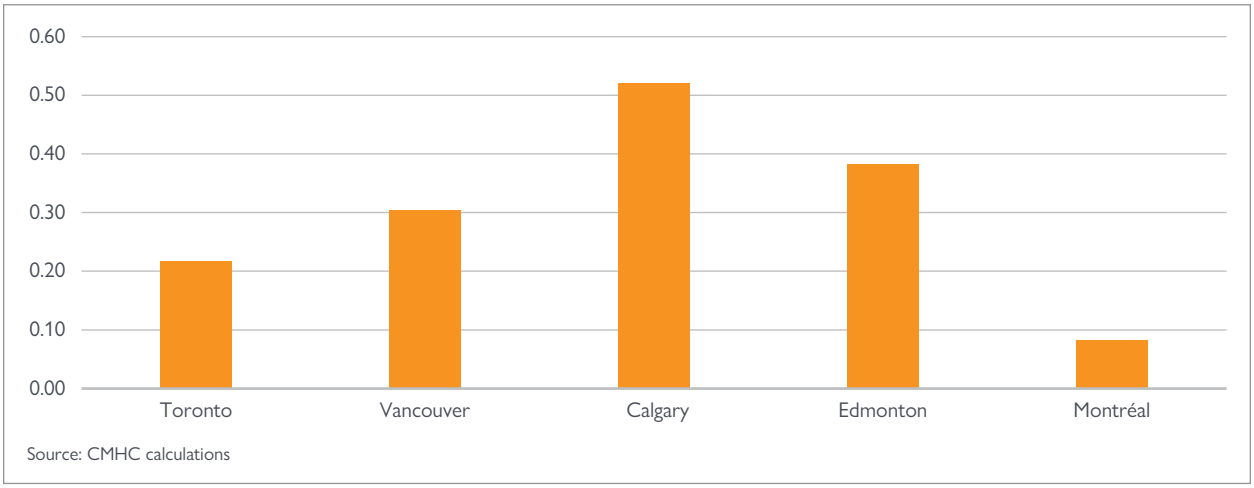


Table 18: Estimation results of demand equations by CMA using instrumental variables, 1992Q1-2016Q2

Panel A: Long-run house price equations by CMA

INDEP. VARIABLE	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
Real Disposable Income	0.54* (1.88)	0.69*** (5.07)	2.44*** (17.95)	2.49*** (16.92)	2.32*** (18.97)
5-Year Real Mortgage Rate	-0.02*** (-3.27)	-0.01*** (-3.11)	-0.01*** (-4.74)	-0.01*** (-2.63)	-0.0004 (-0.07)
Population aged 25-34	1.41*** (8.12)	1.08*** (11.50)	1.92*** (16.35)	2.23*** (13.25)	1.53*** (10.16)
Population/Housing Stock	-3.92*** (-7.53)	-5.73*** (-10.70)	-0.42 (-0.60)	-0.46 (-0.91)	-3.31*** (-6.05)
R-squared	0.96	0.94	0.97	0.97	0.98

Source: CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Panel B: Short-run house price equations by CMA

INDEP. VARIABLE	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
Lagged House Price (Diff.)	0.30** (2.09)	0.34*** (3.74)	0.03 (0.30)	0.54*** (2.78)	0.28** (2.34)
Real Disposable Income (Diff.)	0.98** (2.41)	0.38 (1.11)	0.47 (1.10)	-0.97* (-1.94)	1.27* (1.86)
5-Year Real Mortgage Rate (Diff.)	0.003 (1.00)	0.0008 (0.25)	0.003 (1.07)	0.009*** (2.82)	0.01** (2.51)
Population aged 25-34 (Diff.)	0.47 (0.79)	0.10 (0.43)	1.48*** (3.66)	-0.22 (-0.37)	0.29 (0.83)
Lagged ECT	-0.03 (-0.95)	-0.02 (-1.03)	-0.06* (-1.86)	-0.06 (-0.80)	-0.10** (-2.11)
R-squared	0.31	0.21	0.17	0.17	0.27

Source: CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Table 19: Estimation results of supply equations by CMA using instrumental variables, 1992Q1-2016Q2

Panel A: Long-run house price equations by CMA

INDEP. VARIABLE	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
Lagged House Price	0.93*** (3.67)	2.22*** (7.84)	2.11*** (12.06)	0.52*** (2.72)	0.28** (2.11)
Lagged Population/ Housing Stock	2.31* (1.90)	7.46*** (4.77)	20.82*** (6.71)	16.22*** (10.36)	-12.66*** (-7.71)
Lagged Construction costs	-2.77*** (-5.44)	-5.33*** (-7.81)	-2.34*** (-2.70)	0.18 (0.49)	-0.27 (-0.79)
Lagged sales	1.11*** (10.47)	1.59*** (11.70)	0.83*** (11.91)	0.36** (2.57)	0.62*** (7.00)
R-squared	0.75	0.80	0.82	0.73	0.53

Source: CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

Panel B: Short-run house price equations by CMA

INDEP. VARIABLE	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
Lagged House Price (Diff.)	0.33 (0.54)	2.01*** (2.61)	-0.04 (-0.05)	1.45** (2.11)	0.93* (1.93)
Lagged construction costs (Diff.)	-2.03* (-1.86)	-2.86* (-2.12)	0.63 (0.31)	5.79*** (3.06)	3.57*** (3.81)
Lagged sales (Diff.)	0.81*** (6.49)	0.79*** (4.15)	0.50** (2.80)	0.31** (2.19)	0.15 (1.36)
Lagged ECT	-0.52*** (-6.28)	-0.38*** (-5.35)	-0.09*** (-2.69)	-0.18*** (-3.43)	-0.32*** (-5.67)
R-squared	0.41	0.34	0.09	0.22	0.33

Source: CMHC. Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

6.6 MACROECONOMIC CONSEQUENCES OF LAND SUPPLY

As discussed in Chapter 2, the value of homes has increased to a scale where changes in their values can have macroeconomic consequences, as was experienced in the last recession of 2007-09. This chapter has further argued that an important component of home prices is—in certain cities—the value of land. Clearly, the value of land and limits in its supply can also therefore have macroeconomic consequences. In particular, limits on land supply lead to greater house-price volatility and macroeconomic risk.

In cities where expansion of housing has been relatively easy, construction costs are a greater proportion of the value of the home. As these construction costs change relatively little, prices in these cities tend to be more stable. By contrast, restrictions on supply in many cities act to increase home prices in the face of continuing increases in demand, with the higher prices reflecting higher land values. Consequently, home prices become affected more by financial conditions than by construction costs, and the value of property becomes more volatile and prone to speculative interest.

These risks have been reflected in recent U.S. research. Kiyotaki *et al.* (2011) finds that in an economy where the share of land in the value of real estate is large, housing prices respond more to changes in interest rates. Glaeser *et al.* (2014) reports that prices of property in coastal markets in the U.S. are highly volatile. And a series of relevant results were recorded for the U.S. in Davis and Heathcote (2007). They find, for instance, that the price of land is more than three times as volatile as the price of structures at business-cycle frequencies. Consequently, in cities where most of the value of housing is accounted for by land (San Francisco, Boston), changes in demographics, interest rates or the tax treatment of housing have larger effects on house prices in regions where land's share is high, whereas prices should largely reflect construction costs where land is cheap. Glaeser *et al.* (2008) look at the different responses across U.S. cities to house price increases. In cities with more elastic supply responses, price increases are smaller and there are fewer bubbles since construction responds more to prices in these cities.

Another way of looking at this issue is through the experience of various U.S. cities in the years leading up to the recession. Mayer (2011) classifies U.S. cities according to their histories. The first set of cities he describes as "cyclical", which includes superstar cities that continually attract new workers and businesses. These have strong boom-bust cycles with strong price volatility, and includes the 'superstar' cities such as San Francisco, Boston, Los Angeles and New York. Secondly, there are "steady" markets where normally there is little house-price appreciation except in response to much lower interest rates with house prices driven by construction costs and local demand. This category would include cities such as Atlanta, Chicago, Denver and Detroit. Thirdly there are "Recent boomers", which had price growth above historic norms and that can quickly look like bubble markets, such as Las Vegas, Phoenix, and parts of Florida and southern California.

This history lends itself to the description of how speculation enters these housing markets in Malpezzi and Wachter (2005). A key difference across these cities described by Mayer is the responsiveness of supply. In constrained areas such as San Francisco or New York, there will be limited additional construction, so house prices can seem like a sure bet. These prices then spill over to neighbouring cities as households move out of more expensive cities, driving up their prices as well. One mechanism by which this arises is explored in Chinco and Mayer (2016). Price increases may rise sufficiently in a market to attract investors from other cities or countries. They find a 10 percentage point rise in a city's fraction of sales to out-of-town second house buyers was associated with a 6 percentage points increase in house prices. These outside investors, however, were less well informed of the market than local investors, and were notably less successful than local buyers in timing their exit from the market in Las Vegas and other "boom" markets.

As higher prices reach the recent-boomer cities, supply is more likely to respond as they are not typically land-constrained markets. As Robert Shiller has pointed out, asset purchasers at the height of cycles may not anticipate fully the supply responses. This supply response may not come in cyclical markets but it will happen in the recent-boomer cities, and this creates risk. So while households build up debt in the face of higher prices in recent-boomer markets, construction companies are also building more supply that will eventually bring down prices leaving households with high debt levels and lower home prices. This spike in construction will ultimately leave an oversupply lasting many years before it is absorbed, as observed in Ireland and Spain. The risk is therefore heightened by booms in core cities spreading to areas with higher elasticities of supply (see also Case and Shiller (2003) and Mian and Sufi (2014)).

The obvious question is whether this story of contagion is at work in Canada. Our analysis shows that higher prices in Toronto and Vancouver are spreading to other parts of Ontario and British Columbia. But are Toronto and Vancouver closer to San Francisco or New York, or to Atlanta and Chicago? Are Hamilton and Abbotsford-Mission closer to Denver and Detroit, or to Phoenix and Las Vegas? This concern gives added impetus to the importance of examining the supply side of housing.

We have also examined statistically the extent of spillovers from the large Canadian cities to their neighbours, following the methodology of Pesaran and Yamagata (2011). Generally, a shock to Toronto house price spills over to other CMAs according to their distance from Toronto. The responses of Peterborough, St. Catharines-Niagara and London to the shock to Toronto prices are more pronounced than the responses of some closer CMAs like Hamilton, Guelph, Brantford and Barrie. However, a spatial propagation operates at all horizons from Toronto to Oshawa, London, Kingston, Windsor, Sudbury, Ottawa and Thunder Bay in this order. In British Columbia, the shock to Vancouver house price propagates temporally and spatially to other CMAs. Victoria seems to be affected more than Abbotsford-Mission, which is the closest CMA to Vancouver.[32]

6.7 MARKET DYNAMICS

Demographic and economic dynamics are combined in the life-cycle models of households. Traditionally, households borrow when young to buy a more affordable home, and then buy a larger home when they are wealthier, before paying back their debt and then retiring and dissaving. Another factor at work when couples grow older is that the size of their family grows with children. Aggregated over households, this dynamic leads to a flow of people between rental property to condominium and to single-detached home, which reflects not only higher incomes with greater work experience but also larger family size. Much as these dynamics affect the aggregate amount of savings in the economy, they also affect the stock of housing. One of the concerns that we have heard during the course of our work is that the average size of new condominiums is declining as they are built to meet the needs of investors who intend to rent them out. In the absence of historical data on square footage of condominiums, we cannot verify this claim, however.

6.8 CONCLUSION

The arguments and evidence gathered in this chapter suggest that rising home prices reflect rising land values. These values are likely the result of limits in the supply of land. This rise in land values is changing incentives on the type of dwellings to be built, with greater attention generally focused on multi-unit structures. Over time, there will likely be a growing trend to convert detached homes into denser structures. Whether such an outcome is desirable depends on judgments on prioritizing policy objectives.

[32] Greater detail is provided in CMHC (2017a) and CMHC (2017b).

6.9 APPENDIX A. STATIONARITY TESTS (DECISION BASED ON ADF, PP AND ERS UNIT ROOT TESTS). VARIABLE IS I(1) AT 5%. SAMPLE 1992Q1-2016Q2

	INTERCEPT ONLY			INTERCEPT AND TREND		
	ADF	PP	ERS	ADF	PP	ERS
House price						
Calgary	Yes	Yes	Yes	Yes	Yes	Yes
Edmonton	Yes	Yes	Yes	Yes	Yes	Yes
Montréal	Yes	Yes	Yes 10%	No	Yes	No
Toronto	Yes	Yes	Yes 10%	Yes	Yes	Yes
Vancouver	Yes	Yes	Yes	Yes	Yes	Yes
Per capita income						
Calgary	Yes	Yes	Yes	I(0)	I(0)	I(0)
Edmonton	Yes	Yes	Yes	I(0)	I(0)	I(0)
Montréal	Yes	Yes	Yes	Yes	Yes	Yes
Toronto	Yes	Yes	Yes	Yes	Yes	Yes
Vancouver	Yes	Yes	Yes	Yes	I(0)	Yes
5-year mortgage rate						
Calgary	Yes	Yes	Yes	Yes	I(0)	Yes
Edmonton	Yes	Yes	Yes	Yes	I(0)	Yes
Montréal	Yes	Yes	Yes	Yes	I(0)	Yes
Toronto	Yes	Yes	Yes	Yes	I(0)	Yes
Vancouver	Yes	Yes	Yes	Yes	I(0)	Yes
Housing stock						
Calgary	I(2)	Yes	I(2)	I(2)	Yes	I(2)
Edmonton	I(2)	Yes	I(2)	I(2)	Yes	I(2)
Montréal	I(0)	Yes	I(2)	I(2)	Yes	I(2)
Toronto	I(2)	Yes	I(2)	I(2)	Yes	I(2)
Vancouver	I(0)	Yes	I(2)	I(2)	Yes	I(2)
Population 25-34						
Calgary	I(2)	I(2)	I(2)	I(0)	I(0)	Yes
Edmonton	I(2)	I(2)	I(2)	Yes	I(2)	Yes
Montréal	I(2)	I(2)	I(2)	I(2)	I(2)	I(2)
Toronto	I(2)	I(2)	I(2)	I(2)	I(2)	I(2)
Vancouver	I(2)	I(2)	Yes	I(2)	I(2)	I(0)
Housing starts						
Calgary	I(0)	I(0)	Yes	Yes	Yes	Yes
Edmonton	Yes	Yes	Yes	Yes	Yes	Yes
Montréal	Yes	Yes	Yes	Yes	Yes	Yes
Toronto	Yes	Yes	Yes	Yes	Yes	Yes
Vancouver	Yes	Yes	I(0)	Yes	Yes	Yes
Construction costs						
Calgary	Yes	Yes	Yes	Yes	Yes	Yes
Edmonton	Yes	Yes	Yes	Yes	Yes	Yes
Montréal	Yes	Yes	Yes	Yes	Yes	Yes
Toronto	Yes	Yes	Yes	Yes	Yes	Yes
Vancouver	Yes	Yes	Yes	Yes 10%	Yes	I(0)

7 Closing the Gap: Results from CMHC Model Estimation (panel data approach)

CHAPTER OBJECTIVES:

- Explore additional factors potentially accounting for price increases in Canada's largest cities, and seek further reasons explaining the gap between actual and predicted prices. What makes the gap for some cities larger than for others?
- Develop proxies for additional factors that could influence house prices. Currently, there is a lack of comprehensive historical and recent data on the extent of developable land supply.
- Examine these additional factors in the context of short-term fluctuations. Some of the effects may not be observable at all stages of the cycle, but may become exaggerated at peaks and troughs.

KEY FINDINGS:

- While other potential elements are found to play a role, differences in land supply available for new homes are found to be the most significant factor explaining price fluctuations. This result requires careful interpretation, as it may indicate a shift in the composition of supply toward condominiums.
- Other potential explanations such as investor demand and speculative activity appear to have more limited impacts on prices over the long term.

7.1 INTRODUCTION

We undertook a two-step approach in our econometric analyses of price trends across Canada's major metropolitan centres. Our first step, described in Chapter 4, used the Workhorse model to estimate the price forecast for 2016 based on historical data through to 2010, and subsequently compared these predicted prices to actual prices. Here, we dig further into the second stage, which examines additional factors that could account for the divergence between actual and predicted prices.

Because of data limitations, our analytical approach takes proxies of particular variables that we think might be influencing prices. Consequently, this approach requires the careful interpretation of results. We follow this procedure with respect to three variables of interest—including factors influencing supply, an initial proxy for investor interest in real-estate properties, and speculation. In turn, we would expect the model to suggest house price growth in response to certain events—specifically in the form of supply restrictions (but possibly more so during a boom period); macroeconomic changes favouring investor demand for properties; and speculation at the height of the market.

While we report on the average effects of these factors over a period of many years, we would expect stronger impacts during cyclical peaks. As a result, these variables are also introduced to a model that captures a higher degree of volatility in house price patterns using the full sample from 1988 to 2016 as a further robustness check.

7.2 ADDITIONAL DATA

7.2.1 Measuring Supply Constraints

Our analyses were limited by a lack of robust historical data on the supply of developable or serviced land. To address this issue, we gathered the Fraser Institute's index of regulation and a measure of developable land, based on geographic indicators.

To examine the geographic constraints facing the five cities, we constructed a measure of the share of land that is "developable" following the approach from Saiz (2010). To compute this share, we first chose a point located in the downtown area of a city. We then constructed a radius of 50 km from this point. Within this circle, wetlands, lakes, rivers, and other internal water bodies are considered as non-developable lands. Land steeper than 15 per cent was also excluded. The share of developable land is calculated as the total area within the 50 km radius minus the total area of non-developable land over the total area (Table 20). The data show that the share of land unconstrained by geography is low in Toronto, and even lower in Vancouver. In contrast, there are few geographic barriers to development in the other cities.

Saiz (2010) also suggests that geographically constrained cities tend to have higher regulatory constraints. This pattern is reflected in Canada as well (Table 20). The impact of regulatory and geographic constraints can be summarized as follows:

- Vancouver and Toronto are subject to the highest levels of land supply constraints, in terms of both geography and regulation;
- Montréal and Edmonton are not supply-constrained in geography or regulation; and
- Calgary is supply-constrained in regulation, but not in geography.

Table 20: Geography and regulation constraint on the supply of land

CMA	DEVELOPABLE LAND SHARE	REGULATION CONSTRAINT INDEX
Vancouver	34.08%	2.25
Toronto	54.81%	2.50
Montréal	88.26%	-3.61
Calgary	94.56%	1.07
Edmonton	96.18%	-3.51

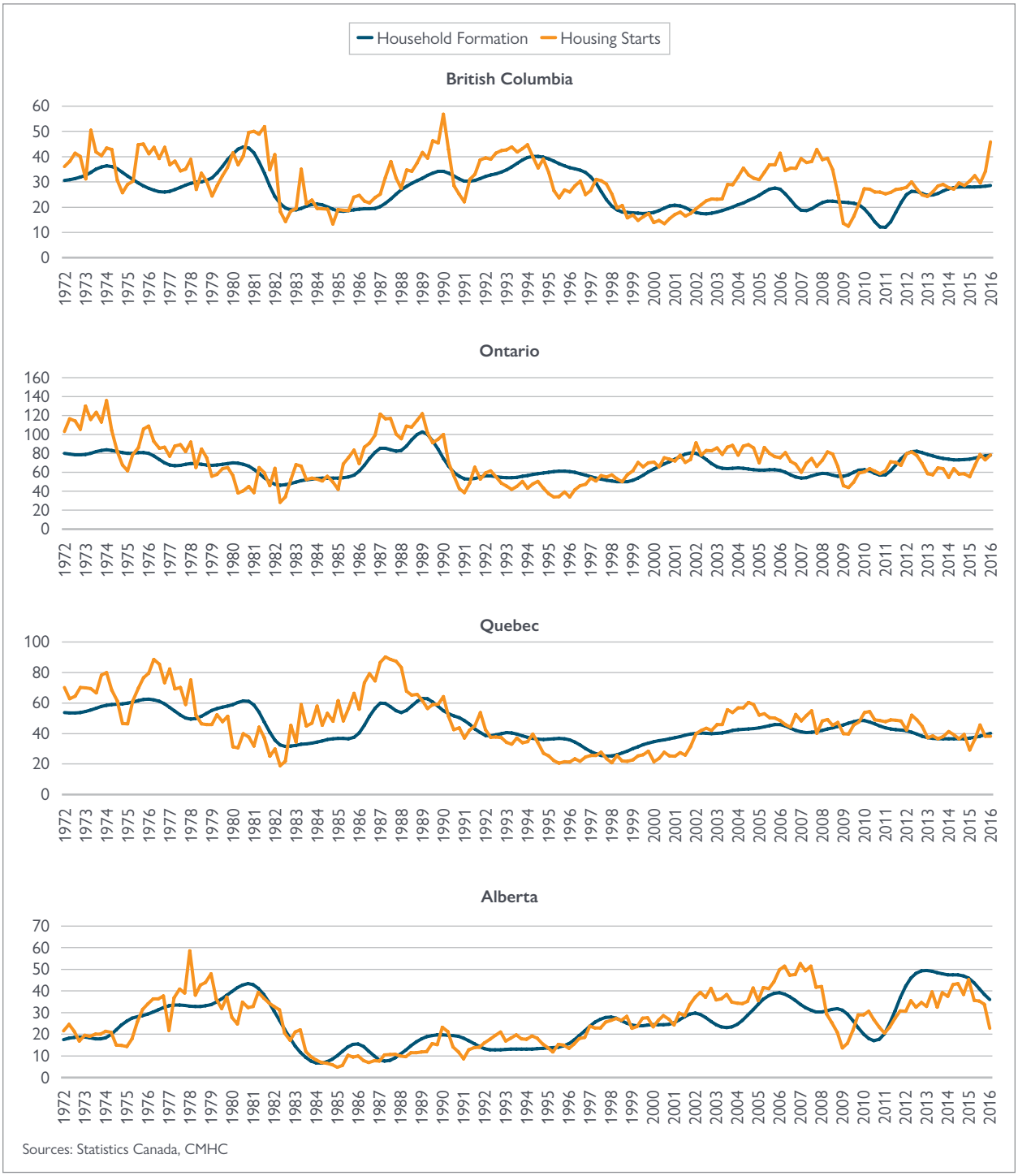
Note: Regulation constraint is a simple sum of demeaned measures of average approval timelines, timeline uncertainty, costs and fees, frequency of rezoning, and council and community opposition. It is read as a z-score (the number of standard deviations from the mean). A large number means high constraint.

7.2.2 Measuring Investment Demand for Properties

We also develop a general proxy for investor demand in the housing market, following Wheaton and Nechayev (2008). For this measure, we take the difference between the supply of new home units and household formation — if the number of housing starts is much higher than the rate of household formation, we conclude this increment to be financed by investors. Alternatively, builders may have been constructing units based on speculation, *i.e.*, if you build it, they will come. This is more likely, however, in the single-detached than in the multi-family segment where pre-sale

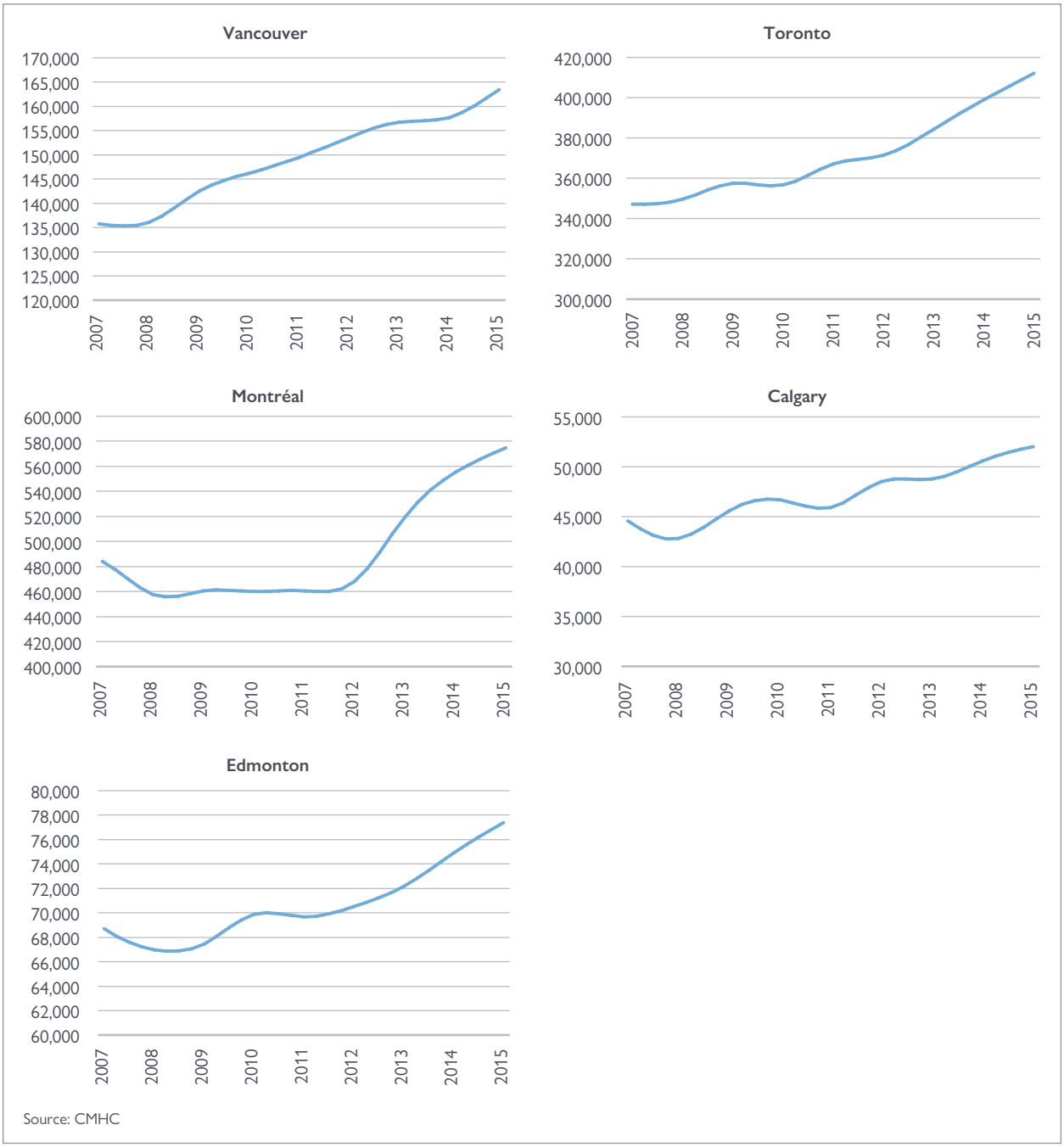
targets need to be reached prior to obtaining financing approval. For the current analysis, we use province-level data for household formation. Figure 38 indicates the gap between housing starts and household formation was positive during both 2002 and 2007 in the four provinces—British Columbia, Ontario, Quebec, and Alberta. The gap has remained positive in British Columbia since 2008, while it has become negative in Ontario, Quebec, and Alberta since 2013.

Figure 38: Housing starts and household formation



As an alternative measure of investor demand in the housing market, we also looked at the number of privately owned rental units. This measure reflects the sum of purpose-built and condominium apartment rental units. While this metric is specifically aimed at the rental sector (rather than homeownership), we use it as a crude indicator of investor demand since sentiment toward private property is likely correlated with this variable. Figure 39 shows that privately owned rental units in all five CMAs have been trending up since 2010, although levels and growth rates differ.

Figure 39: The stock of privately owned rental apartments



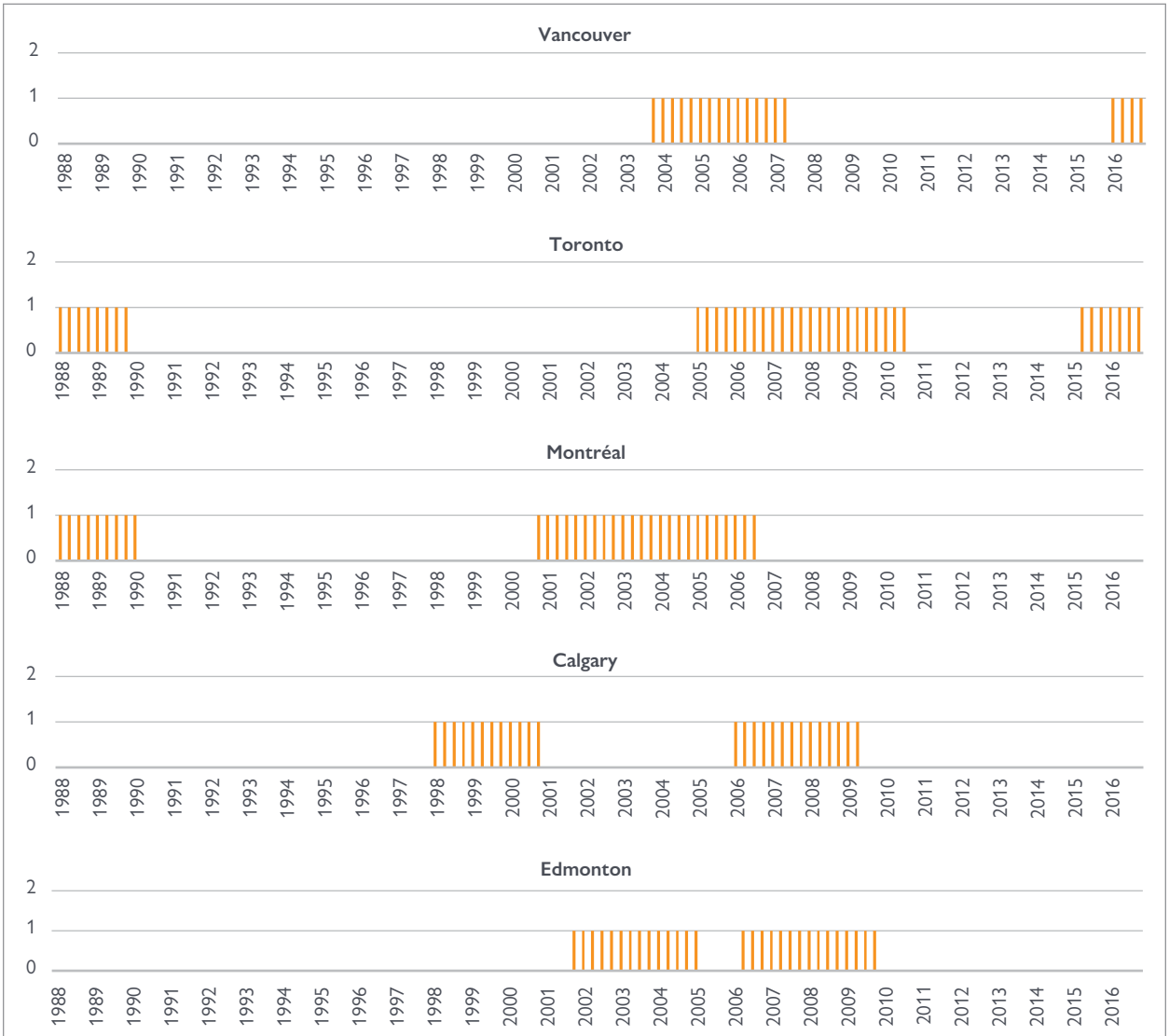
Source: CMHC

7.2.3 Measuring Speculation

CMHC's HMA framework contains a 'price acceleration' metric to detect rapid growth in house prices that may signal excess optimism for real state (Phillips *et al.*, 2015). Researchers at the Federal Reserve Bank of Dallas have also applied a similar method to monitor housing markets for episodes of excessive exuberance.

Figure 40 shows historical estimates of the price acceleration indicator, which takes on the value of 1 if there is price acceleration and zero otherwise. Recent price acceleration was detected in Vancouver and Toronto, while there was no such sign in Montréal, Calgary, or Edmonton. (Note that as part of the decision rules of the HMA framework, the indicator continues to reflect price acceleration for 3 years after it was last detected.)

Figure 40: Price acceleration metric



Sources: CMHC analysis using data from CREA and the Québec Federation of Real Estate Boards
Note: The indicator equals "1" when price acceleration is detected, "0" when it is not.

7.3 EMPIRICAL ANALYSIS

Recall that in Chapter 4 we evaluated the role of traditional fundamental factors—including disposable income, the size of the young-adult population, and mortgage rates. In the present analysis, we extend the framework to reflect additional factors—including supply constraints, investor demand for real estate properties, an indicator for speculation, and a CMA dummy controlling for the identity of each CMA. We also examine interrelated effects. We use two approaches to look at supply constraints: firstly, we use the Fraser Institute's measure of regulation, and then we use a geographic constraint developed by CMHC.

In this step, we conduct panel-data analysis where the key dependent variable represents the forecast error estimating the gap between actual and predicted prices (generated in Chapter 4). This forecast error is entered separately for each CMA i, where i denotes a specific CMA—Vancouver, Toronto, Montréal, Calgary, or Edmonton. The starting econometric model is as follows:

$$FERRORS_{i,t} = \alpha_0 + \alpha_1 CMA_i + \alpha_2 YTREND_{i,t} + \beta(REG_{i,t} \times MLSCAN_t) + \gamma INVDEM_{i,t} + \theta SPECULATION_{i,t} + \epsilon_{i,t}$$

where,

$FERRORS_{i,t}$: forecasting error for CMA i at time t from our Workhorse model;

CMA_i: fixed effect;

$YTREND_{i,t}$: year trend;

$REG_{i,t} \times MLSCAN_t$: interaction term between Fraser Institute's index of regulation and MLS® average house prices;

$INVDEM_{i,t}$: investor demand, defined as the difference between housing starts and household formation or, alternatively, as privately owned rental apartments;

$SPECULATION_{i,t}$: price acceleration dummy or the market sentiment index; and

$\epsilon_{i,t}$: error term.

Motivated by the previous chapter's discussion on the potential interaction between supply constraints and speculation, we also include an interaction effect between these two variables. The interaction term ($REG_{i,t} \times MLSCAN_t$) captures the idea that the effects of constraints on supply vary across house-price cycles (Gyourko *et al.*, 2008). Effectively, the constraint will be 'more binding' when house prices are high. Statistically, it introduces time variation into the regulation-constraint variable, which is measured over a year.

The results show statistically significant estimates for the effect of supply constraints as well as CMA dummies on increasing average prices. (Table 21.) Although weaker, there is evidence that investor demand and speculation for real estate are also increasing prices. The interaction term between regulation constraints and speculation has a significant effect on housing prices, suggesting that the impact of speculation on prices increases with the degree of regulation constraints, or that the impact of regulation constraints on house prices is more pronounced when there is speculation. This could indicate that speculation is more likely to occur in inefficient markets that are supply-constrained, as conditions prevent price deviations from readjusting. When the regulation constraint is interacted with investor demand for real estate properties, the term is not statistically significant.

Altogether, 72 per cent of the forecast errors can be explained by covariates—including CMA dummy, year dummy, regulation constraints, investor demand, and speculation. The regulation term is the key predictor of forecasting errors in different specifications. The positive coefficient of regulation constraints implies that house prices move up higher over the national cycle in more supply-constrained markets. The impact of regulation constraints on house prices is larger if there is speculation.

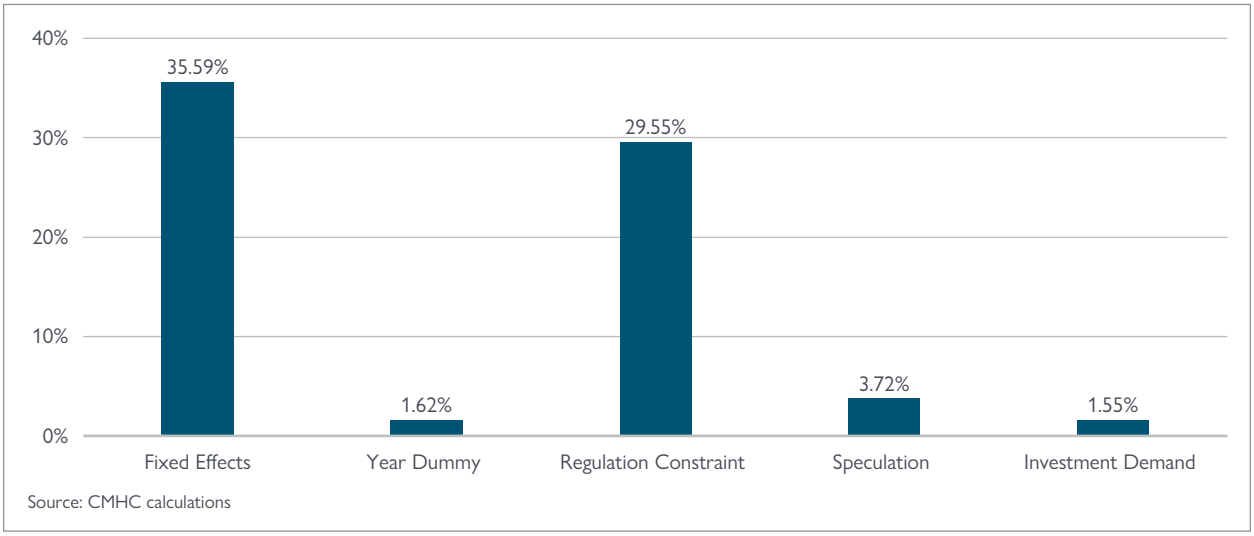
Table 21: Results of panel data analysis with regulation constraint
(Dependent variable = forecasting errors, 2010-2016, 5 CMAs)

INDEP. VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
Regulation constraint	0.18*** (6.41)	0.18*** (6.35)	0.17*** (6.02)	0.12*** (4.14)
Investment demand		0.88*** (2.86)	0.80** (2.43)	0.54* (1.69)
Speculation			6.70 (0.72)	-277*** (-3.56)
REG*Speculation				0.35*** (3.67)
Fixed effect	Yes	Yes	Yes	Yes
Year trend	-2.66* (-2.50)	-1.07 (-0.91)	-1.33 (-1.08)	-3.58* (-2.71)
R-squared	0.70	0.72	0.72	0.75

Note: t-statistics are reported in parentheses.
* Significant at the 10 per cent.
** Significant at the 5 per cent.
*** Significant at the 1 per cent.

The explanatory contribution of each variable is shown in Figure 41. The fixed effect accounts for 36 per cent of the forecasting errors, while the interaction term between regulation constraints and national house prices accounts for 30 per cent. Speculation and investor demand for properties account for 5 per cent of the forecasting errors.

Figure 41: Shapley value decomposition of the model to explain forecasting errors with regulation constraint



We now turn to using the geographic metric. Recall that there is an inverse relationship between the geographic constraint and the regulatory index. Hence, when we replace the regulatory constraint with the geographic constraint, we obtain a negative coefficient—the less developable land available, the higher the average price. Moreover, according to Table 22, the negative coefficient of geographic constraint implies that house prices move much more over the national cycle in more geographically constrained markets. Again, the impact of geographic constraints on house prices is larger if there is speculation. Both investor demand for real estate and speculation affect house prices significantly, and the impact of speculation is increasing when geographically constrained.

Table 22: Panel data analysis with geographic constraint
(Dependent variable = forecasting errors, 2010-2016, 5 CMAs)

INDEP. VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
Geographic constraint	-0.59*** (-2.75)	-0.87*** (-4.15)	-0.87*** (-4.16)	-0.88*** (-4.32)
Investment demand		1.49*** (4.27)	1.25*** (3.41)	1.24*** (3.46)
Speculation			18.65* (1.91)	-126** (-2.30)
GEO*Speculation				0.84*** (2.68)
Fixed effect	Yes	Yes	Yes	Yes
Year trend	2.07 (0.91)	7.39* (3.01)	6.63* (4.48)	-3.58* (-2.71)
R-squared	0.62	0.67	0.68	0.70

Note: t-statistics are reported in parentheses.

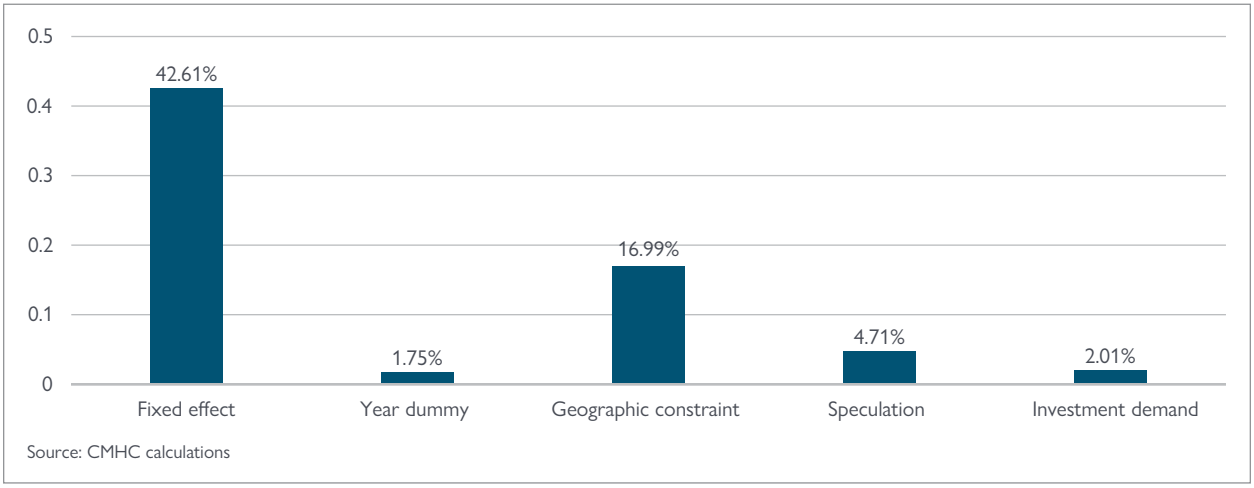
* Significant at the 10 per cent.

** Significant at the 5 per cent.

*** Significant at the 1 per cent.

In this formulation, 70 per cent of the forecasting errors can be explained by covariates—including geographic constraints, CMA dummy, investor demand, and speculation. Of this proportion, 43 per cent was accounted for by the CMA dummy, 17 per cent by geographic constraints, 5 per cent by speculation, and 2 per cent by investor demand. (See Figure 42.) The effect of geographic constraints is lower than regulatory constraints, but interestingly this smaller effect is reflected in the higher share explained by the fixed effect. (See Figure 41.)

Figure 42: Shapley value decomposition of the model to explain forecasting errors with geographic constraint



Source: CMHC calculations

The above results are robust to different measures of speculation and investor demand for real estate properties. For illustrative purposes, we show regression results with regulation constraints using different measures of speculation and investor demand. (See Table 23.)

Table 23: Panel data analysis to explain forecasting errors with different measures of speculation and investment demand

(Dependent variable = forecasting errors, 2010-2016, 5 CMAs)

INDEP. VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
Regulation constraint	0.18*** (6.41)	0.22*** (7.15)	0.21*** (6.32)	0.16*** (3.91)
Privately owned rental property		0.51*** (4.80)	0.45*** (4.12)	0.50*** (3.91)
Market sentiment index			1.11* (1.89)	1.21** (2.09)
REG*SENTIMENT				0.001** (2.18)
Fixed effect	Yes	Yes	Yes	Yes
Year trend	-2.66*** (-2.50)	-8.12*** (-5.77)	-7.87*** (-5.63)	-8.67*** (-6.09)
R-squared	0.70	0.75	0.76	0.77

Note: t-statistics are reported in parentheses.

* Significant at the 10 per cent level.

** Significant at the 5 per cent level.

*** Significant at the 1 per cent level.

To summarize:

- Chapter 4 showed that fundamental factors—such as disposable income, young-adult population, and mortgage—largely explain long-run trends in house prices in Vancouver, Montréal, Calgary, and Edmonton. However, these factors explain only one-third of the house price trends in Toronto; and
- Various combinations of covariates—including CMA-dummy, regulatory restrictions on land use, geographic constraints on land supply, investor demand for real-estate properties, and speculation—explain more than 70 per cent of the forecasting errors over the 2010-16 period. Among these factors, the most important contributors are the CMA dummy and regulation/geographic constraints of land use, while speculation and investor demand account for approximately 5 per cent of the forecast errors according to the model. The results are robust to different measures of speculation and investor demand for properties.

7.3.1 Alternative Modelling Approach: Robustness Check

The approach adopted in this study allows us to study the contribution of regional characteristics to explaining local-level house prices over the period from 2010 onward. To further test the validity of this approach, in this section we adopt an alternative approach that tests statistical significance over the entire sample from 1988 to 2016.

We conduct this robustness check in the following two ways:

1. Conduct panel-data analysis of the determinants of long-run house prices; and
2. Undertake analysis in an error correction model to study the determinants of short-run fluctuations in house prices.

7.3.2 Explaining Long-Run House Prices with the Full Sample

The formal presentation of the modified demand model is as follows:

$$PRICE_{i,t} = c + \alpha_1 CMA_i + \alpha_2 YEAR_t + \beta_1 INCOM_{i,t} + \beta_2 YPOP_{i,t} + \beta_3 MORTGAGE_{i,t} + \sum_{j=-k}^{k} \gamma_{1,j}\, \Delta INCOME_{i,t-j} + \sum_{j=-k}^{k} \gamma_{2,j}\, \Delta YPOP_{i,t-j} + \sum_{j=-k}^{k} \gamma_{3,j}\, \Delta MORTGAGE_{i,t-j} + \varepsilon_{i,t}$$

where

$PRICE_{i,t}$: natural logarithm of real house prices in CMA i

CMA_i: fixed effect

$YEAR_t$: year dummy

$INCOM_{i,t}$: natural logarithm of real personal disposable income per person

$YPOP_{i,t}$: natural logarithm of young-adult population aged 25-34 years old

$MORTGAGE_{i,t}$: real 5-year fixed mortgage rates;

$\sum_{j=-k}^{k} \Delta$: control variables in leads and lags; and

$\epsilon_{i,t}$: error term.

Under the specification using the full sample, results show that the CMA dummy, disposable income, young-adult population, and mortgage rates significantly affect long-run house prices. (See Table 24.) In particular, an increase of one per cent in real disposable income raises house prices by 1.16 per cent; an increase of one per cent in the young-adult population increases house prices by 0.37 per cent; and a decrease of 100 basis points in real mortgage rates raises house prices by one per cent.

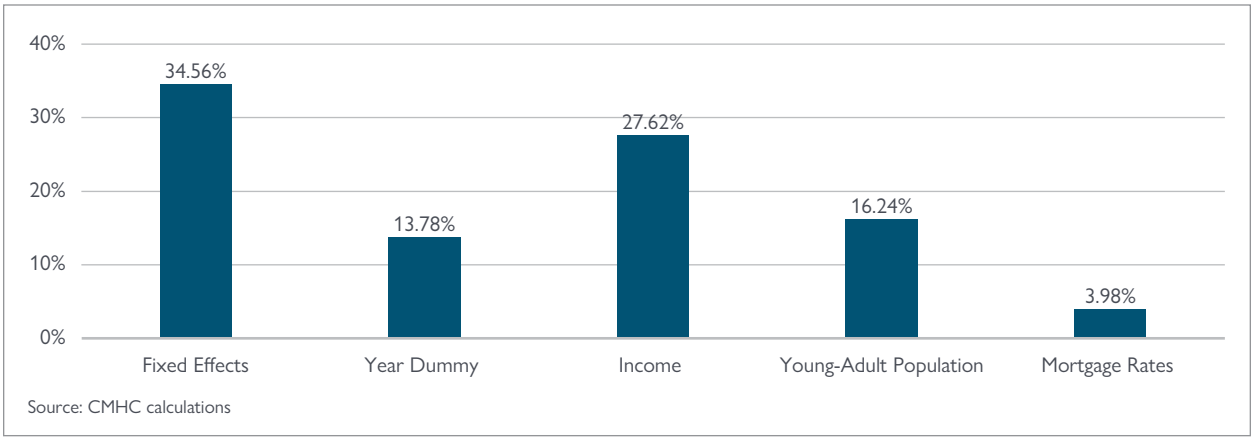
Table 24: Panel-data result of the long-run equation using full-sample data
(Dependent variable = real house prices in natural logarithm, 1988-2016, 5 CMAs)

INDEP. VARIABLE	MODEL
Income	1.79*** (23.61)
Population 25-34	0.56*** (9.77)
Mortgage rate	-0.02*** (-6.72)
Fixed effect	Yes
R-squared	0.92

Note: t-statistics are reported in parentheses.
* Significant at the 10 per cent.
** Significant at the 5 per cent.
*** Significant at the 1 per cent.

The combination of CMA dummy and fundamental factors explains 92 per cent of the price variation among the five CMAs. Of this proportion, results from the Shapley value decomposition indicate that 49 per cent of the variation is accounted for by the CMA dummy, 21 per cent by disposable income, 10.5 per cent by young-adult population, and 11.32 per cent by real mortgage rates. (See Figure 43.)

Figure 43: Shapley value decomposition of the long-run equation, 1988-2016



7.3.3 Error-Correction Model

To explain short-run fluctuations in house prices, we adopt an Error-Correction Model. The essential argument here is that many of the additional factors that could account for high prices may only occur at the peak or trough of the housing market—investor demand will not be uniform throughout the business cycle, for instance, but may tend to exacerbate cyclical upswings, and will therefore impact shorter term fluctuations.

The formal presentation of the model is as follows:

$$\begin{aligned}\Delta PRICE_{i,t} = {} & c + \alpha_1 CMA_i + \alpha_2 YEAR_t + \alpha_3 ECT_{t-1} + \beta_1 \Delta(REG_i \times MLSCAN_t) + \beta_2 INVDEM_{i,t} \\ & + \beta_3 SPECULATION_{i,t} + \beta_4 \Delta INCOM_{i,t} + \beta_5 \Delta YPOP_{i,t} + \beta_6 \Delta MORTGAGE_{i,t} \\ & + \sum_{j=-k}^{k} \gamma_{1,j}\, \Delta\Delta(REG_i \times MLSCAN_{t-j}) + \sum_{j=-k}^{k} \gamma_{2,j}\, \Delta INVDEM_{i,t-j} + \sum_{j=-k}^{k} \gamma_{3,j}\, \Delta\Delta INCOME_{i,t-j} \\ & + \sum_{j=-k}^{k} \gamma_{4,j}\, \Delta\Delta YPOP_{i,t-j} + \sum_{j=-k}^{k} \gamma_{5,j}\, \Delta\Delta MORTGAGE_{i,t-j} + \varepsilon_{i,t}\end{aligned}$$

where

$\Delta PRICE_t$: growth rate of house prices from the previous quarter

CMA_i: fixed effect

$YEAR_t$: year dummy

ECT_{t-1}: error-correction term

$\Delta REG_i \times MLSCAN_t$: interaction term of regulation constraint index and growth rate of MLS® average of house prices for Canada

$INVDEM_{i,t}$: investor-driven demand, defined as the difference between housing starts and household formation

$SPECULATION_{i,t}$: price acceleration dummy or consumer confidence index (the percentage of people that think it is a good time to purchase a house or other durable goods)

$\Delta INCOM_t$: growth rate of real personal disposable income per person

$\Delta YPOP_t$: growth rate of young-adult population

$\Delta MORTGAGE_t$: change in real 5-year fixed mortgage rates

$\sum_{i=-k}^{k} \Delta\Delta$: includes control variables in leads and lags and

ε_t: Error term.

The impact of regulation constraints on the growth rate of house prices is significant in the model. Results are robust in various specifications. The error-correction term is significant in various specifications, indicating the existence of long-run relations between house prices and fundamental factors. The negative coefficient of -0.06 implies that the half-life of a shock to price growth is 11 quarters. The half-life is approximated by $\ln(2)/\ln(1+\alpha_3)$, where α_3 is the coefficient of the error-correction term. It takes five and a half years for prices to adjust back to fundamental levels. Both investor demand for real estate properties and speculation affect growth of house prices significantly.

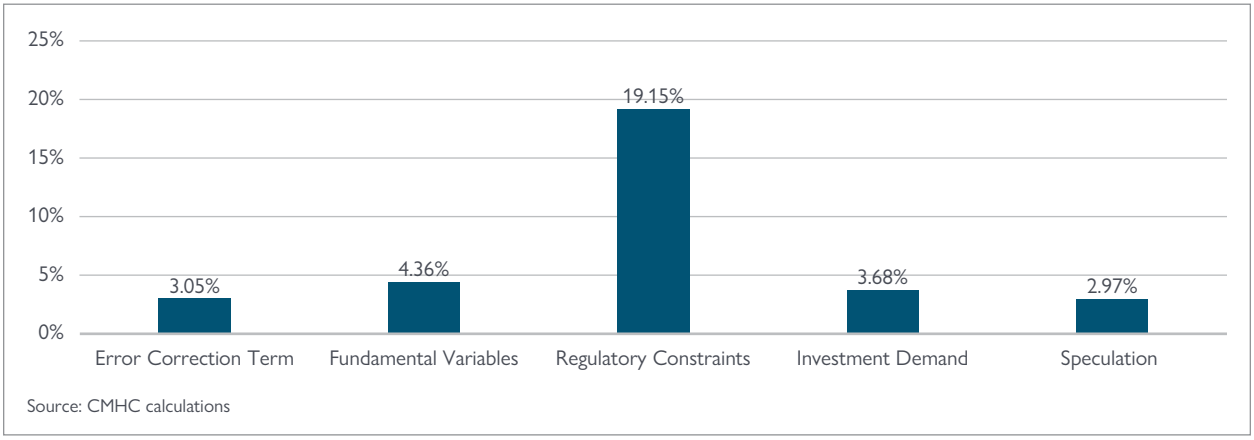
The model explains 33 per cent of growth variation in house prices. Of this proportion, the Shapley value decomposition shows that 3 per cent is accounted for by the error correction term, 19 per cent by regulation constraints interacting with the national average price, 4 per cent by fundamental factors, 4 per cent by investor demand for properties, and 3 per cent by speculation. The results are robust to different measures of speculation. (See Figure 44.)

Table 25: A panel data analysis of error-correction model
(Dependent variable = growth rate of real house prices, 1988-2016, 5 CMAs)

INDEP. VARIABLE	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
Regulation constraint	0.07*** (8.00)	0.07*** (8.43)	0.07*** (8.52)	0.07*** (8.52)
Error correction term		-0.05*** (-4.20)	-0.07*** (-5.36)	-0.08*** (-5.54)
ΔIncome		0.10* (1.83)	0.11** (2.04)	0.11** (2.13)
ΔPopulation 25-34		1.27*** (3.84)	1.59*** (4.75)	1.51*** (4.47)
ΔMortgage rate		-0.05*** (-4.20)	0.002** (2.19)	0.002** (2.16)
Investment demand			0.0006*** (3.37)	0.0006*** (5.12)
Speculation				0.004 (1.47)
CMA Fixed effect	Yes	Yes	Yes	Yes
Year Fixed effect	Yes	Yes	Yes	Yes
Constant	-0.01 (-1.01)	-0.007* (-0.75)	-0.005* (-0.51)	-0.009 (-0.89)
R-squared	0.32	0.38	0.40	0.40

Note: t-statistics are reported in parentheses.
* Significant at the 10 per cent.
** Significant at the 5 per cent.
*** Significant at the 1 per cent.

Figure 44: Shapley value decomposition of the Error-Correction model



Source: CMHC calculations

7.4 CONCLUSION

In this chapter, we identified and tested the determinants of short-run fluctuations of house prices across Canada's major metropolitan centres—Vancouver, Toronto, Montréal, Calgary, and Edmonton—over the 2010-16 period. The results show that 70 per cent of forecasting errors unexplained by traditional fundamental factors (i.e., income, young-adult population, and mortgage rates) are in turn explained by other factors—such as CMA dummy, land-use regulation/geographic constraints, investor demand for properties, and speculation. In general, however, any gap between predicted and actual prices tends to be associated with supply restrictions.

The results using the full sample from 1988 to 2016 are robust to various specifications. In particular, the Error-Correction model reveals that house prices share long-run relations with fundamental factors (i.e. income, young-adult population, and mortgage rate), and that the error-correction term contributes significantly to explaining price fluctuations. Furthermore, Shapley value decomposition results show that the CMA dummy and geographic constraints on land use are the most important factors explaining price fluctuations.

8 Who are the Domestic Investors in Canada's Housing Market?

CHAPTER OBJECTIVES:

- Examine the extent of investment by individual Canadian taxfilers in the housing market, at least partially, for the purpose of generating rental income. Such income could also come from renting spare bedrooms or basements.
- Explore the characteristics of investors.

KEY FINDINGS:

- Around 5 per cent of Canadian taxfilers obtain income from rental property. Of these, half are from the five cities covered in this report. By comparison, this proportion was only 40 per cent for the overall taxfiling population.
- While the number of taxfilers reporting rental income is increasing, the average income from rent is declining.
- There appears to have been an increase in total rental income relative to fixed income generated by investments such as bonds. This would be consistent with lower interest rates and investors switching away from bonds towards housing in the "search for yield."

8.1 INTRODUCTION

In our earlier models, we adopted a battery of approaches to assess what fundamental factors could explain house price growth in Canada's major markets. Taken together, our results indicated that, although conventional fundamentals helped account for price growth, there was a portion of the gap between predicted prices and actual price changes that remained unexplained, particularly for Vancouver and Toronto.

In this section, we examine another factor that could impact the demand for housing—investor interest in rental markets. Statistics that depict movements along the rental income distribution, such as the proportion of taxfilers entering or exiting rental markets from one year to the next, provide indirect, but important, new evidence to help understand the role of investors in influencing house prices.

We concentrate in this chapter on examining the extent of individuals' direct investment in property for rental. We also document recent trends. Unfortunately, these data do not go back far enough in time to apply the methods used elsewhere in this report to examine house prices.

8.2 DATA AND DATA SOURCES

Rental market investment activity has many implications. To this end, we have developed new time series data using the Longitudinal Administrative Databank (LAD) to examine the dynamics of Canadian taxfilers and identify patterns characterizing investment in Canada's largest housing markets. The data therefore consist of information on the flow of funds, not the stock.

The LAD is a 20 per cent Bernoulli sample of the T1 Family File (T1FF) and is constructed by Statistics Canada using information from individual income tax records and other administrative sources. The T1FF covers all persons from census families and persons not in census families who completed a T1 income tax return. The LAD also contains information from the Longitudinal Immigration Database (IMDB), which covers immigrants who landed between 1980 and 2015 and provides information on their key characteristics at landing.

However, the LAD is not a simple random sample of the T1FF population—only those with an SIN are eligible to be sampled into the LAD. This sampling rule ensures individuals can be tracked over time with a reliable identifier. Also important to note is that the data should be interpreted in the context of living taxfilers—not the whole population, as not all individuals file income tax returns and a small share of taxfilers die each year.

All dollar figures are expressed in nominal terms, and to prevent our analyses from becoming skewed, the entire sample is trimmed of extreme outliers at the upper tail of distributions and across individual characteristics. The population of the LAD is estimated by scaling the number of records by a factor of 5, and prior to release, the data are subjected to stringent non-disclosure practices, including statistical dominance tests, estimate rounding, and the addition of unbiased random noise using disturbance weights. The unit of analysis in this study is individual taxfilers since LAD weights are available only at the individual- rather than at the household-level.

The LAD now spans 34 years, from 1982 to 2015, and contains a wide variety of demographic variables, as well as investment and non-investment income sources. But the current LAD sample does not allow us to generate statistics that provide direct evidence on housing investment activity. Consequently, CMHC worked with Statistics Canada to establish a record linkage between the LAD and the Statement of Real Estate Rentals (T776). Hence, we are the first to use administrative tax data to conduct rental market analyses in Canada.

The T776 data are available at Statistics Canada from 2000 and currently reflect both bar code returns and EFILE information. However, the sample is restricted to 2006 and subsequent years since information from bar code tax records is not available for prior years. The T776 linkage file contains only those records that match LAD record SINs, and each filer may submit up to six T776 forms due to electronic tax filing limitations. As such, data on individual rental properties may not always be complete, and therefore we report estimates of the minimum number of rental properties, which may not always represent the full size of their portfolios.

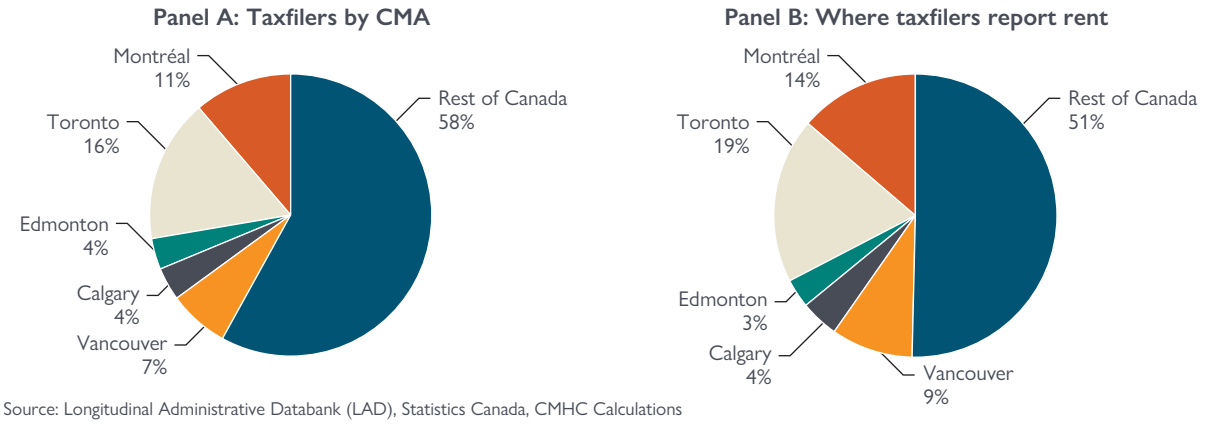
A final point is that identified partnership records are removed, and we calculate gross rental income shares, since gross rent, as reported in the T1FF, cannot be interpreted directly. Gross rent is one of the key measures used in this chapter to determine the scale of investment activity in Canada's major centres.

8.3 BASIC FACTS AND TRENDS

This section provides a broad statistical portrait of rental market dynamics in Canada's five largest metropolitan centres. It describes panels of rental taxfilers—that is, populations reporting rental income—and presents trends from 2010 to 2014, a period of significant house price growth. Estimates by total income decile, age and sex are used to examine patterns, as are comparisons between immigrant and Canadian-born taxfilers.

Nationally, 27.4 million taxfilers reported income in 2014, up 5.2 per cent from 2010. Among the census metropolitan areas (CMAs), Toronto had the highest share of Canadians filing tax returns, followed by Montréal and Vancouver. In line with underlying demographics, the share of taxfilers was lower in Calgary and Edmonton. (See Panel A of Figure 45.)

Figure 45: Taxfiler data in Canada, by CMA, 2014

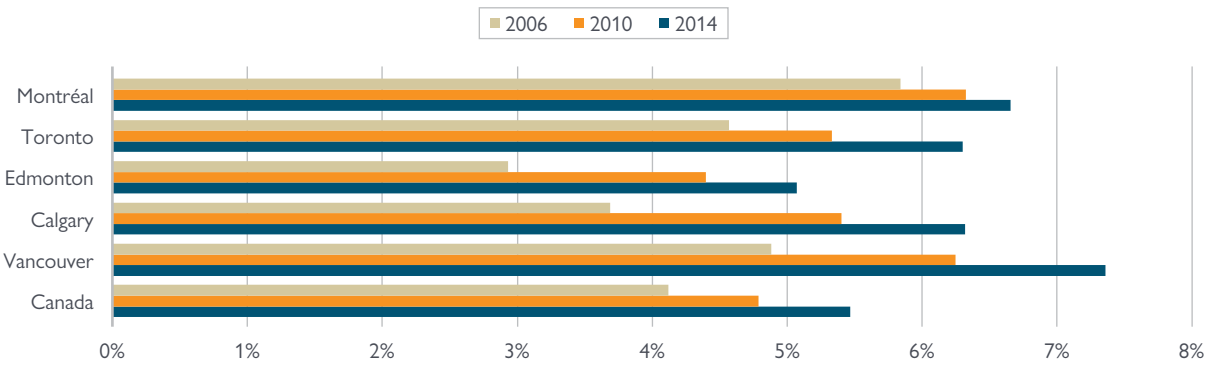


Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Similarly, the proportion of filers reporting gross rental income in 2014 tended to follow patterns consistent with those of the Canadian population. Toronto (18.9 per cent), Montréal (13.7 per cent) and Vancouver (9.3 per cent) had the highest shares of rental taxfilers, while these shares were lower in Calgary (4.4 per cent) and Edmonton (3.3 per cent). Overall, the five CMAs combined accounted for 49 per cent of rental taxfilers in Canada, which was above the share of the country's total taxfilers, at 42 per cent. (See Panel B of Figure 45.)

In relative terms, the share of rental filers as a proportion of the total number of taxfilers increased across the country, although trends varied greatly from one city to another. In Canada as a whole, 5.5 per cent of taxfilers reported rental income in 2014, compared with 7.4 per cent in Vancouver, 6.7 per cent in Montréal, and 6.3 per cent in both Toronto and Calgary. Edmonton had the lowest share (5.1 per cent) among the cities. (See Figure 46.)

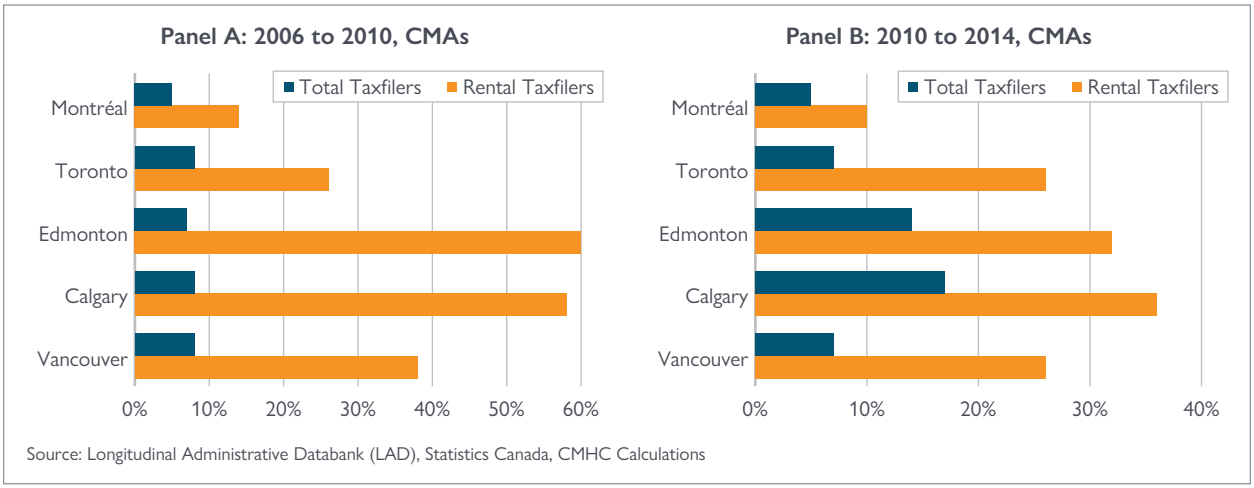
Figure 46: Share of Taxfilers Reporting Rent Relative to All Taxfilers, by CMA



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Regional variations were also observed on the growth rates of taxfilers. Over the 2006 to 2010 period, the number of rental taxfilers grew at the fastest pace in the Prairie CMAs of Alberta. (See Panel A of Figure 47.) The shares climbed approximately 60 per cent in both Calgary and Edmonton, about three times the rate for Canada (22 per cent).

Figure 47: Growth in the number of taxfilers, and in the number of taxfilers reporting rental income, by CMA



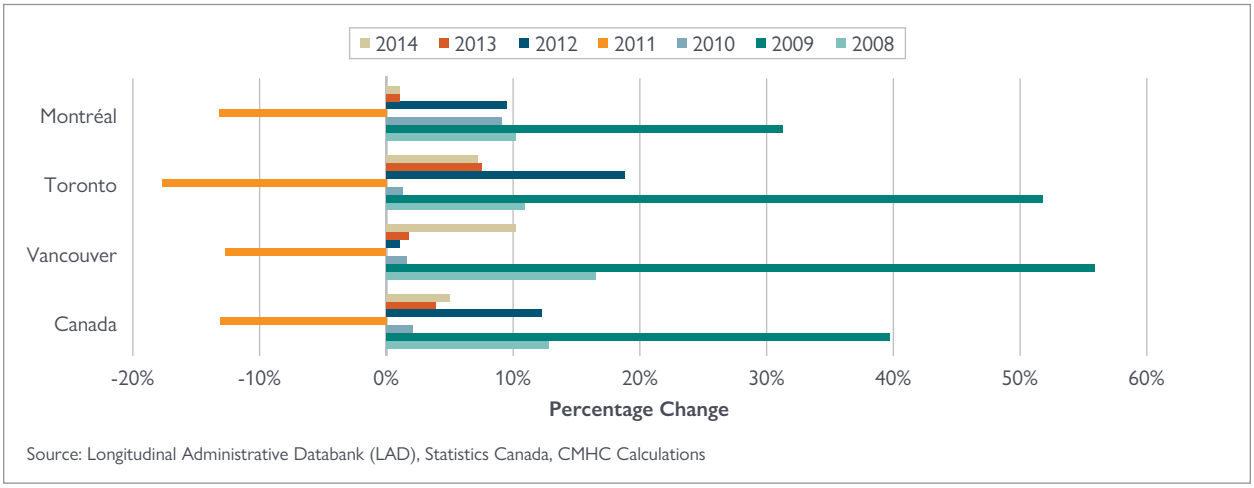
Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

This pattern changed over the 2010-2014 period, when there was less difference among the CMAs in terms of growth in the number of taxfilers reporting rent. With the exception of Montréal, growth ranged from 26 per cent in both Vancouver and Toronto to 36 per cent in Calgary. (See Panel B of Figure 47.)

In 2014, Canadians reported over $23 billion in total rental income; this represented approximately 2 per cent of total income reported by Canadians in that year. Among the CMAs, total gross rental income was highest in in Toronto ($4.4 billion) and Montréal ($4 billion), followed by Vancouver ($2.5 billion). In contrast, taxfilers in Calgary and Edmonton had the lowest total gross rental income ($1 billion and $0.8 billion, respectively).

As Figure 48 shows, total gross rent declined in 2011 before bouncing back in 2012. With the exception of Edmonton, where total rent remained essentially flat, the decline was also widespread across CMAs, with the largest decreases in Toronto (-18 per cent), Vancouver and Montreal (both -13 per cent).

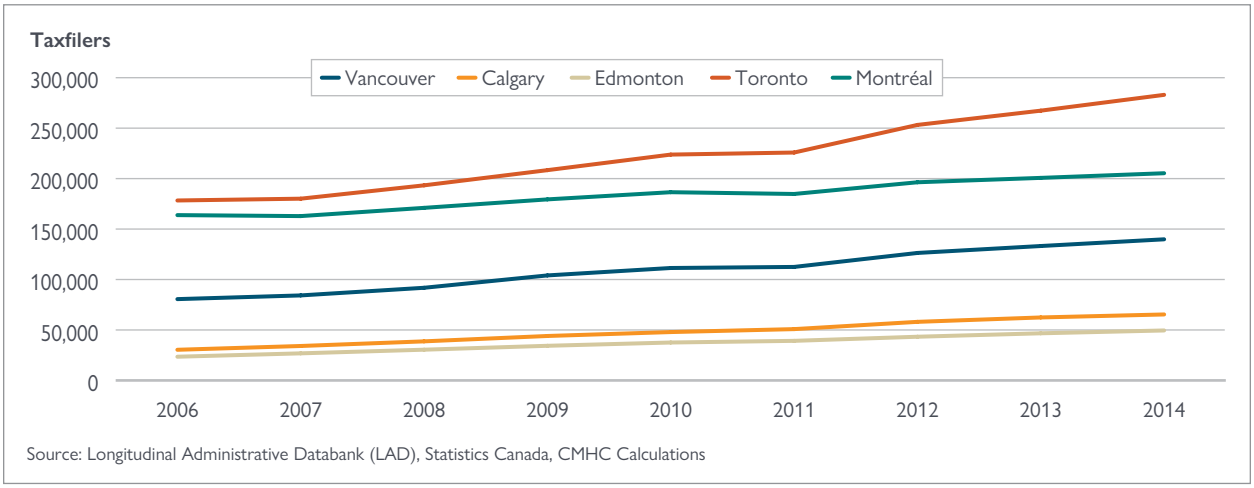
Figure 48: Change in Gross Rental Income of Taxfilers



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Despite the 2011 decline in gross rent, there were steady increases in the number of taxfilers reporting rent. (See Figure 49.) Every CMA in the study posted taxfiler growth above 5 per cent, except for Montréal. Altogether, the data confirm a sharp increase in the number of small-scale investors reporting rental income over the period.

Figure 49: Change in the number of rental taxfilers



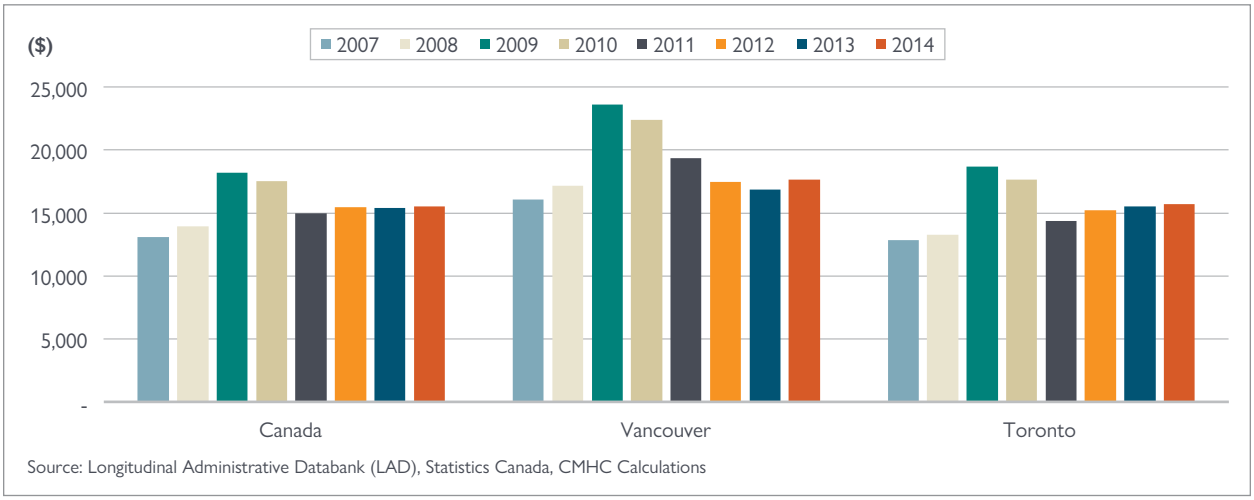
Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Such a pattern occurred against the backdrop of expanded use of mortgage helpers—that is, dwelling units that have been created within a larger principal residence. This trend makes pricier homes more affordable by enabling homebuyers and investors to qualify for bigger mortgages, in line with escalating home prices in Canada's major metropolitan centres.

Overall, the average rental income reported by Canadian taxfilers was estimated at $18,165 in 2009. The average decreased to $14,991 in 2011 and rose to $15,456 in 2012. However, this growth was still not enough to offset the declines in average rent that occurred over the period. (See Figure 50.) Again, the decline in average rental income, coupled with the increase in the number of rental taxfilers, suggests that a greater number of smaller units, basements or spare bedrooms are being rented out.

At the regional level, taxfilers in Montréal reported the highest average rent in 2014 ($19,539), followed by those in Vancouver ($17,666), Edmonton ($15,783) and Calgary ($15,665). The lowest average rental income was reported in Toronto ($15,721), which is somewhat low for a city with higher levels of income and wealth.

Figure 50: Average Gross Rental Income Reported by Taxfilers



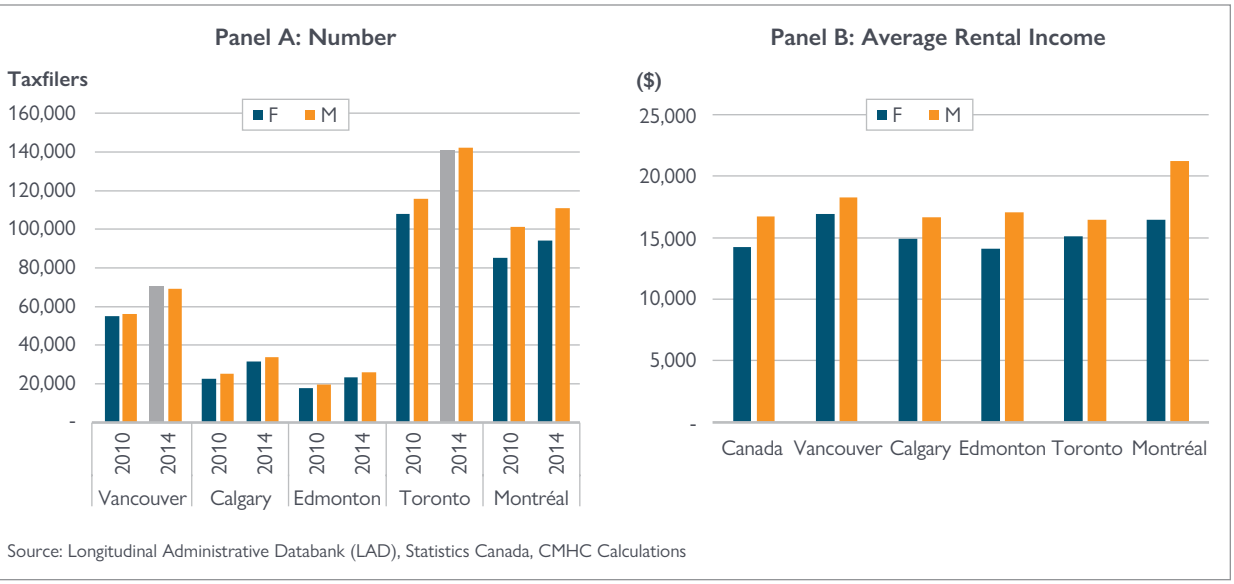
Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

8.4 SURGING ACTIVITY FROM FEMALE TAXFILERS

During the 1980s, the increase in the share of female taxfilers—the share they represent of the total taxfiler population—was the largest observed in Canada. In particular, there have been slightly more female than male taxfilers since 1984, marking a reversal of trends according to LAD data.

Nonetheless, the sex structure of the rental taxfiler population in 2010 was similar across all five CMAs, with more males than females reporting rental income. The rental share composed of males ranged from 51 per cent in Vancouver to 54 per cent in Montréal. (See Panel A of Figure 51.)

Figure 51: Rental Taxfilers by gender, 2014



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

However, this differential in taxfiler shares has since been reduced, as growth has been more rapid for females than males during the 2010-2014 period. The number of female taxfilers reporting rent in Canada rose 22 per cent to 706,775 in 2014, with the largest gains in Toronto (30 per cent) and Vancouver (28 per cent). In contrast, the rate was relatively lower among male taxfilers, at 23 per cent in both cities. Overall, the difference in rental shares that existed between male and female taxfilers prior to 2010 had largely disappeared by 2014.

Despite an increasingly female population, there were still differences in average rental income reported between the two groups. In 2014, for example, female taxfilers reported an average of $14,221 in gross rental income, while male taxfilers reported an average 1.2 times that of females, at $16,726—a gap that could at least be partially explained by a growing market share of smaller rental units, such as less expensive basement apartments.

At the same time, the difference in average reported rent was also evident also across the CMAs. Among female taxfilers, average rent ranged from $14,082 in Edmonton to $16,922 in Vancouver, a difference of $2,840. (See Panel B of Figure 51.) For males, the difference in rental income reported was even larger. Taxfilers in Montréal reported on average $21,224 in gross rent, nearly 28 per cent more than the average reported in Calgary, for example.

8.5 TORONTO IMMIGRANTS INVESTING MORE

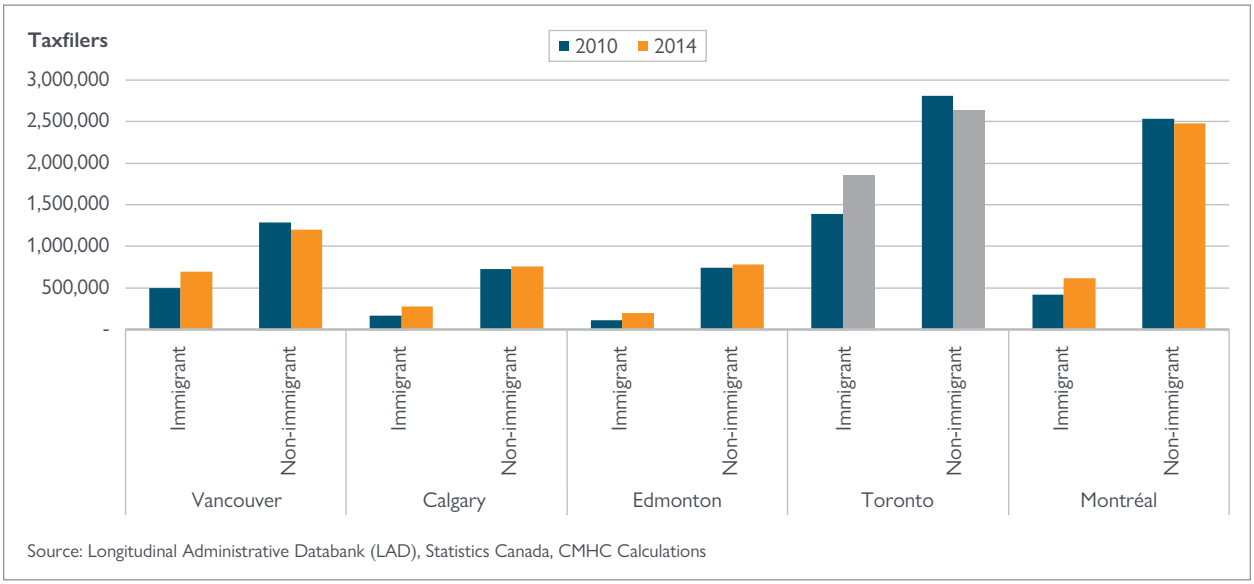
This section provides new evidence on the distribution of taxfiling immigrants as well as variations across the five major metropolitan centres covered in this report.

In 2014, over 4.8 million immigrants filed taxes in Canada, accounting for about 18 per cent of the country's total taxfiler population. The term *immigrant* is used here to refer to individuals that have, at any point in their lives, been landed immigrants or permanent residents. In that same year, their share ranged from 20 per cent in both Montréal and Edmonton to 37 per cent in Vancouver and 41 per cent in Toronto.

The 2010-2014 panel of taxfiling immigrants grew 44 per cent over the period in Canada. In contrast, Canadian-born taxfilers contributed slightly negatively over the period, marking the first time that the LAD data has recorded a smaller number of taxfilers (starting in 2011).

Population growth among taxfiling immigrants varied significantly across the five CMAs in the study. In relative terms, Edmonton, Calgary and Montréal were among the cities with the highest growth rates. However, a large part of this variation is attributable to population size differences. And while, in absolute terms, the number of immigrant taxfilers increased in each CMA, they grew fastest in Toronto. (See Figure 52.) Vancouver had the second-largest increase in the number of immigrants.

Figure 52: Total Taxfiler Population

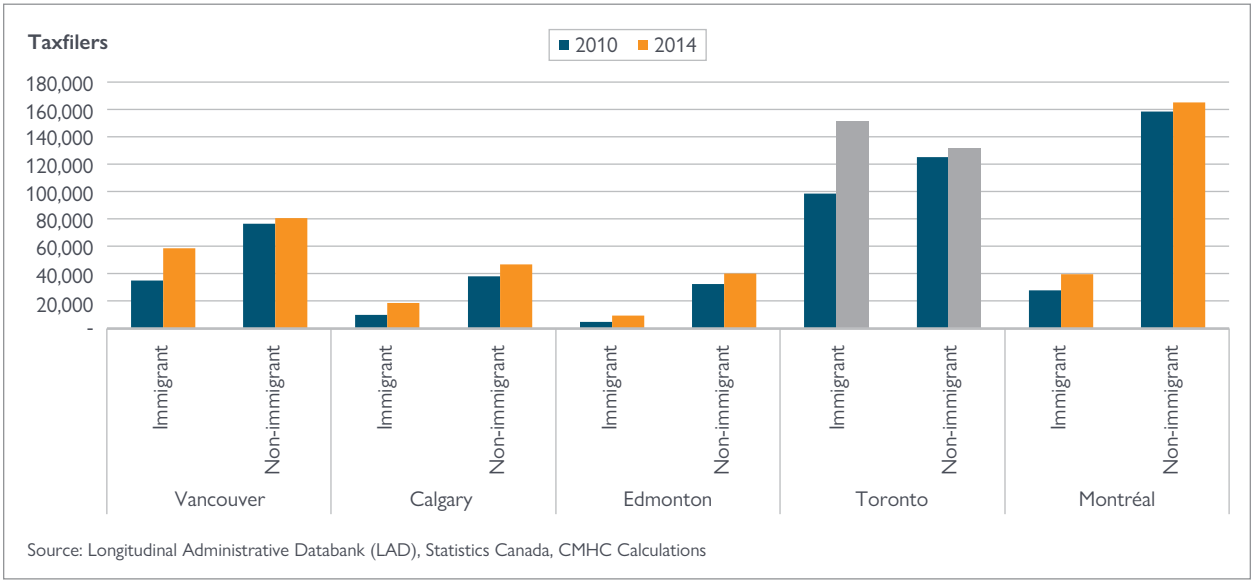


Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Since 2010, a growing share of immigrants have reported rental income in Canada's housing markets. Rental taxfiling rates for immigrants increased nationally, from 18 per cent in 2010 to 23 per cent in 2014. Among the CMAs, Toronto and Vancouver had the highest proportions of immigrant taxfilers reporting rent in 2014, followed by Calgary. Rental taxfiling rates were lower in both Edmonton and Montréal, somewhat below the national rate.

The figures for Toronto, Canada's largest housing market, provide new evidence on the evolution of investment activity over the past few years. For the first time in 2012, the share of immigrant rental taxfilers in Toronto (50.1 per cent)—the share they represent of the total taxfiler population reporting rental income—exceeded the share of Canadian-born taxfilers (49.9 per cent). The share has since remained elevated relative to historical levels, increasing to 52.4 per cent in 2013 and to 53.5 per cent in 2014. (See Figure 53.)

Figure 53: Rental Taxfiler Population

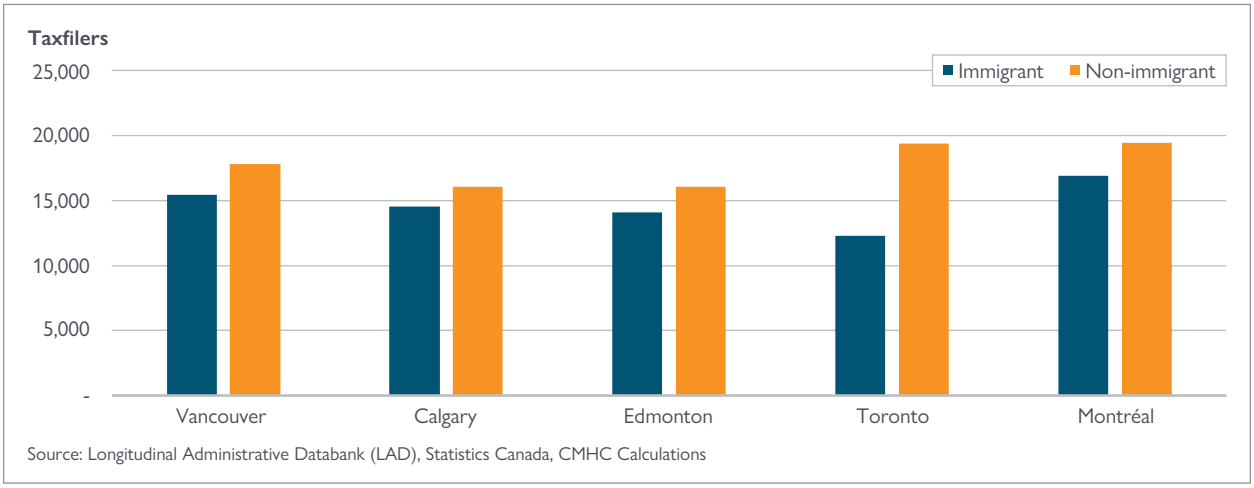


Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

This trend toward more immigrant than Canadian-born rental taxfilers in Toronto occurred against the backdrop of an increasingly immigrant population. However, this explains some—but not all—of the differences in rent reporting rates between the two groups of taxfilers. If economic incentives have shifted differentially, then part of the divergent trends in rental investment could be traced to other demand side factors, such as the strength and diversity of Toronto's labour market, which attracts young adults seeking post-secondary education or employment.

On average, Canadian-born taxfilers reported higher rental income than immigrant taxfilers in each of the CMAs in 2014. (See Figure 54.) Montréal and Toronto reported the highest rental averages. Perhaps surprisingly, taxfiling immigrants in Toronto reported the lowest average rent.

Figure 54: Average Gross Rental Income, 2014



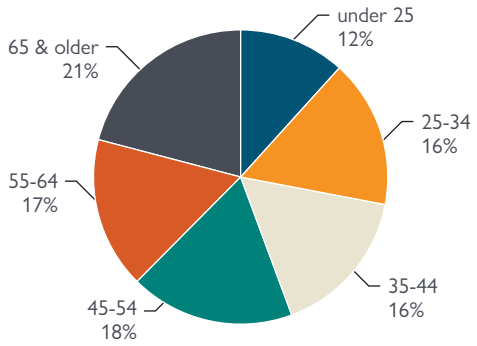
Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

8.6 LIFE-CYCLE PATTERNS CONTINUE TO SHAPE THE MARKET

From 2011 to 2014, Canada registered the largest increases in the proportion of taxfilers aged 65 and over since the 1993 tax year. This acceleration of taxfiler aging is the result of the first baby boomers reaching the age of 65 in 2011.

As a result of the rapid growth in the number of seniors, 2012 marked the first time that more seniors filed income taxes than taxfilers aged 45 to 54. In particular, the share of senior taxfilers increased from 22 per cent in 2010 to 24 per cent in 2014. The corresponding numbers for 45- to 54-year-olds declined from 22 per cent to 20 per cent during the period, as people who reached these ages are smaller in number than the baby boomers. Meanwhile, the share was unchanged for taxfilers under 25, at 12 per cent. By comparison, Canada's overall taxfiler population grew by 5 per cent over the same period. (See Figure 55.)

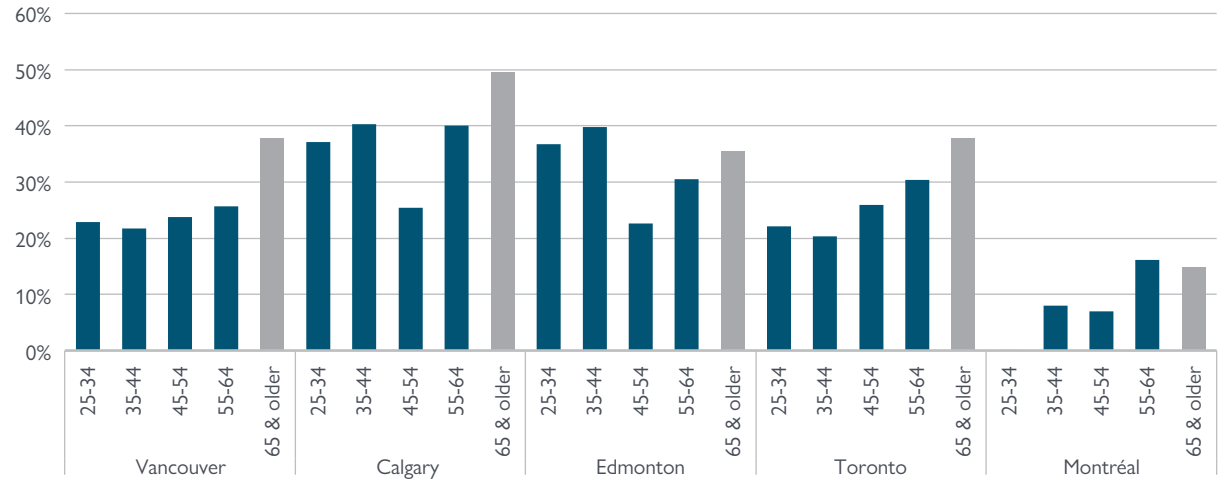
Figure 55: Taxfiler Population Shares, Canada, 2014



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Trends in the proportions of rental taxfilers are also shifting towards those aged 65 and older. Across groups, growth in the number of seniors reporting rent became stronger than that for other age groups over the 2010-2014 period. (See Figure 56.)

Figure 56: Rental Taxfiler Growth, 2010-2014

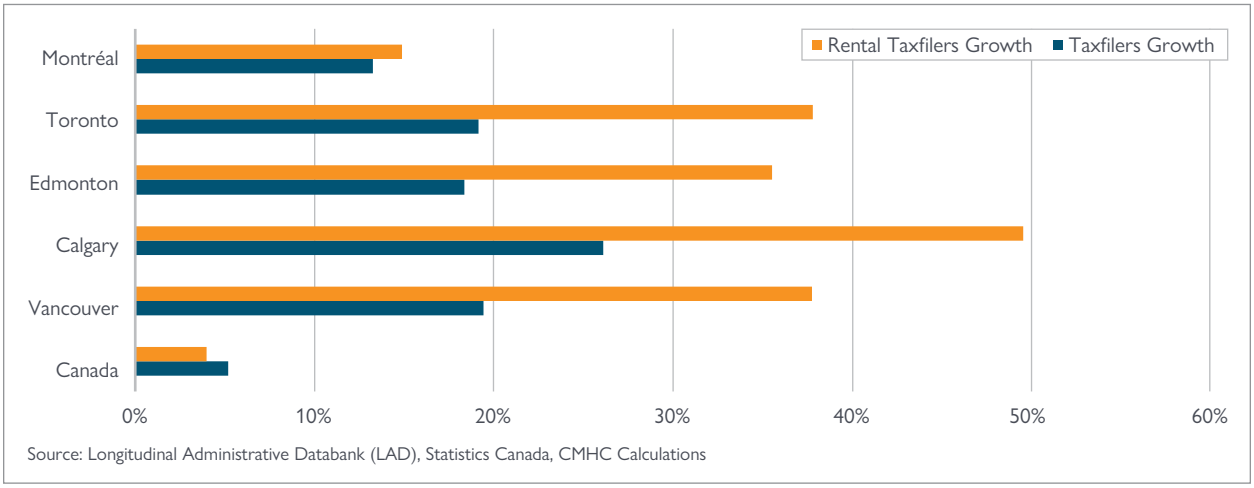


Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Outside of Montréal, our estimates suggest that rental taxfiler growth tends to be strongest for those aged 65 and older, ranging from 36 per cent in Edmonton to 50 per cent in Calgary. Generally, taxfilers aged 55 to 64 had the second-largest increase among the CMAs, with growth between 26 per cent in Vancouver and 40 per cent in Calgary. While still reasonably high, growth was slowest among the younger group of taxfilers aged 25 to 34. Increases for this age group ranged from 22 per cent in Toronto and 23 per cent in Vancouver to 37 per cent in both Prairie CMAs.

As Figure 57 shows, in addition to a growing portion of the taxfiler population aged 65 and older, there were also proportionately more seniors reporting rental income in 2014. This suggests that, aside from population aging, other factors can also have an impact on changes in the number of rental taxfilers.

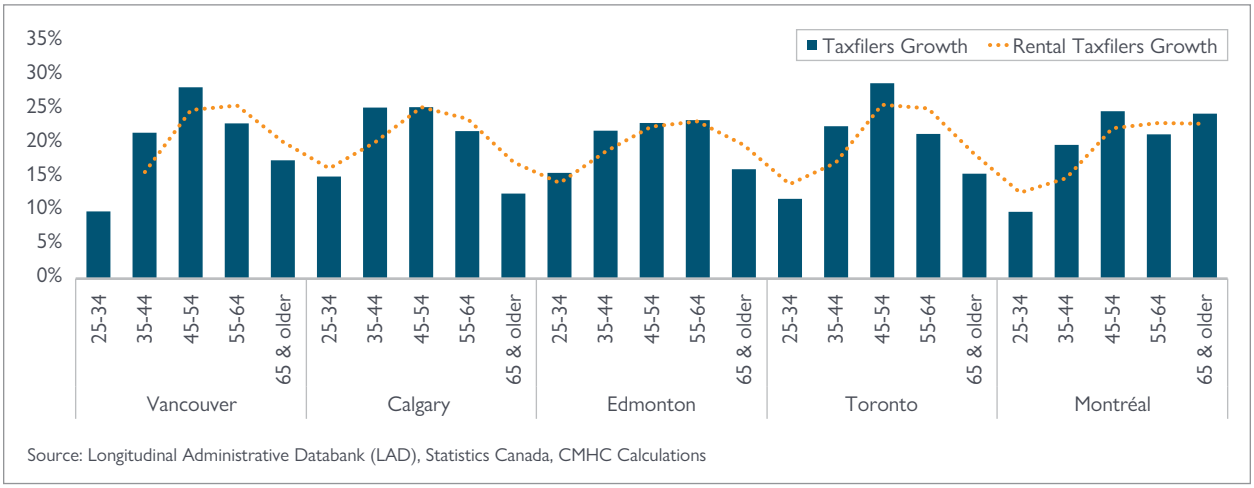
Figure 57: 2010-2014 Growth of Taxfilers 65 and older



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Although growth patterns varied with age, the age composition of the rental taxfiler population is relatively uniform across Canada's largest metropolitan centres. With the exception of Montréal (which shows less dissaving with age), rental market profiles followed an inverted U-shaped pattern over the life-cycle. In other words, rental investment tracked taxfiler earnings in this cross-section of the data, with rising rates from the 20s until the 40s and steadily declining rates at older ages over the period of dissaving toward retirement. (See Figure 58.)

Figure 58: Taxfiler Shares of the Rental Market, 2014



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Generally, younger taxfilers will not have had the time to accumulate enough savings for down payments, causing them to delay investment. Further, younger taxfilers now study longer, begin their careers later and delay family formation. As such, borrowing constraints may be more binding for this age group, and this is particularly true during periods of rising house prices.

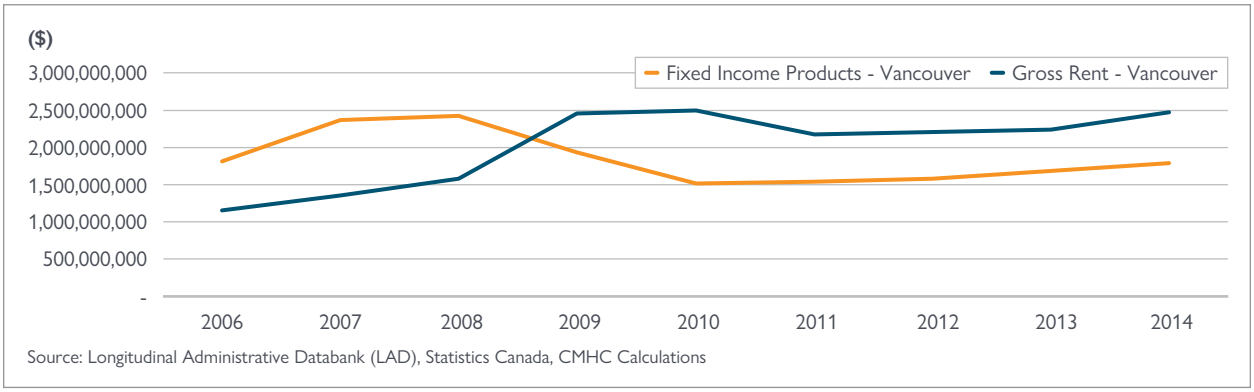
As expected, rental investment increases with both age and income (discussed in the next section). And while the current picture corroborates the life-cycle theory, it should be noted that the slope of the curve is shifting at the top end of the distribution, as the oldest group of taxfilers experience the strongest gains in their relative market shares. This indicates that higher rates of investment across succeeding age cohorts may be suggestive of trends in the underlying structure of housing markets.

8.7 TRENDS IN TOTAL INVESTMENT

In line with theory, the investment horizon decision depends on how taxfilers choose to distribute their savings over the life-cycle. There are potentially strong incentives for taxfilers to invest as economic circumstances change, and they may relate to the opportunity cost of capital. For example, if there is an increase in the expected capital gains from owning a rental property, then there would be an increased incentive to invest, independent of its relative cost.

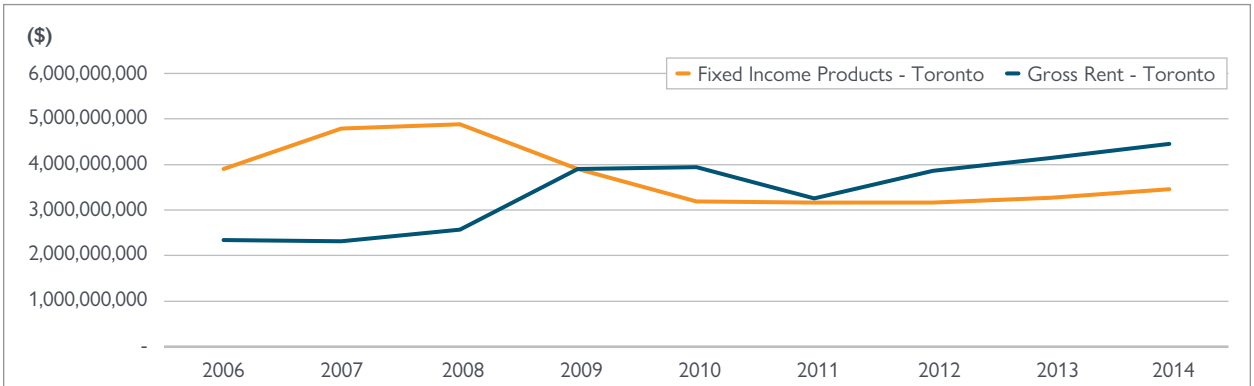
And this seems to be the case, beginning in the 2010 to 2014 period, as financial markets for fixed income products (such as bonds) perform relatively poorly while house values appreciate. (See Figure 59 and Figure 60.) As a result, some might enter the housing market, not only for consumption purposes but also to improve investment returns as housing market conditions improve.

Figure 59: Investment income by type, 2006-2014, Vancouver



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 60: Investment income by type, 2006-14, Toronto



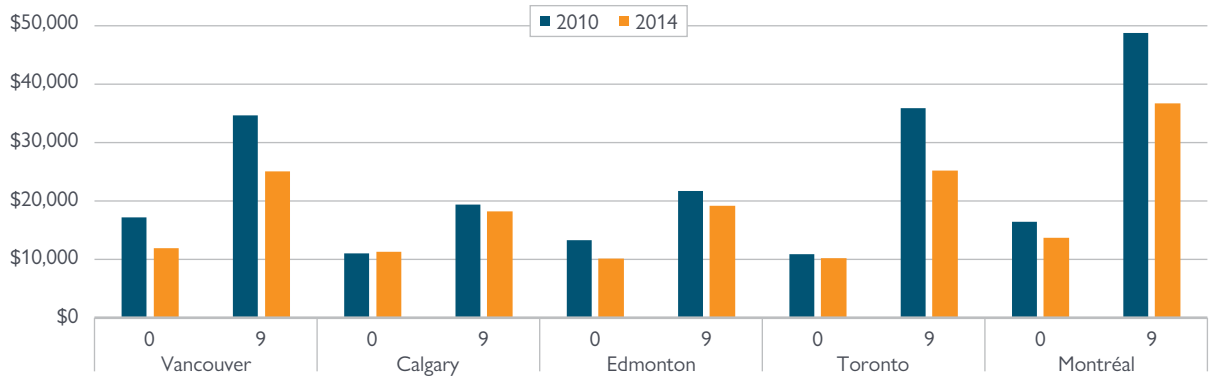
Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

8.8 TOP DECILE EARNERS REPORT THE LARGEST SHARE OF RENTAL INCOME

This section examines the trend in rental income reporting by income decile groups. Total income deciles are derived based on the total income ranking for the entire Canadian population living in private households. Total income refers to the sum of a taxfiler's before-tax income excluding capital gains, and modified by Statistics Canada's Income Statistics Division (ISD).

Average rent reported by Canadian taxfilers from both bottom and top deciles were generally lower in 2014 relative to 2010. (See Figure 61.) The top decile had the largest decline in average rent in Canada, followed by the bottom decile, while taxfilers from the middle deciles reported moderate increases.

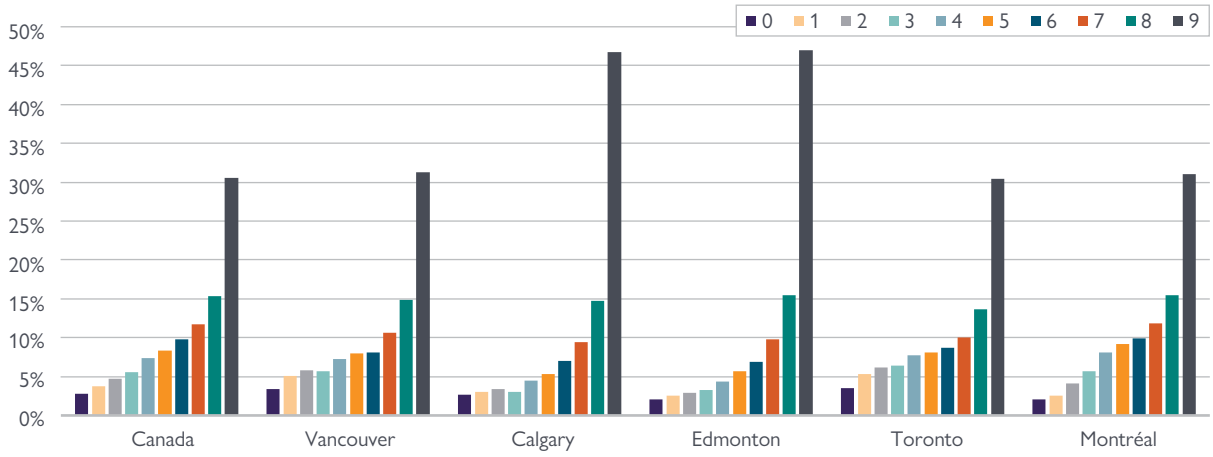
Figure 61: Average rental income by decile



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Even though the average rent reported by the top decile declined, total rent gradually increased with income. The share of gross rent held by the top decile in Canada has declined from 35 per cent in 2010 to 31 per cent in 2014, nearly 7 percentage points below the peak of 37 per cent in 2009. Despite this, the top decile still retained a significant portion of the rental market in Canada. Furthermore, the top three deciles combined accounted for nearly 58 per cent of the total market in 2014. Top decile shares were generally the same across most CMAs, at around 31 per cent, but significantly higher in the Prairies, at 47 per cent in both Calgary and Edmonton. (See Figure 62.)

Figure 62: Total Gross Rental Income Shares by Decile, 2014



Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

8.9 CONCLUSION

Results from this chapter suggest that rising home prices attract small-scale rental investors into Canada's major markets. Clearly, there is greater investor interest in the housing market, but now individuals also tend to rent out some of their housing in order to increase affordability. It is also possible that many of these investors have effectively generated demand for builders and developers to construct more housing. In this regard, investors could be effectively encouraging more supply rather than increasing demand.

There is more work to be done on the impacts of rental investment on housing markets. For one thing, we have not distinguished among the different types of rental investors. For another, we have focused entirely on the taxfiler perspective of rental market dynamics. No comparative analysis has been presented between groups of taxfiling investors. Finally, it is unclear whether the observed heterogeneity derives from underlying differences in property characteristics or from some other reason altogether. Understanding these different trends and the extent to which they impact housing markets is a promising direction for future research, and we leave this work to a different project in the future.

9 Exploring Canadian Homebuyers' Behaviours and Expectations: An Application of Behavioural Economics

CHAPTER OBJECTIVES:

- Review perspectives of behavioural economics on housing.
- Introduce survey results conducted by CMHC on homebuyers' behaviours and motivations conducted in Montréal, Toronto and Vancouver.
- Identify next steps.

KEY FINDINGS:

- In Vancouver, 53 per cent of respondents who purchased a condominium apartment experienced participating in a bidding war.
- About 45 per cent of respondents in Toronto and Vancouver reported exceeding their purchase budget.
- Homebuyers' long-term price expectations are in line with past market returns.
- No homebuyers believe the value of their home will decline in the next twelve months.

9.1 INTRODUCTION

So far, we have mentioned several times the influence that expectations of future house price changes might have on investors' and homebuyers' decisions to purchase a house. Here we examine expectations more directly through a survey developed by CMHC (the Homebuyers' Motivations Survey, HBMS).

The behaviour of U.S. homebuyers prior to the last recession was prescient in signalling sentiment in the housing market. Some of these insights were garnered through a survey done by Robert Shiller and Karl Case. In our efforts to further understand Canadian housing markets, CMHC has harnessed and refined their insights to develop our own survey of Canadians' behaviours and motivations.

To ensure the validity of this survey, we identified new homebuyers (who had purchased a home in the prior 12 months), and invited them to participate in an online survey. We are very grateful to the more than two thousand Canadians who participated in this effort. As a result, we have established a sufficiently large sample size to be able to draw a statistically sound analysis.

9.2 WHAT IS BEHAVIOURAL ECONOMICS?

Behavioural economics roots its key concepts in the traditional texts of classical economics. Loss aversion, overconfidence and self-control were recognized by Adam Smith as key mechanisms explaining human behaviour. These concepts are now being revisited through the well-known works of Richard Thaler and Daniel Kahneman.

Behavioural economics is now establishing itself as a suitable framework to analyze housing markets. So-called sentiment indices are often used to test the efficacy of economic indicators in forecasting exercises. Marcato and Nanda (2016) found sentiment in real estate conveys information to help predict changes in real estate returns. Citing investment decisions as the main area of application, such findings could also prove useful to understand potential risks to the housing system. They find predictability of prices is due to future price expectations that cannot be explained by conventional fundamental drivers.

Case and Shiller (2003) implemented a survey to provide detailed descriptive analyses on homebuyer expectations, and found that expectations played a role in the house price boom and decline in California. Homeowners may feel overconfident about the returns to real estate, providing an explanation why markets deviate from their predicted values, particularly at market peaks or troughs. Their empirical contribution is the basis of the present chapter in which we report findings on key decisions of homebuyers in the homebuying process in Montréal, Toronto and Vancouver. This chapter introduces the survey results in a descriptive fashion. Further research will be undertaken to model homebuyers' behaviours through an econometric framework.

Drawing on more recent work by Case, Shiller, and Thompson (2012) we focus on:

- The concept of overconfidence by examining price expectations among homebuyers in the short and long term;
- How social pressures—friends and family, real estate industry experts and media—influence homebuyers; and
- The concept of self-control through questions relating ability to respect a purchasing budget and to participate in a bidding war.

The results show long-term homebuyers' expectations in Vancouver, Toronto, and Montréal are in line with past price growth. In the short term, none of the respondents believed the value of their home would decline in the next twelve months.

Purchasing a property involves synthesizing information from various sources. Respondents reported being influenced by friends and family and realtors to a much greater extent than by government and media. First-time homebuyers reported being more influenced than repeat buyers.

Homebuyers in Toronto and Montréal who reported experiencing a bidding war spent a premium of $125,000 and $43,000, respectively, on their home purchase. Vancouver is an exception. Bidding wars occurred to a greater degree for apartment condominiums, where prices are lower than the median.

9.3 SURVEYING HOMEBUYERS

The questionnaire was designed to survey the attitudes and behaviours of homebuyers. As such, this provides a novel approach to understanding homebuyers' motivations in the purchase of a home. The results probe the concepts of loss aversion, self-control and overconfidence.

9.3.1 Questionnaire

The questionnaire includes six different sections:

1. The homebuyer profile: To establish a demographic portrait of the respondents
2. The type of home purchase: To characterize the home by price, location, tenure, and physical characteristics
3. Constraints faced during the home purchase process: To identify how individuals relate to local market conditions
4. The presence of external influences: To identify and measure the degree to which social groups influenced homebuyer's behaviours
5. The view on price movements: To measure a respondent's assessment and outlook of past and future home prices
6. The opinion on other investment vehicles: To compare how alternative investment vehicles are evaluated

9.3.2 What does the survey sample look like?

This section gives brief summary statistics on who responded to the survey in Vancouver, Toronto, and Montréal. Table 26 provides highlights on regional differences. Patterns align with what might be expected with higher values in Toronto and Vancouver compared to Montréal, and the value of single-detached housing being higher than apartments.

Table 26: Purchasing price of dwelling types across CMAs

	SINGLE-DETACHED	SEMI-DETACHED	TOWNHOUSE	LOW RISE APARTMENT	HIGH RISE APARTMENT
Vancouver					
Mean	$1,335,001	$918,290	$610,267	$452,323	$601,433
Median	$1,154,940	$827,000	$555,000	$401,111	$515,000
Standard deviation	$696,017	$407,475	$265,052	$224,731	$364,644
Number of observations	206	19	93	183	164
Toronto					
Mean	$1,016,472	$833,837	$596,161	$526,066	$461,256
Median	$872,500	$750,000	$573,442	$527,000	$406,206
Standard deviation	$510,377	$316,383	$180,948	$256,390	$211,455
Number of observations	223	55	59	10	150
Montréal					
Mean	$392,780	$466,415	$388,143	$286,280	$338,940
Median	$329,000	$355,035	$330,000	$245,000	$305,000
Standard deviation	$246,360	$368,718	$188,327	$148,503	$180,078
Number of observations	517	109	63	215	95

Source: CMHC HBMS

Repeat buyers hold more equity in real estate and earn more than first-time homebuyers. Their greater ability to pay enables them to pay more for homes, such as single-detached homes. Table 27 demonstrates first-time homebuyers spent less.

Table 27: Buyer experience and purchase price

	MEAN	STANDARD DEVIATION	MEDIAN
Overall sample			
Not first time homebuyers, n=1277	$692,784	$535,954	$540,000
First time homebuyers, n=946	$455,236	$316,283	$365,000
Vancouver			
Not first time homebuyers, n=384	$956,912	$657,472	$801,000
First time homebuyers, n=290	$549,809	$401,115	$475,000
Toronto			
Not first time homebuyers, n=304	$877,886	$494,463	$779,121
First time homebuyers, n=196	$594,344	$317,844	$530,000
Montréal			
Not first time homebuyers, n=589	$425,048	$284,103	$350,000
First time homebuyers, n=460	$307,973	$139,382	$275,000

Source: CMHC HBMS

9.4 SURVEY RESULTS

9.4.1 Self-Control

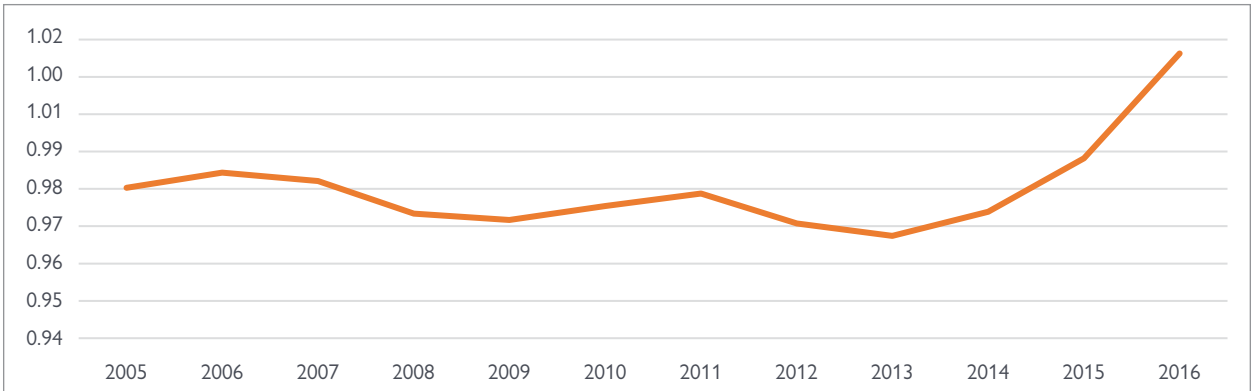
Bondt and Thaler (1985) shows investors tend to overvalue an investment when they were exposed to "good news" stories and undervalue it during "bad news" stories. Overreacting to data indicates evidence of lack of what behavioural economists call *self control*. Housing markets share similarities with the example above. Like financial investors, households must synthesize information from various sources to form their opinion about how much housing to consume. Popular phrases such as "it's a sellers' market" or "you can't miss out" colour how people think about real estate and most importantly informs how they are expected to behave in market transactions.

In this section, we provide a key area where households overreact to the information: whether or not households reported being in a bidding war. A bidding war may arise because of perceived necessity of owning a home, but it could also be a time of high pressure where choices become more impulsive. Circumstances for the would-be buyers could be opaque or non-transparent and could incite mispricing.

Sellers and their representatives prepare the sale of the property with calculated expectations. Subtle cues promoting the sale as "no presentation of offers" until a given time are sufficient hints to make potential buyers aware of a bidding war. In addition, properties listed 5-10 per cent below "perceived" market value also tend to attract many interested parties who believe they've found a discount.

The Vancouver market showcases an example where sellers failed to adjust the sale price of their property to reflect long-term market value. For much of the period covering 2005 to 2015, the sale price-to-list price ratio reverted to 0.98. For most of 2015, however, the ratio exceeded 1.00 across most submarkets in the Greater Vancouver market which suggests an increase in competition among would-be buyers, likely leading to an increase in the number of bidding wars.

Figure 63: Sold price-to-list price ratio, Vancouver CMA Average



Source: Real Estate Board of Greater Vancouver MLS®

Unlike classic open auctions, households participating in a bidding war are only somewhat aware of the number of participants because would-be buyers can only keep track of the number of bids at the time of submission, and more bids can enter between that time and the time the presentation of offers closes. Only the seller and their representative are aware of the number of participants. Therefore, the lack of information incentivizes would-be buyers to be impulsive and exaggerate their offer; it is thus no surprise the sale price in a bidding war tends to exceed substantially the asking price.

Households participating in a bidding war are also unaware of the prices offered by rival parties, as the information is kept confidential until the end of the presentation of offers. Rather than reflecting the marginal value of the home, the selling price instead reflects what one buyer is willing to pay. Once the sale price is realized and the information is made available to the public, this price becomes an additional reference point to the public. Consequently, in a market, where supply is constrained and demand is strong, bidding wars act as a combustible to propel sale prices.

Table 28 reports summary statistics comparing homebuyers who experienced a bidding war versus those who have not. In both Toronto and Montréal, homebuyers paid more for a property. The case is different in Vancouver where the trend is reversed. The upper end of the market in Vancouver is likely accessible to only a few homebuyers, making it less likely to attract multiple bidders.

Table 28: Purchase price in a tight market

	VANCOUVER		TORONTO		MONTRÉAL	
	MEAN	MEDIAN	MEAN	MEDIAN	MEAN	MEDIAN
Not in a bidding war	$870,614	$651,600	$702,319	$599,900	$360,304	$309,100
Number of observations	312		219		870	
Experienced a bidding war	$744,209	$605,000	$814,545	$725,000	$436,999	$352,000
Number of observations	371		284		182	

Source: CMHC HBMS

The distribution of sales by purchase price provides evidence to this hypothesis where buyers not experiencing a bidding war who purchased in the upper 25th percentile of the market spent on a median price of $1,100,000 whereas those who experienced a bidding war spent $902,000. In Vancouver, bidding wars are especially concentrated in condominium apartments; 53 per cent of buyers experienced a bidding war compared to lower percentages in Toronto and Montréal.

Therefore, while Toronto and Montréal markets experience bidding wars because of overall market conditions—due to low supply of homes for sale or preference for certain areas—which tend to push up prices across many price segments of the market, the case of Vancouver bucks this trend. Buyers experiencing bidding wars seem to find themselves purchasing condominium apartments to a greater extent. Overall, this points to an area of the market showing particular tightness, where buyers tend to be first-time homebuyers and older households.

One of the consequences of experiencing a bidding war is that households may be unable to respect their purchase budget. Table 29 reports summary statistics on households' self-reported assessment of whether they respected their purchase budget or not. In the two most expensive markets, approximately 47 per cent of households reported paying more than planned on their home purchase. Probing further into the behaviour of households, it is unclear whether there is any evidence to suggest that experiencing a bidding war increases the likelihood of households spending more than they initially planned. Those who reported spending more than planned, however, generally purchased a more expensive property than those who reported respecting their budget.

Table 29: Allocating scarce resources

	VANCOUVER	TORONTO	MONTRÉAL
Share who said:			
I paid less than I planned	6.37%	5.84%	10.95%
I paid about what I planned	44.30%	44.06%	62.76%
I paid more than I planned	46.96%	47.89%	24.00%
I didn't have any budget	2.37%	2.21%	2.29%
Observations	675	497	1,050

Source: CMHC HBMS

Table 30 reports summary statistics for those who reported exceeding their budget. There is a clear link between overspending and purchase price. Homebuyers who reported exceeding their budget the most also paid the highest median price for their purchase.

Table 30: How much households spend when they spend too much

	VANCOUVER			TORONTO			MONTRÉAL		
Over budget by….	**Mean**	**SD**	**Median**	**Mean**	**SD**	**Median**	**Mean**	**SD**	**Median**
Less than 5%	$715,195	$421,162	$630,000	$939,408	$526,234	$797,412	$352,210	$140,913	$319,000
More than 5% but less than 10%	$702,070	$382,263	$600,000	$787,587	$424,362	$695,000	$403,044	$224,835	$343,000
More than 10%	$918,974	$555,833	$750,000	$874,003	$532,628	$803,535	$490,951	$287,980	$389,033
On budget, n=340	$765,737	$636,084	$580,950	$697,645	$412,219	$601,000	$355,596	$237,063	$299,000
In a bidding war and over budget by...									
Less than 5%	$568,358	$277,084	$510,000	$1,078,857	$543,589	$1,005,000	$404,431	$189,857	$355,000
More than 5% but less than 10%	$679,166	$272,512	$555,000	$791,554	$418,590	$694,500	$436,454	$234,847	$381,250
More than 10%	$872,552	$522,775	$726,000	$876,139	$402,394	$832,500	$575,846	$372,517	$480,000

Source: CMHC HBMS

9.4.2 Social Influences

A key tenet of behavioural economics is that cognitive bias—arising from social pressure and influences—shapes human behaviour. For instance, research has shown that small-scale investors tend to follow the recommendations of their financial advisors without taking into account the interests the financial advisor affiliation serves, making them subject to persuasion. Buying a property is no different. Would-be buyers have to synthesize a lot of information during the purchase process. Realtors, media, family and friends have interests spanning beyond the interests of homebuyers. And respondents recognize such differences with 90 per cent of respondents believing realtors are either optimistic or very optimistic about the real estate market. This section reports survey results on what social groups influence homebuyers.

Social networks, such as family, friends and realtors tend to be very influential (Table 31). There is still a significant percentage (37.16 per cent), however, who reported realtors have no influence on their purchasing decision. A closer look shows 60 per cent of respondents in Montréal reported realtors have no influence on their purchase decision. Most respondents reported the media and government did not have much influence.

Table 31: Social influences and the home purchase

	FAMILY AND FRIENDS	REALTORS	BUILDERS	MEDIA	GOVERNMENT
No influence	26.16%	37.16%	78.02%	64.98%	76.23%
Very little influence	12.41%	20.09%	11.83%	17.51%	13.67%
Some influence	30.45%	29.84%	7.37%	13.85%	7.82%
A lot of influence	30.98%	12.91%	2.78%	3.66%	2.29%

Source: CMHC HBMS

The social group exerting the most influence on the respondents' purchase decision is friends and family (Table 32). This was true across the three urban centres surveyed. In Toronto and Vancouver, approximately 65 per cent of respondents reported friends and family have some or a lot of influence on their home purchase while approximately 50 per cent of respondents in Montréal reported friends and family have some or a lot of influence. These findings stand in stark contrast to Montréal respondents where 30 per cent reported that friends and family have no influence at all on their purchase decision.

The impact of social groups was particularly obvious when looking at first-time homebuyers and repeat buyers.

Table 32: Social influences and buyer experience

	FAMILY AND FRIENDS		REALTORS		MEDIA		GOVERNMENT	
	FIRST TIME	REPEAT BUYER	FIRST TIME	REPEAT BUYER	FIRST TIME	REPEAT BUYER	FIRST TIME	REPEAT BUYER
No influence	16.50%	33.41%	32.26%	41.00%	59.01%	69.47%	68.67%	81.90%
Very little influence	10.15%	14.13%	19.44%	20.62%	20.17%	15.42%	18.12%	10.32%
Some influence	31.92%	29.12%	33.33%	26.94%	16.95%	11.57%	10.37%	5.87%
A lot of influence	41.33%	23.34%	14.96%	11.45%	3.86%	3.54%	2.84%	1.90%

Source: CMHC HBMS

Overall, first-time homebuyers report all social groups have more influence on their decision than repeat buyers. First-time homebuyers have less experience going through the purchase process and typically rely on their immediate surroundings. Family and friends, for instance, play a significant role for first-time homebuyers, 73 per cent reported they have some influence or a lot of influence on them. Realtors also play an influential role, with 48 per cent of first-time homebuyers having reported they have some or a lot of influence.

When looking at media and government influence, the percentages taper off sharply for both first-time homebuyers and repeat buyers. In addition, 58 per cent of respondents reported the tone of messages from the media to be either pessimistic or very pessimistic while 43 per cent reported government messages to be either pessimistic or very pessimistic. Messaging from friends, family, and realtors may reinforce homebuyers' established beliefs.

9.4.3 What do people believe is driving home prices?

It is quite common to hear about factors impacting price growth. While these stories tend to be location specific, they also become accepted as common knowledge. Table 33 reports summary statistics on the level of influences of each factor

Table 33: What influences price growth in my city?

	NO INFLUENCE	VERY LITTLE INFLUENCE	SOME INFLUENCE	A LOT OF INFLUENCE
Employment growth	5.86%	18.39%	48.00%	27.74%
Population growth	2.25%	7.32%	44.16%	46.27%
My city is attractive	1.79%	5.06%	30.85%	62.30%
Lack of buildable land	6.01%	12.41%	35.17%	46.41%
City hall is too slow to approve zoning changes	12.24%	29.28%	38.44%	20.04%
Not in my backyard	16.55%	39.51%	33.26%	10.68%
Foreign investors	3.69%	10.94%	33.25%	52.12%
Local speculators	3.14%	13.16%	46.00%	37.70%

Source: CMHC HBMS

Foreign investors in the Canadian market have received an abundant amount of press lately. It is not surprising 52 per cent of respondents believe foreign investors have a lot of influence on price growth. In each of the three markets, 80 per cent of respondents believe foreign investors have some or a lot of influence on home prices. In Vancouver, 69 per cent of respondents believe foreign investors have a lot of influence on price growth. Interestingly, foreign investors and local speculators are both felt to be equally influential in affecting house prices (combining some and a lot of influence).

What stands out, however, is that city attractiveness is the factor reported to be impacting growth the most, even more than foreign investors. Respondents recognize that the city where they live is a significant population draw, which exerts pressures on price. On the other hand, fewer respondents reported land supply as having a lot of influence on price growth. This trend is observable in all three cities too. In a nutshell, respondents ascribe more influence on price to strong demand than a lack of supply.

NIMBYism is perceived as exerting much less influence than expected. Respondents may live in newer subdivisions where proposals for densification are not being considered. Contentious proposals also tend to garner a lot of press, but they typically trigger a strong position only among those impacted directly.

9.4.4 Overconfidence

A long-standing empirical result is that future price expectations influence how homebuyers value their property in the present. Homebuyers consider price growth as being important to their purchase. Case and Shiller (2006) argue expectations played a central role in producing California's price boom, signifying to consumer overconfidence in the real estate market. The direction goes both ways in fact. By 2008, with the housing collapse well under way, Case and Shiller (2010) found respondents then mostly expected declines in future home prices. Examining how overconfident or pessimistic homebuyers are about prospects of price growth is a cornerstone of this study.

The survey provides some preliminary indication to test whether price expectations are being formed rationally (Table 34). One approach to rational-thinking suggests homebuyers would need to be aware of and incorporate all readily available information to form rational price expectations. The survey results show homebuyers were aware of the price changes in their cities over the previous 12 months, indicating that they had up-to-date knowledge of their market after their home purchase. This is in line with the results of Case and Shiller. In addition, our results show price-growth expectations for the next ten years (the 'long term') are roughly in line with actual price movements over the previous ten years. While not conclusive, this could be suggestive of backward-looking price expectations as opposed to forward-looking, rational expectations. Backward-looking expectations implies slower reactions to changes in the marketplace.

Table 34: Price expectations across cities

	VANCOUVER	TORONTO	MONTRÉAL
Median future price growth expectation – 10 year	7%	7%	5%
Median future price growth expectation – 12 month	10%	8%	5%
Median estimated price growth – prior 12 months	10%	13%	5%
Actual price change, year-over-year, MLS®HPI composite from September 2017	11%	12%	5%
Average annual growth in SML® HPI composite 2006-2016	6%	7%	4%

Sources: CMHC HBMS, CREA

While roughly 22 per cent of respondents felt that a price drop of 5 per cent or more was likely or very likely over the next 12 months, no respondents expected negative price growth in the value of their home over that same period. The results show a strong correlation between the perceived likelihood of a price drop over the next 12 months and the estimates of price growth over the long run (i.e., the next 10 years). The relationship is much weaker when looking at estimates of price growth over the short run. One interpretation of these results is that homebuyers are able to incorporate risk into their purchase decision in the long run. In the short run, however, buyers fail to incorporate risk in their purchase decisions. This leads to an overestimation of current values during periods of elevated market risk.

9.5 CONCLUSION

Homebuyers consider various sources of information to form their opinions about purchasing a home. The survey was a first attempt in Canada to better understand and describe their behaviours. The results show half of recent homebuyers reported exceeding their purchase budget. As detailed above, two explanations provide potential solutions as to why this behaviour arises. First, homebuyers who report having participated in a bidding war are twice as likely to spend more than planned compared to those who have not participated in a bidding war. Second, not a single homebuyer reported that their property could depreciate over the next 12 months, which suggests there is a short-term risk of miscalculations. In the long term, however, homebuyers' price expectations are in line with past market returns. Crucially, unlike the views of homeowners in the U.S. prior to the last recession, the survey results show homebuyers in Canada's largest cities demonstrate a much more sober outlook on the future of real estate prices.

The descriptive statistics presented above are the beginning of a larger project by CMHC that will seek to model homebuyers' choices and to identify the causal mechanisms informing their house-purchase decisions in the short term.

9.6 APPENDIX

Questionnaire

The questionnaire included six different sections. The first sections aimed to screen respondents to ensure the questionnaire was filled out by the homeowners. Respondents who lived at the address but are not owners (observations = 105) answered an abridged version focused exclusively on opinions about the real estate market. Surveying homebuyers about their opinions and views entails these views are likely to change over time. The real estate market is the subject of much conversation in the media and has often been a focal point of discussion by elected officials. Therefore, it was important to survey homebuyers who purchased a house in a time horizon we found acceptable. In the end, we succeeded in having the bulk of respondents purchasing within a twelve month period preceding the administration of the questionnaire. The screening part of the questionnaire provided both a purchase date, defined as a date where an offer was accepted by the seller, and a sale date, defined as the date when the transaction was closed.

In addition, a few warm-up questions with binary outcomes framed the screening section: such as whether the property was a condominium, whether the homebuyer was a first-time homebuyer, whether the property was purchased before delivery.[33] Finally, a question describing the property concluded the screening section.

[33] Condominium units are usually pre-sold and delivered months or years after the initial purchase contract is ratified. This is an additional check to assess time of purchase and attitudinal context, as a homebuyer who decided to buy in 2015, let's say, must have done so with different information than someone who purchased in mid-2017.

In the following section, titled "The Purchase", respondents were asked to report factual information about their home purchase, as well as to provide a subjective assessment of their decision. Respondents were asked the price paid for the property, whether or not they respected their budget and by how much they derogated in percentage terms. Respondents were asked if they participated in a bidding war as well.

Respondents were then asked three questions regarding their assessment of the purchase—whether they bought when they felt ready; whether they bought in the area they wanted; and finally whether they bought a house appropriately sized for them.

The section called "Motivation" asks respondents to rank the level of influence exerted by certain groups on the respondents' home purchase. Another question sought to validate the level of influence by asking respondents how they perceive the attitudes of these groups vis-à-vis the real estate market.

In the section titled "Current Views", respondents were asked to conduct an assessment of the value of their home, according to perceived recent changes in the market. Following this, respondents were asked about their outlook on home prices over a one and ten year horizon.

The final section, "Market Sentiment" presentsed a number of statements respondents answered along a Likert scale, with a five point range of strongly disagree to strongly agree (or not likely at all to very likely). Some of the questions sought to gauge the level of confidence of respondents by asking them to contrast different investment vehicles. Other questions assessed the likelihood of further price growth or price decline in the real estate market in a given time period. Finally, the questionnaire closed with a query on standard demographic data such as income, household size, and age group of the respondent.

Survey administration

We defined a survey sample of 30,000 households equally distributed in the Census Metropolitan Area of Vancouver, Toronto and Montréal. The sample was selected randomly from a property database recording residential transactions. A survey invitation was mailed to the residential address where the transaction occurred on September 8th. Respondents were provided two weeks to access a CMHC website which hosted the questionnaire. Once the respondent agreed to take the survey, the respondent was redirected to a third-party provider responsible for handling electronic data collection. The online survey period remained active until October 13th. Starting September 21st, the third party provider conducted interviews with the survey sample in order to increase the response rate. This approach faced some limitations because far fewer individuals have landlines. The third-party provider made up to four attempts to reach the household. In the end, 2,251 owners and 105 non-owners filled out the survey. The responses were strongest in Montréal with 1,059 surveys completed, followed by Vancouver with 685 surveys completed and finally Toronto with 507 surveys completed.

10 Density and Urban Sprawl

CHAPTER OBJECTIVES:

- Explore patterns in population density, and compare different patterns across Canadian cities.
- Examine how density can be made livable.

KEY FINDINGS:

- Montréal, Toronto and Vancouver are following patterns of increasing densification, and Toronto and Vancouver have reversed the trends toward sprawl over the last decade.
- Because of limited data, it is unclear if the process of densification is meeting its potential. Our limited data for Vancouver suggests that the redevelopment and new building processes are not meeting what Canadians want.

10.1 INTRODUCTION

Over the past few decades, cities around the world have faced increased urban sprawl. Sprawl, the expansion of homes away from city centres into car-dependent communities, has been a low-cost and rapid way to supply housing in order to satisfy growing populations, particularly after the Second World War (Baum-Snow, 2007; Kopecky and Suen, 2010). Today, sprawl tends to be associated with greater motor vehicle use, increased GHGs emissions, air pollution, and longer commuting times. Sprawl also poses the risk of damaging wildlife habitats and affecting water systems by increasing the impermeability of land. Furthermore, sprawl tends to generate demand for infrastructure that municipalities in tight fiscal positions could find challenging to supply. As a result of these factors, municipal and provincial governments across Canada have chosen to combat urban sprawl using their planning processes to restrict the locations of employment and land development.

It is beyond the scope of this research to undertake a thorough analysis of urban sprawl, and some have expressed skepticism that concerns surrounding its potential impacts have already been thoroughly evaluated (see discussion in Glaeser and Kahn (2004) and in Duranton and Puga (2015)). Sprawl could also reflect choices made by households to obtain more space as family size or income grows. Nevertheless, in this report we presume that sprawl has an overall negative effect on households and the economy. Defining the appropriate level of population density in urban centres remains a difficult task, and its optimal degree may differ by industrial structure as arguments in the next chapter suggest.

In this chapter, we document the evolution of population density in the five major metropolitan centres covered in this report. Although a crude metric in terms of spatial development comparisons, density does give some indication of how these cities evolved between 1991 and 2016. It is a slow-moving indicator because, compared to other goods and assets in the economy, the stock of housing changes slowly, with new buildings adding only marginally to the stock each year.

Data in this chapter indicate that Montréal has consistently experienced compact development, whereas Calgary and Edmonton tended to be more sprawled. Meanwhile, Vancouver and Toronto started to reverse the sprawl in their cities over the 2006 to 2016 period. In Toronto, Vancouver and Montréal, a key element of these policies has been the introduction of urban growth boundaries (UGBs). In Vancouver, the Agricultural Land Reserve (ALR) has existed since 1973. In Ontario, the Growth Plan was introduced in 2006. In Montréal, the *Plan métropolitain d'aménagement et de développement* (PMAD) was established in 2011.

Higher density through restricting land supply does not have to lead to higher home prices if the following conditions hold:

- the process of land redevelopment is fast and efficient; or there is a large supply of either serviced land or land that could be redeveloped within the greenbelt; and,
- the provision of new residential structures meets household quality standards (for example, number of bedrooms or floor space).

Determining whether these conditions hold is limited by the paucity of data. However, according to the crude proxies that we have developed, many Vancouver homes are disproportionately demolished in order to be replaced by more expensive ones containing the same number of families. There also appears to be a sizable price gap when moving from 2- to 3-bedroom homes, suggesting that there is a shortage of 3-bedroom homes. We do not have data for Toronto on this issue, but we suspect that this is happening there as well.

10.2 MUNICIPAL AND PROVINCIAL POLICY ACTION

To address problems of urban sprawl, local governments from around the world have pursued a planning approach variously called "smart growth", "new urbanism" or related terms. This approach was developed in reaction to the process of urban sprawl as described above, and primarily aimed at reducing automobile dependence. As such, their response concentrated on designing walkable neighbourhoods, public transit systems and greater integration of different land uses at the neighbourhood level.

These policies are reflected in city planning in some Canadian cities. For example, Metro Vancouver's goals include creating a compact urban area, supporting a sustainable economy, protecting the environment, responding to climate change impacts, developing complete communities, and supporting sustainable transportation choices (Metro Vancouver, 2017). Similarly, in Ontario, the guiding principles include supporting complete communities, prioritizing intensification, providing flexibility to capitalize on new economic opportunities, supporting affordable housing, improving integration of land use planning with infrastructure, recognizing diversity of communities, protecting heritage and hydrological systems, protecting agricultural areas, conserving cultural heritage, and integrating climate change considerations (Ontario, 2017).

Clearly, these statements reflect many desirable objectives, and those living in more compact cities will reap the benefits. Ensuring the livability of our cities is vital, but as Richard Florida says, "we have to do density right" (Florida, 2017). The costs of failing to achieve livability can be painful to see, engendering the pushback against soulless cities captured in Jane Jacobs' *Death and Life of Great American Cities* (1961).[34]

[34] For Canadian examples, see Natrasony and Alexander (2005).

10.3 HOW DO WE SEE DENSITY?

Many Canadians probably feel an instinctive dislike for increased density, associating it with poor-quality tower blocks. In turn, this probably reinforces community opposition to redevelopment of under-used land sites. Architects and planners have taken these concerns on board, and are increasingly turning to smaller low-rise structures to increase density. The famed English architect, Richard Rogers, highlighted in his presentation how increased density does not necessarily mean increased height (Rogers, 2016).

To understand these opportunities in the Canadian context, we commissioned *Urban Strategies* to highlight some case studies of under-used land can be converted to highly livable space. Five of their case studies are highlighted on the next few pages, and the entire document will be published separately.

The case studies provide an overview of recent developments, as well as of projects in advanced planning stages, demonstrating innovative approaches to increasing and diversifying the housing supply in Toronto and Vancouver, including the supply of affordable homes. The focus is on projects where existing land uses were converted or intensified to yield an urban residential or mixed-use form. For example, they include shopping centres and industrial sites transformed into mixed-use, mixed-tenure new communities, and the general urbanization of underused sites in transit hubs and corridors. Although each of the projects is unique, they all shed light on the future possibilities for reuse and redevelopment projects that address housing issues in both inner-city and suburban contexts.

Since it is widely recognized that it is not sustainable to meet housing demand largely through low-density development at the edges of cities, strategic intensification will continue to be a primary means of increasing housing supply. Downtowns, suburban centres, and transit corridors are obvious priority areas for housing growth. In addition, significantly increasing density through context-sensitive developments in existing lower-density residential areas is a strategy that cities should continue to explore.

Cities can also create housing where none was initially contemplated, as in Toronto's West Don Lands. Former industrial and commercial sites generally, as well as under-utilized parking lots, should always be considered for residential conversion. Vancouver's Olympic Village illustrates a large-scale conversion of a former industrial site into a mixed-use neighbourhood. In Toronto, Weston Common is not only creating 370 new rental units on a former parking lot, but also making a better use of the empty podium space in an adjacent building by creating a community hub for arts and culture. These developments also demonstrate that, beyond just increasing the supply of housing, infill and intensification projects of any significance should be accompanied by usable, well-designed open spaces at grade, commercial amenities where appropriate, and other facilities that benefit the wider area. In addition, multi-purpose rooftop amenity space, like that of the 60 Richmond project in Toronto, will become increasingly common.

CASE STUDIES

Residential Addition to Commercial | Pre-Construction

HUMBERTOWN

Etobicoke, City of Toronto, ON

DESCRIPTION

From the initial idea in 2010, to the final masterplan in 2013, the Humbertown regeneration has gone through a rigorous process of reviews and refinements. The final masterplan proposes five mixed-use buildings, and adds 604 residential units of which 160 are retirement units. Given that it is a high-density regeneration project in a mature neighbourhood, Humbertown was initially met with strong community concerns. The approval process spanned three years and involved six comprehensive reviews, as well as a mediation by the Ontario Municipal Board. In the end, the project was scaled down from high-rise residential towers to mid-rise buildings. Nonetheless, the project retained the original idea of a dense urban community, and introduced relative affordability in the area. The project proposed the idea of a 'Humbertown Mix', which involves introducing a mix of uses on the site to animate the area around the clock. A key aspect of this idea is the flexible use of the central parking space to accommodate both retail and community uses, which leads to active uses of the area beyond traditional retail hours. Other community services and amenities are integrated into the site such as a daycare, and a generous mix of public spaces including a community garden, a parkette, and an elevated pedestrian connection throughout the site. While the project has not yet been realized, it presents important lessons on how an older retail plaza can be reimagined into an intensified, mixed-use development.

Humbertown Masterplan
Credit: LGA Architectural Partners, Scott Torrance Landscape Architect Inc., Kirkor Architects, and DoHere Digital

CONTEXT

- Humbertown is located in an affluent suburban community in Etobicoke on the west side of Toronto.
- It is currently a shopping centre, built in 1956, which has not physically changed in 50 years.
- The shopping mall is nested inside a predominantly low-rise mature neighbourhood, with detached single family homes.
- The mall buildings are nearing the end of their lifecycle, and there are extensive parking lots.
- The site was acquired in 2006 and was the subject of a design competition to introduce residential use and reimagine it as a vibrant mixed-use community.

KEY FEATURES

- 604 residential units added to a previously commercial site
- Flexible open space in the centre that doubles as parking and a village square
- Mix of uses to activate the site round-the-clock
- Mix of housing types, from one, two, and three-bedroom units to townhouses
- Most of existing surface parking replaced by underground parking directly connected to the shopping mall

PROJECT INFORMATION

Developer
Tridel
First Capital

Architect
LGA Architectural Partners
Kirkor Architects
Scott Torrance Landscape Architect Inc.

Tenure
Condominium

Land Area
36,373 sq. m

Gross Floor Area (GFA)
54,059 sq. m (residential)
74,896 sq. m (total)

Height
9-12 storeys

Density (Residential)
2.06 FSI

Number of Units
604

Range of Unit Types
1 bedroom
2 bedroom
3 bedroom
Townhouse

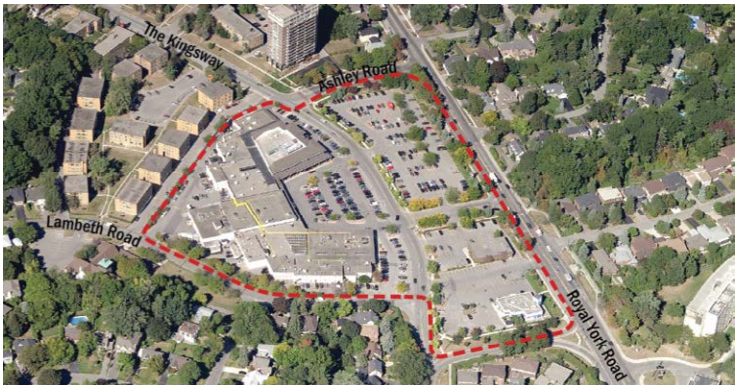
Unit Price Range
TBD

Percentage of Units Below Market Rate
Information not available

Length of Approval Process
23 Months

Type of Application(s)
Zoning By-law Amendment

Parking
Surface: 42 (commercial)
Underground: 1,610 (residential and commercial)



The Site
Credit: Urban Strategies Inc.

Humbertown, 1959
Credit: City of Toronto Archives

Proposed Underground Retail Parking
Credit: LGA Architectural Partners, Kirkor Architects and DoHere Digital

Site Plan
Credit: Urban Strategies Inc.

HUMBERTOWN

35 WABASH AVENUE

City of Toronto, ON

DESCRIPTION

35 Wabash is a townhouse and condominium project currently under construction on a vacant site previously occupied by a two-storey industrial building demolished in 2010. The project represents an appropriate form of low-rise residential intensification on an underutilized site. It is well-served by municipal infrastructure, community facilities and other services. The four-storey building is a hybrid of stacked townhouses and an apartment building, with two-storey units accessed from an internal corridor, and street-level access for the ground-level units facing Wabash Avenue. Each of the 60 one-, two-, and three- bedroom townhouses and flats has either a private backyard or a rooftop terrace. 30 units are located on the ground and second floors, of which 20 are two-storey units, three are single-storey units on the ground floor, and seven are single-storey units on the second floor. The remaining 32 units are two-storeys, located on the third and fourth floors. With units up to 151 square metres in size, many of the split-level suites provide family-friendly housing in an urban market largely dominated by smaller condos. The building offers 64 square metres of shared indoor amenity space on the ground floor, and 60 square metres of shared outdoor amenity terrace. The building incorporates a brick frame that provides a contemporary interpretation of historic warehouse designs. It also reflects the industrial heritage of the area with extensive glazing throughout the front façade along Wabash Avenue. The project won the BILD Award for mid-rise buildings in 2016 for its excellence and innovation in design and construction. The building is an example of optimizing a site with medium-density, family friendly development, within a low-rise neighborhood.

CONTEXT

- Site is located near the eastern edge of the low-rise Roncesvalles neighbourhood in the west end of Toronto.
- Immediate surroundings include Sorauren Avenue Park, future Wabash Community Centre, Sorauren Park Town Square, and a live-work building to the north.
- The area is generally characterized as a residential neighbourhood, but the site is located within an area in transition from light industrial towards residential uses.

South Façade
Credit: Zinc Development

KEY FEATURES

- 4 storey low rise apartment building
- 60 units with either a private backyard or rooftop terrace
- Building design reflects former industrial character of the area
- Includes 64 square metres of shared indoor amenity space and 60 square metres of shared outdoor amenity terrace

PROJECT INFORMATION

Developer
Zinc Developments Inc.

Architect
Raw Design Inc.

Tenure
Condominium

Land Area
2,653 sq. m

Gross Floor Area (GFA)
6,832 sq. m (residential)

Height
4 storeys

Density (Residential)
2.66 FSI

Number of Units
60

Range of Unit Types
1 Bedroom (23%)
2 Bedroom (47%)
3+ Bedroom (30%)

Unit Price Range
$400 - $600/ sq. ft

Percentage of Units Below Market Rate
N/A

Length of Approval Process
2015-2016

Type of Application(s)
Zoning By-law Amendment
Site Plan Approval

Parking
Underground: 68

The Site
Credit: Nearmap

35 Wabash Proposed Rendering
Credit: RAW Design

View of a Private Rooftop Terrace
Credit: Raw Design

35 WABASH AVENUE

Residential Addition to Commercial | Built

WORLD ON YONGE

Markham, ON

DESCRIPTION

World on Yonge is a mixed-use development built on the site of the former Hy&Zel's plaza in the Town of Markham. It is an example of a mixed use intensification of an outdated retail plaza in a suburban community. The project is located on existing transportation corridors and includes residential, office, hotel and retail uses. The Official Plan and Zoning by-law Amendment applications were filed in 2006. Initially, the community was resistant to the application, especially regarding the building heights and future traffic impacts. The applications were refused by the City, and subsequently, the developer appealed the decision to the Ontario Municipal Board (OMB). After significant modifications to the proposed development, the site plan application was eventually approved by the board in 2009. The building height was reduced and the project committed to LEED Silver standards along with adding more green spaces within the site. World on Yonge offers 1,223 market rate residential units across four, mixed-use high-rise buildings with retail at grade, and a 20 storey office and hotel complex. The site is serviced by three privately owned roads with public access, and contains two publicly accessible parks, one internal and the other facing south. The project won the Building Industry and Land Development (BILD) Award in 2011.

CONTEXT

- The site is situated at 7161 and 7171 Yonge Street, at the edge of Town of Markham where it meets the City of Vaughn and the City of Toronto boundaries.
- The site is located just blocks north of Steeles Ave and offers close proximity to Highways 407, 404, 400, and Highway 7.

World on Yonge
Credit: Kirkor Architects

KEY FEATURES

- Mixed use development with office, residential, hotel and retail amenities
- 1,223 residential units
- Includes two publicly accessible parks, one internal and the other facing south
- BILD Award, 2011

WORLD ON YONGE

PROJECT INFORMATION

Developer
Liberty Developments

Architect
Kirkor Architects

Tenure
Mixed Use

Land Area
40,000 sq. m

Gross Floor Area (GFA)
Residential: 103,000 sq. m
Office: 16,890 sq. m
Commercial: 21,896 sq. m
Hotel: 21,371 sq. m
Total: 163,157 sq. m

Height
Building A1 & A2: 34 Floors
Building B1 & B2: 27 Floors & 22 Floors
Building C: 20 Floors

Density (Residential)
N/A

Number of Units
1,223

Range of Unit Types
1 Bedroom
2 Bedroom
3 Bedroom

Unit Price Range
N/A

Percentage of Units Below Market Rate
40%

Length of Approval Process
2006 - 2009

Type of Application(s)
Zoning By-law Amendment
Site Plan Approval

Parking
Underground: 2,408

The Site
Credit: Nearmap

Site Plan
Credit: Kirkor Architects

View of the Landscape Courtyad and Retail
Credit: Kirkor Architects

View from Yonge Street
Credit: Kirkor Architects

WORLD ON YONGE

Residential Addition to Commercial | Pre- Construction

OAKRIDGE SHOPPING CENTRE REDEVELOPMENT

City of Vancouver, BC

DESCRIPTION

Plans are underway to redevelop the Oakridge Centre, an auto-oriented shopping centre from the 1950s, into a new mixed-use community where retail, residential, office, transit, and amenities are seamlessly integrated. In 2014, after two years of public consultation involving over 30,000 community members, Council approved the rezoning of the 115,335 square metre Oakridge Centre site for a comprehensive redevelopment up to 4.6 million square feet. The proposed development is comprised of 11 residential towers and three mid-rise buildings, above two floors of retail and service uses. It will be home to a diverse mix of residents in 2,914 dwelling units, including 290 social housing units and 290 secured market rental housing units. The development will also include 168,059 square metres of commercial space, a 36,422 square metre rooftop park, and a 6,503 square meter civic centre. The civic centre will comprise a community centre, an expanded library, a seniors' centre, and a 69-space childcare facility. Construction on the project was set to begin in 2016 with full completion of all phases by 2024. However, in late 2015, the project's proponents identified key constraints to moving forward, including the presence of an aquifer and the need to accommodate the continuous operation of the shopping mall during a multi-phased construction. The proponents are currently seeking a new rezoning that would reduce the previously approved residential and commercial densities by 20%.

Site Plan
Credit: Henriquez Partners Architects

CONTEXT

- Oakridge Centre is located in the centre of the City of Vancouver at the intersection of Cambie Street and 41st Avenue.
- Oakridge Centre, developed in 1956, was the first auto-oriented shopping centre in Vancouver.
- The site is at the intersection of the Canada Line and high frequency bus service on 41st Avenue.

KEY FEATURES

- A comprehensive mixed-use development including retail and service, office, and residential uses
- 11 residential towers and three mid-rise buildings over two floors of retail and service uses
- A total of 2,914 residential units, including 290 social housing units and 290 secured market rental housing units
- A Civic Centre comprised of a community centre, Oakridge Seniors Centre, a library, and a 69-space childcare
- 36,422 square metre rooftop park

OAKRIDGE SHOPPING CENTRE

PROJECT INFORMATION

Developer
Ivanhoe Cambridge
Westbank

Architect
Henriquez Partners Architects
Stantec Architecture
Gensler

Tenure
Condominium and Rental

Land Area
115,335 sq. m

Gross Floor Area (GFA)
Residential: 25,641 sq. m
Commercial Space: 168,059 sq. m
Civic Centre: 6,503 sq. m

Height
Residential Towers: 17-44 storeys
Mid-rise Buildings: 9-13 storeys

Density (Residential)
3.71 FAR

Number of Units
2,914 (total)

Range of Unit Types
Studio
1 Bedroom
2 Bedroom
3 Bedroom

Unit Price Range (Propsed rental rate)
Studio: $375
1 Bedroom: $375 - $540
2 Bedroom: $570
3 Bedroom: $660

Percentage of Units Below Market Rate
20%

Length of Approval Process
February 2014 - Ongoing

Type of Application(s)
Zoning By-law Amendment

Parking
Commercial: 5400
Residential: 1570

The Site
Credit: Nearmap

The Centre Court
Credit: Ivanhoe Cambridge/Westbank

The Entrance Promenade
Credit: Ivanhoe Cambridge/Westbank

Tower Heights
Credit: Henriquez Partners Architects

OAKRIDGE SHOPPING CENTRE

SURREY CITY CENTRE

City of Surrey, BC

DESCRIPTION

Surrey is a city located to the southeast of Vancouver. While largely suburban, in the last 15 years the city has started to develop an identifiable downtown. Now called the Surrey City Centre, this large-scale development was enabled by the master plan initiated by the City of Surrey. The original City Centre plan was completed in 1991, and updated in 2006 when the City realized that the document's assumptions about the downtown context and development were no longer relevant. A transit plan is also a key part of the master plan, with a strong focus on multi-modal street design that facilitates both pedestrian and cyclist movements. In terms of existing and planned transit, Surrey City Centre is connected to downtown Vancouver by a SkyTrain. A future at-grade rapid train system has also been proposed, which will connect Surrey City Centre to major regional destinations. When completed, Surrey City Centre will become a hub for high density housing, employment, culture, and entertainment. The new City Centre plan is written to address three phases, and will guide development in the area for the next 30 years. The final phase, which is now complete, features refinements to the plan, as well as implementation strategies for servicing and financing. Currently located in the City Centre are a university, a hospital, civic and historic districts, as well as a new innovative business sector. Over time, the City Centre has become a diverse area, with new immigrants, students, and young professionals, along with established residents of all ages, calling it their home. Along with adding density, green infrastructure and open spaces have been introduced to the City Centre. There are greenways, planted boulevards, and rain gardens. Visual and physical access to the surrounding natural features have been maintained, including fish bearing creeks, riparian areas, and views to the North Shore mountains. The momentum is in place for Surrey's downtown development, and will continue with the guidance of the renewed vision presented by the Surry City Centre plan.

Surrey City Centre
Credit: City of Surrey

CONTEXT

- Surrey City Centre is located in northern Surrey, which is a part of Metro Vancouver that sits between the Fraser River and the U.S. border.
- It is designated as the region's second metropolitan centre in the Metro Vancouver 2040 Regional Growth Strategy.
- The site is connected to the SkyTrain Expo Line, and a future Light Rail Transit network. It is also in close proximity to two international airports, Vancouver and Abbotsford.
- A new light rail transit network is proposed and will connect Surrey City Centre with Guildford, Newton, and Langley.

KEY FEATURES

- Build density and mixed use
- Transit oriented development
- Encourages housing diversity with a full spectrum of tenures including ownership and rental, as well as supportive and social housing
- Range of unit sizes including larger family units and smaller units for singles, students, and seniors that are typically more affordable

PROJECT INFORMATION

Developer
Master Plan by City of Surrey - Developer selection through proposal calls

Architect
Various/TBD

Tenure
Mixed Tensure/Mixed Use

Land Area
540 hectares

Gross Floor Area (GFA)
TBD

Height
2-36 storeys

Density (Residential)
High-rise residential 5.5 FAR
Mid-rise to high-rise 3.5 FAR
Low-rise to mid-rise 1.5 FAR

Number of Units
Capacity between 50,000 - 70,000
Exact number of units TBD

Range of Unit Types
TBD

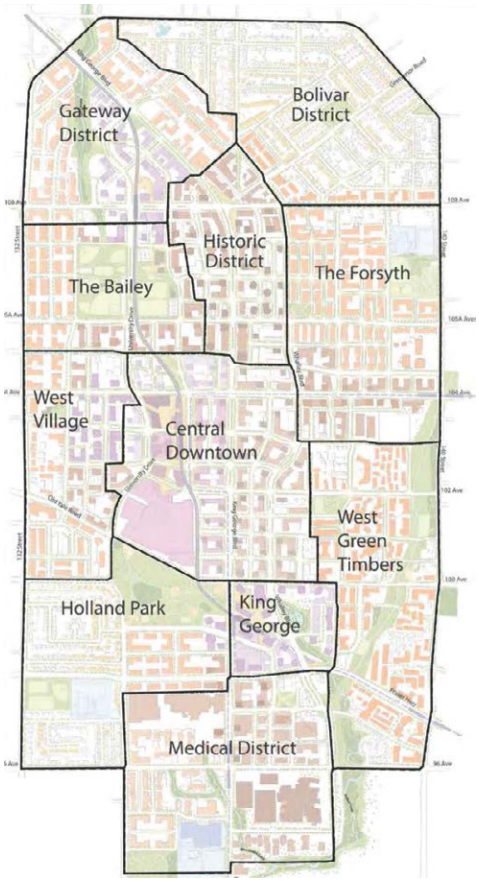
Unit Price Range
TBD

Percentage of Units Below Market Rate
TBD

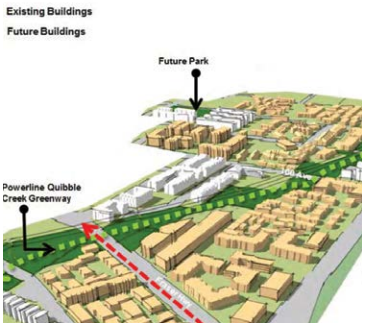
Length of Approval Process
Ongoing

Type of Application(s)
N/A

Parking
N/A



Surrey City Centre Masterplan Area
Credit: City of Surrey



Intensification of Neighbourhoods
Credit: City of Surrey

The Commercial Core
Credit: City of Surrey

SURREY CITY CENTRE

10.4 WHAT IS HAPPENING TO POPULATION DENSITY IN CANADA'S LARGEST CITIES?

The population density of a city will reflect densification efforts by governments and the choices of households and firms. Data can be generated on patterns of population density to see how cities evolve in response. Bertaud and Malpezzi (2003) show how cities in market-based economies generally follow a pattern of high population density around central business districts and low density as households live farther away from city centres. But this pattern is violated in cities that were centrally planned, such as Moscow or Brasilia, or cities facing other influences, such as the impact of apartheid on Cape Town's development.

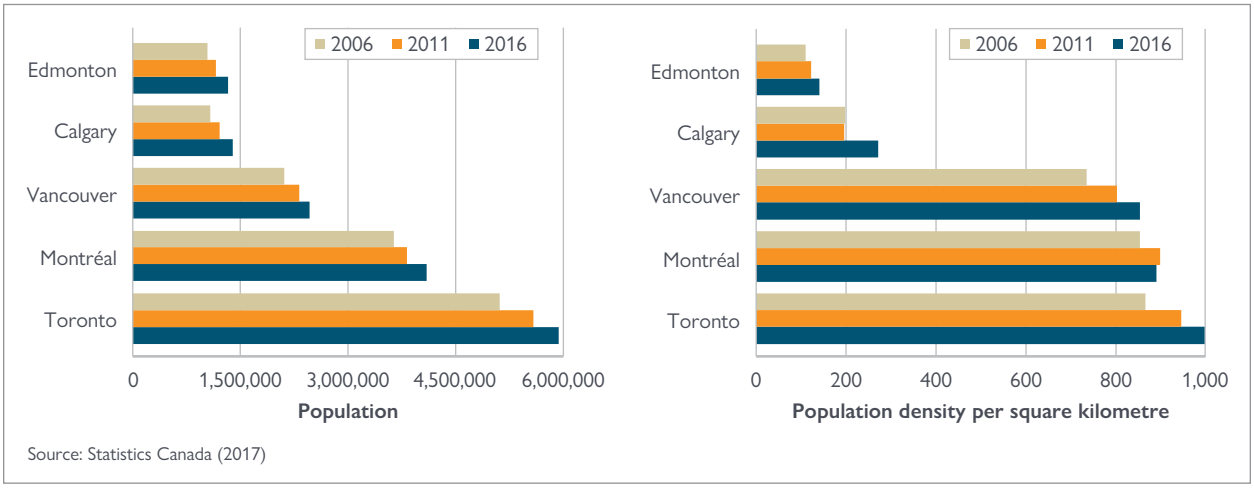
Although the concept of population density seems straightforward enough—the amount of population per unit area—its practical implementation is complex and needs to be treated with care. Two immediate challenges are:

1. What is the unit area? Should the unit measure be defined as a metropolitan area, the area within commuting distances, or the area defined by government or political boundaries?
2. Should the area metric be defined as gross or net? That is, should it correspond to the actual physical surface area or its total value reduced by the area of land that will not (or cannot) be developed, such as parkland, marshlands, wetlands, protected areas, roads, etc.

The first is addressed using Statistics Canada's concept of Census Metropolitan Areas (CMAs), but it is important to note that their boundaries can change over time to reflect demographic or economic changes. Later in this chapter we use OECD data that employs a different geographic definition in order to improve international comparability; hence, results differ. Because of data availability, the second point is addressed through the use of gross area in this analysis, and this important data gap is also raised in Section 10.6.

Figure 64 shows Statistics Canada data on population and population density for the five key cities analyzed in this report. The data suggest that the population in each city has increased over the 2006 to 2016 period. Meanwhile population density increases also occurred in all these cities except Montréal, where there was a small decline. The largest difference between the cities is seen in Edmonton and Calgary on the one hand, and Vancouver, Montréal and Toronto on the other. This is because the Prairie cities have expanded horizontally in response to population growth, whereas the other three cities have expanded vertically over time. Given the different approaches to development of these two groups, the remainder of this chapter focuses primarily on Toronto, Montréal and Vancouver. Potential reasons for these differences are discussed in the subsequent chapters.

Figure 64: Population and population density, select Canadian cities



Source: Statistics Canada (2017)

The following analysis looks at how Montréal, Vancouver and Toronto evolved from 1991 to 2016 using three different approaches.[35] First, we look at maps that depict population density changes in the three cities. Second, we examine density changes graphically by distances from the Central Business District (CBD), and lastly we look at a basic statistical approach that estimates changes in population density.

Figure 65 shows maps comparing densities in 1991 and 2016. The Vancouver maps show higher population concentrations within areas defined by the Urban Containment Boundary (Figure 66). Similarly in Toronto, growth in population density is concentrated in areas designated by the Ontario Growth Plan (Figure 67). (The methodology for constructing the maps is in the Chapter Appendix).

Figure 68 shows the estimated relationship between density and distances from Central Business Districts (CBDs). A cubic spline is added for illustrative purposes. For each Census Tract, the data clearly show that areas closer to downtown have higher densities. But the data also show that there are many areas close to downtown with lower densities. In the case of Vancouver, this trend may reflect protected areas; but it could also be explained by single-detached housing.

To understand the evolution of population density, the statistical approach estimates a simple relationship between population density and distance from CBDs. Despite its simplicity, the approach does yield some important insights, which we explore further in Table 35. The table fits a curve to population density by Census Tract for each of the five cities.[36] Interpretation of the data can be done by looking at the following elements:

1. The intercept, which indicates ideal levels of population density at the centre of the CBD (at kilometre 0);
2. The slope, which shows how rapidly population density declines as a function of greater distances from CBD areas (the percentage decline in population density for each kilometre travelled away from the CBD); and
3. The R^2 measure, which shows how well distance from CBD areas explains population density.

Generally, cities experiencing compact development tend to show high density levels in CBD areas (high intercept), rapid density declines with distance (large slope), and variations in travelled distance explaining a large share of density (high R^2). These patterns are shown graphically in panels A, B and C of Figure 69. Table 36 also shows that the number of Census Tracts increases over time as they are split into two or more Census Tracts (usually when their population exceeds 10,000) or the CMA expands.

This more granular data show that population density in the city centre of Toronto has just jumped ahead of Montréal levels. The growth seen in Toronto may be driven by increased construction of condominiums in the city's core. The data also suggest:

- Montréal is the most compact city. It has high, but declining levels of population density in the CBD. Distance from CBD areas largely explains the pattern of development;
- Both Calgary and Edmonton have low-density CBDs, which have been in decline in recent years. Distance is not a good explanatory factor of the city structure, i.e., the cities are relatively sprawled; and
- Toronto and Vancouver had tended to sprawl across their regions. However, between the 2006 and 2016 Census data, both cities have experienced a reversal in this trend.

[35] Older analysis and other approaches are available in Bunting *et al.* (2006) and Filion *et al.* (2010).

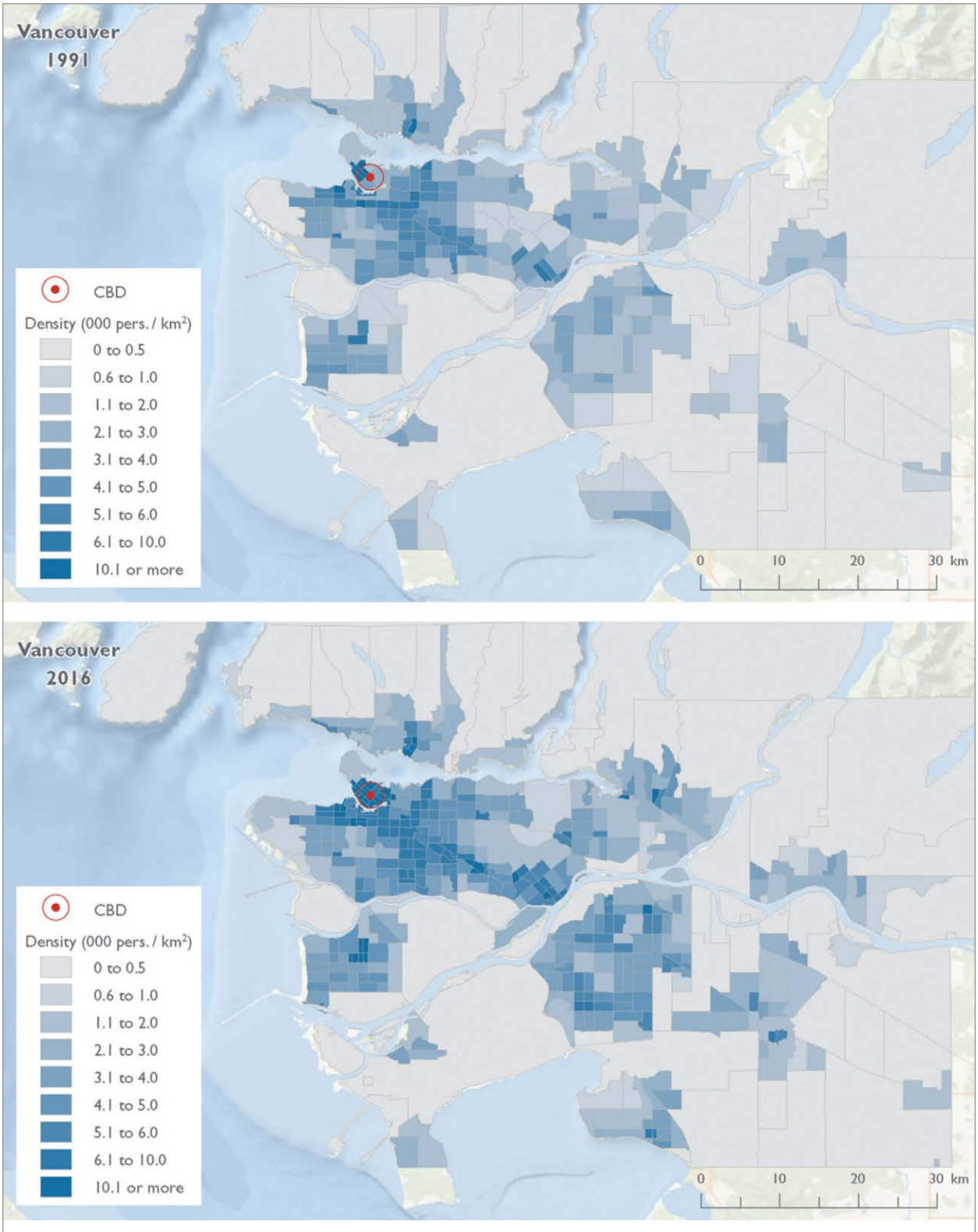
[36] The fitted curve is $di = s_0.exp\ \{-bxi\}$ where di is population density in Census Tract i, x_i is distance from the Central Business District to census tract i, $exp\ \{.\}$ is an exponential function, and s_0 and b are estimated parameters. Other approaches are discussed in McMillen (2010).

Table 35: Estimating population-density relationships for large Canadian cities

NAME OF CMA	YEAR	NUMBER OF CENSUS TRACTS	INTERCEPT (S_0)	SLOPE (b)	GOODNESS OF FIT (R^2)
Montréal	1991	749	12545.37	0.0813	0.33109
	1996	769	12537.31	0.08226	0.34356
	2001	862	12723.64	0.08348	0.36531
	2006	878	12720.66	0.0827	0.37658
	2011	921	12800.57	0.08318	0.39343
	2016	970	13249.94	0.08408	0.41898
Toronto	1991	812	10008.79	0.05701	0.2826
	1996	813	10228.37	0.05444	0.26038
	2001	932	10912.63	0.05012	0.2215
	2006	1003	10671.86	0.04775	0.22596
	2011	1088	11357.76	0.04637	0.19827
	2016	1151	13317.12	0.05453	0.21163
Calgary	1991	153	3408.87	0.05101	0.10393
	1996	153	3351.66	0.04852	0.09756
	2001	193	3348.28	0.03626	0.07013
	2006	203	3507.48	0.0448	0.10589
	2011	248	3380.66	0.0337	0.07117
	2016	253	3507.64	0.02914	0.0601
Edmonton	1991	195	3081.59	0.05028	0.17162
	1996	196	2866.19	0.04504	0.16426
	2001	211	3087.6	0.04796	0.1792
	2006	229	3195.45	0.05153	0.17934
	2011	252	3301.66	0.0524	0.19073
	2016	272	3344.84	0.04662	0.19724
Vancouver	1991	299	8330.04	0.10463	0.28621
	1996	299	8667.81	0.09463	0.27821
	2001	387	8786.74	0.0711	0.27926
	2006	410	9287.96	0.07025	0.27143
	2011	457	9682.21	0.06082	0.2398
	2016	478	10585.69	0.06671	0.24465

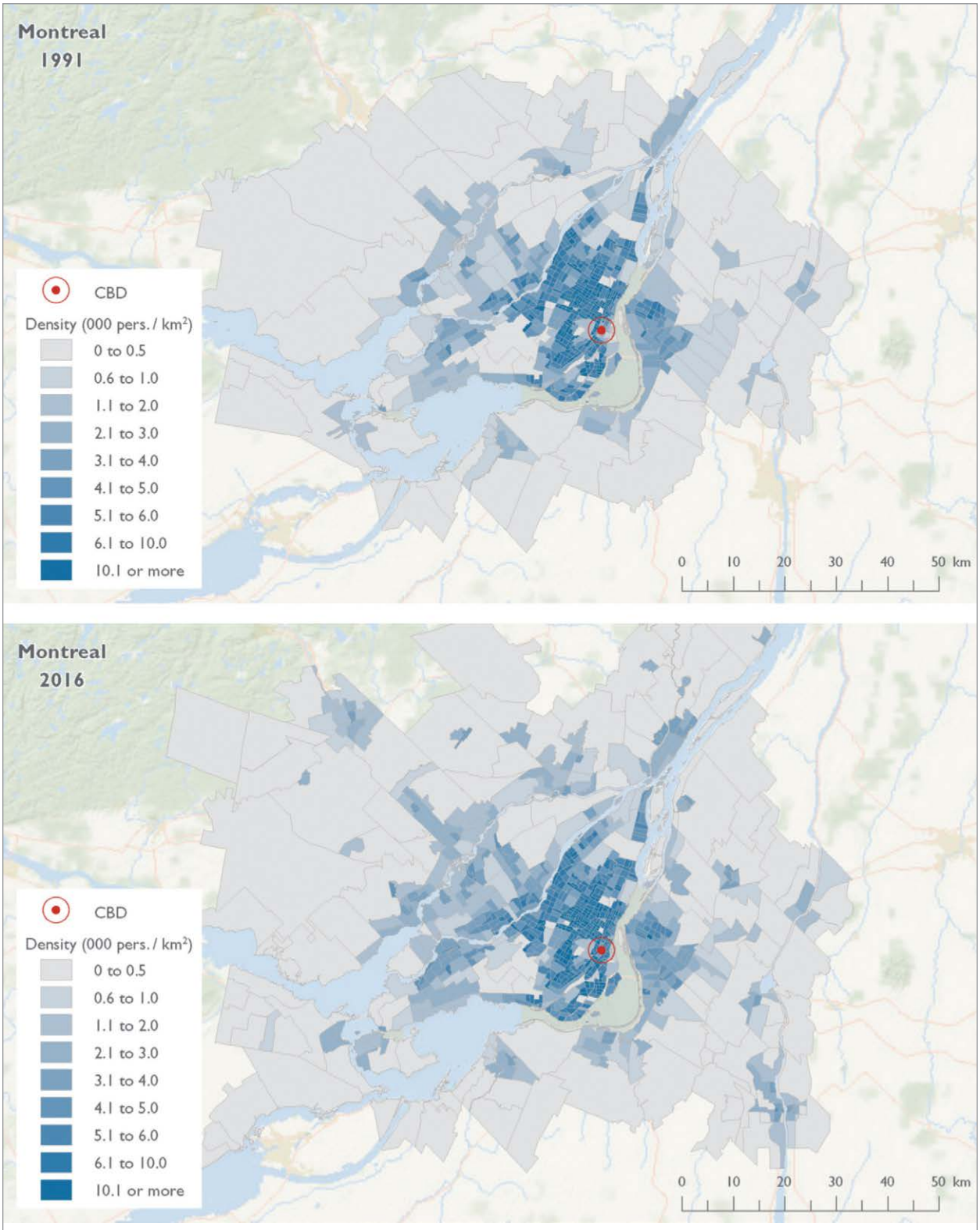
Sources: CMHC calculations based Statistics Canada Census data

Figure 65: Maps of population density



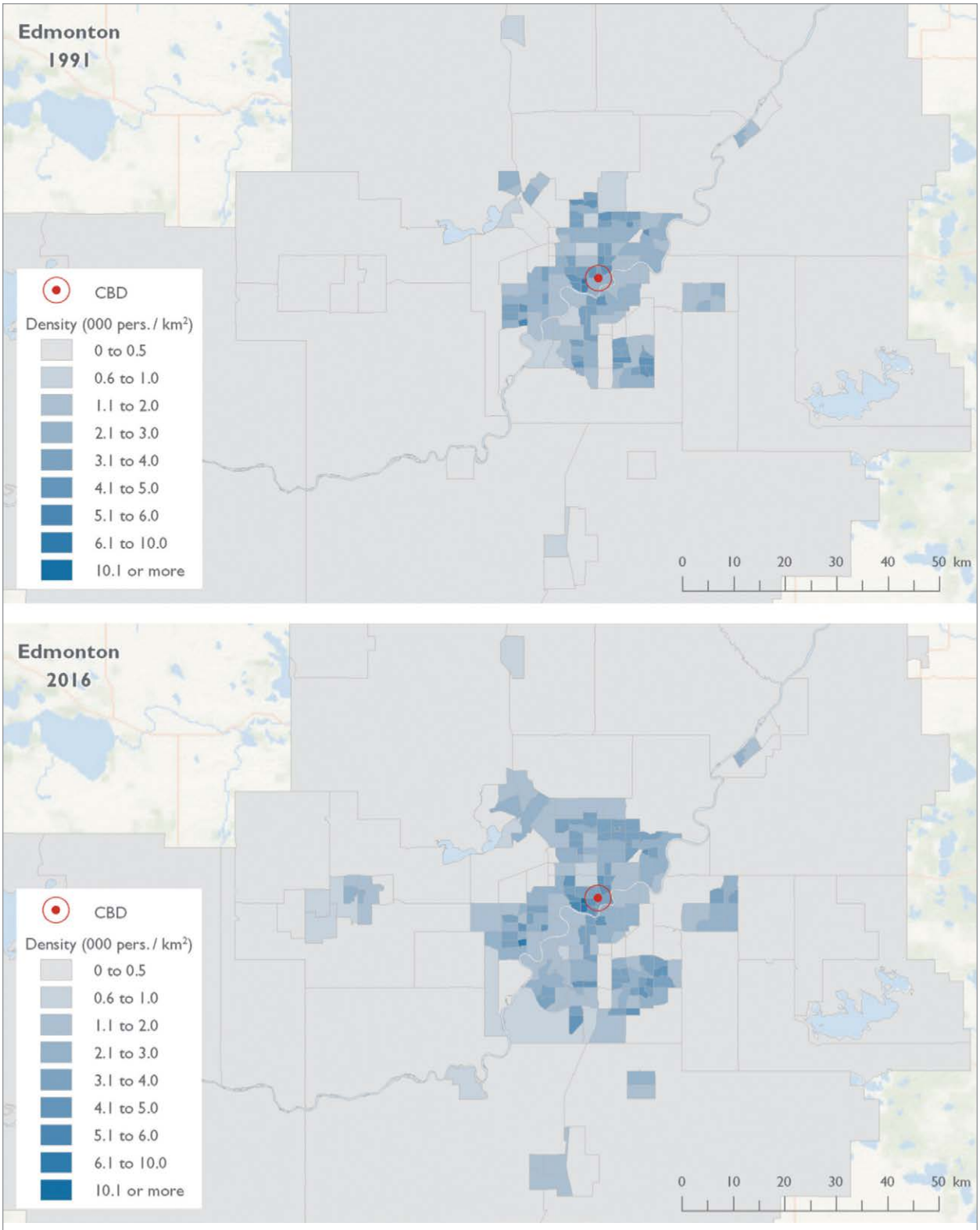
Source: CMHC calculations based Statistics Canada (2017a)

Figure 65: Maps of population density (cont.)



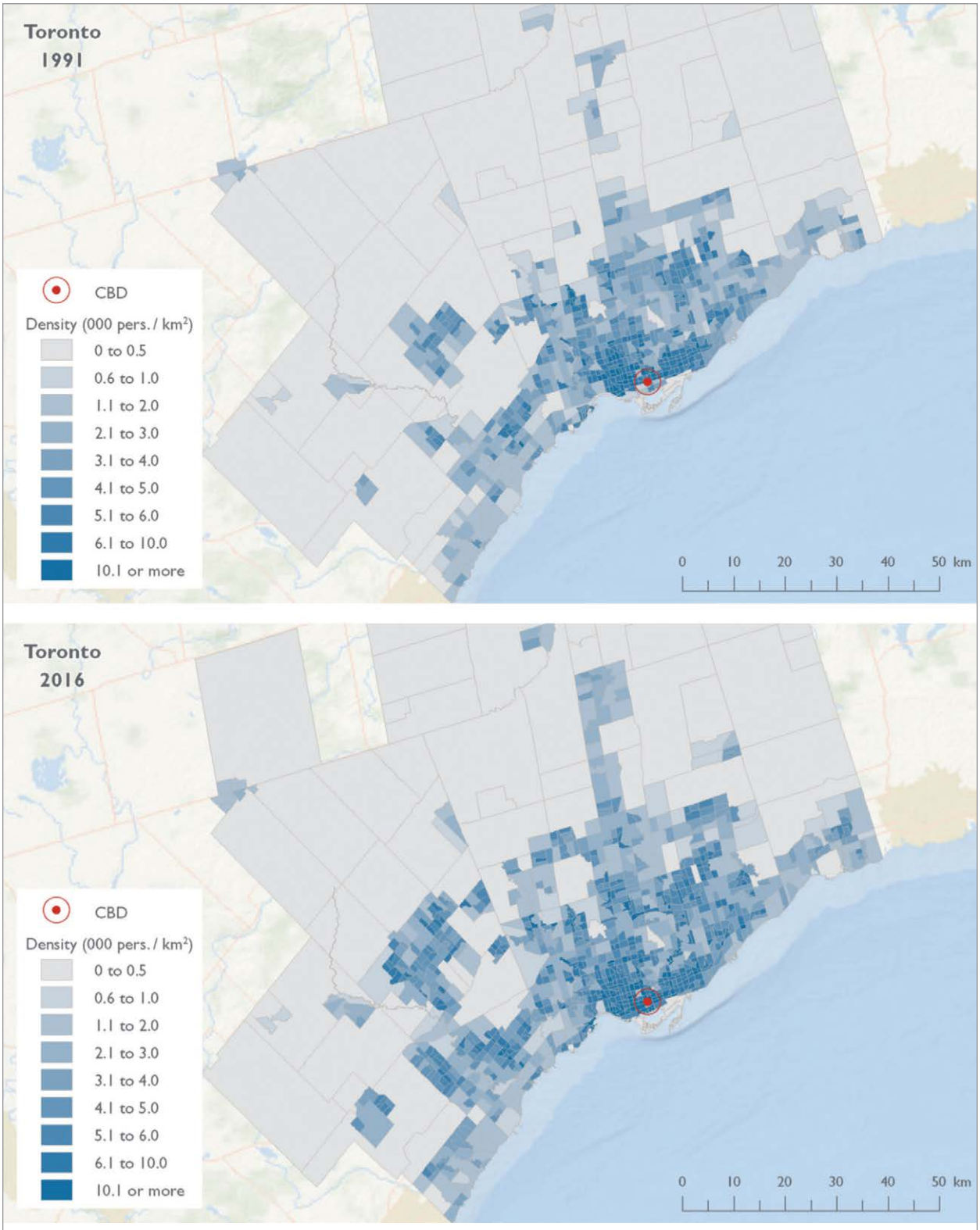
Source: CMHC calculations based Statistics Canada (2017a)

Figure 65: Maps of population density (cont.)



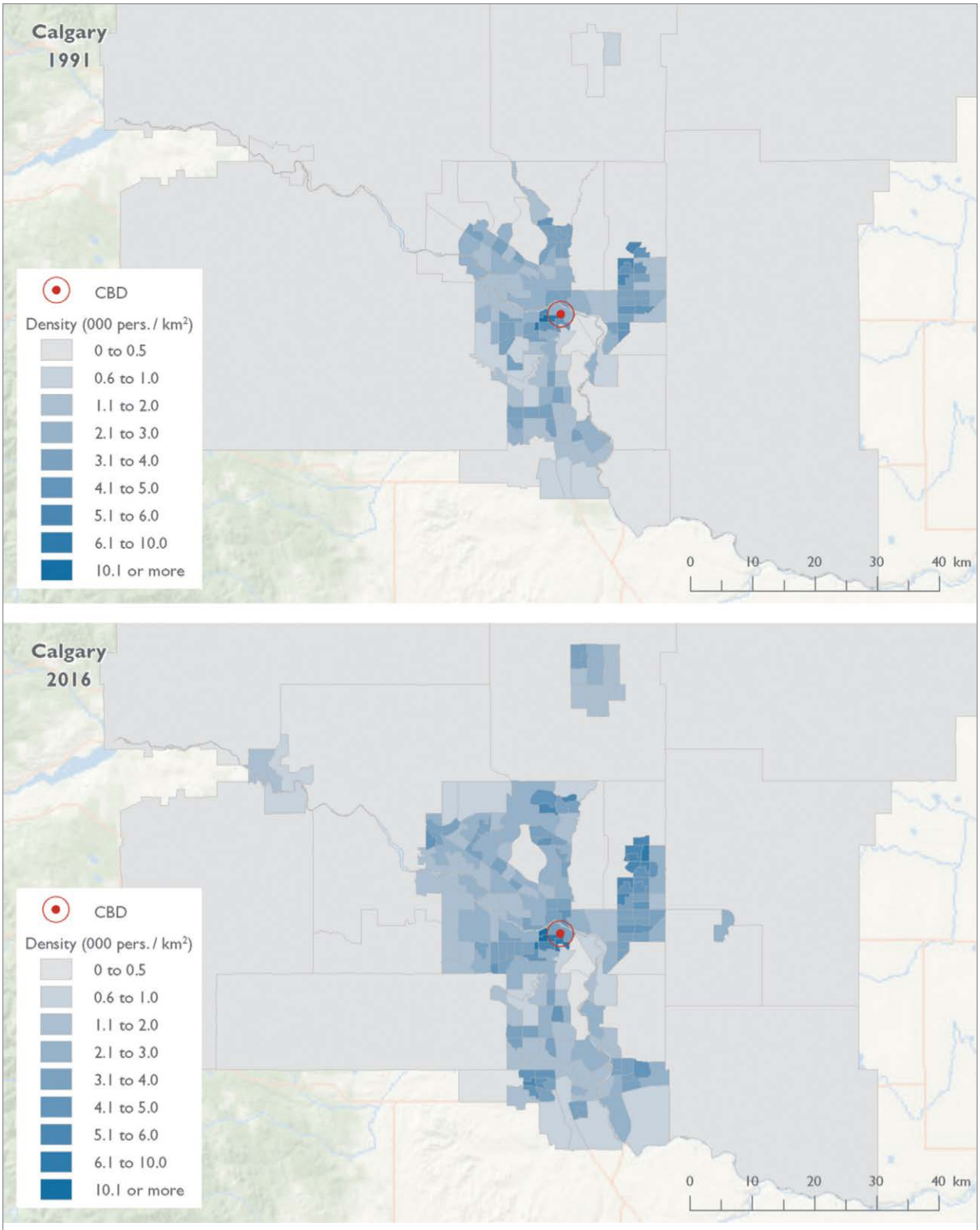
Source: CMHC calculations based Statistics Canada (2017a)

Figure 65: Maps of population density (cont.)



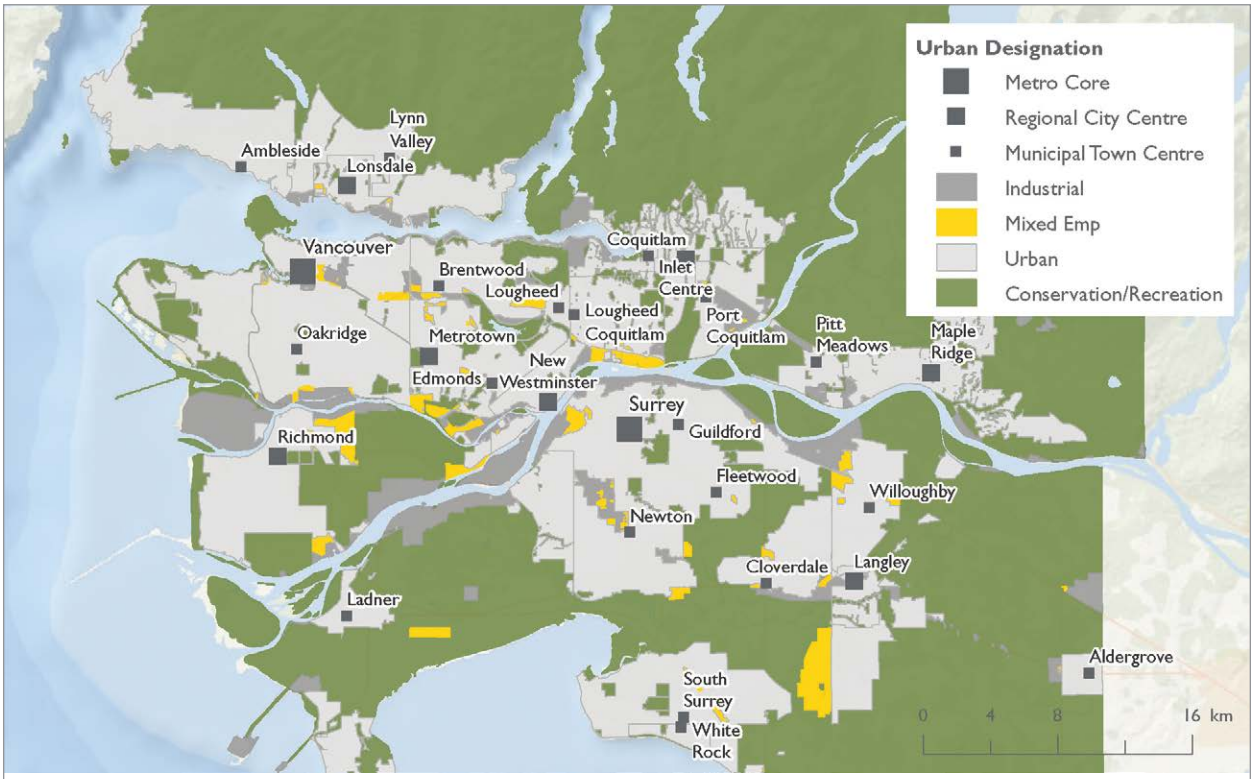
Source: CMHC calculations based Statistics Canada (2017a)

Figure 65: Maps of population density (cont.)



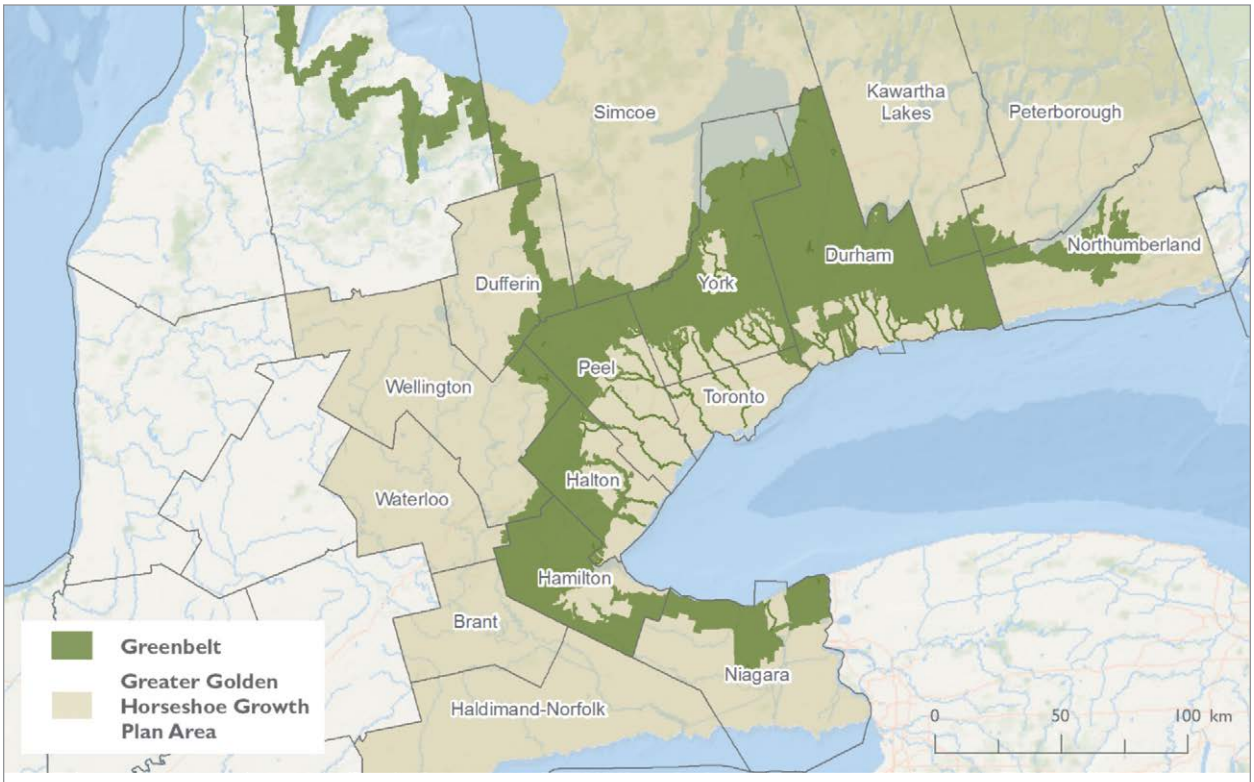
Source: CMHC calculations based Statistics Canada (2017a)

Figure 66: Regional land use designations in Metro Vancouver



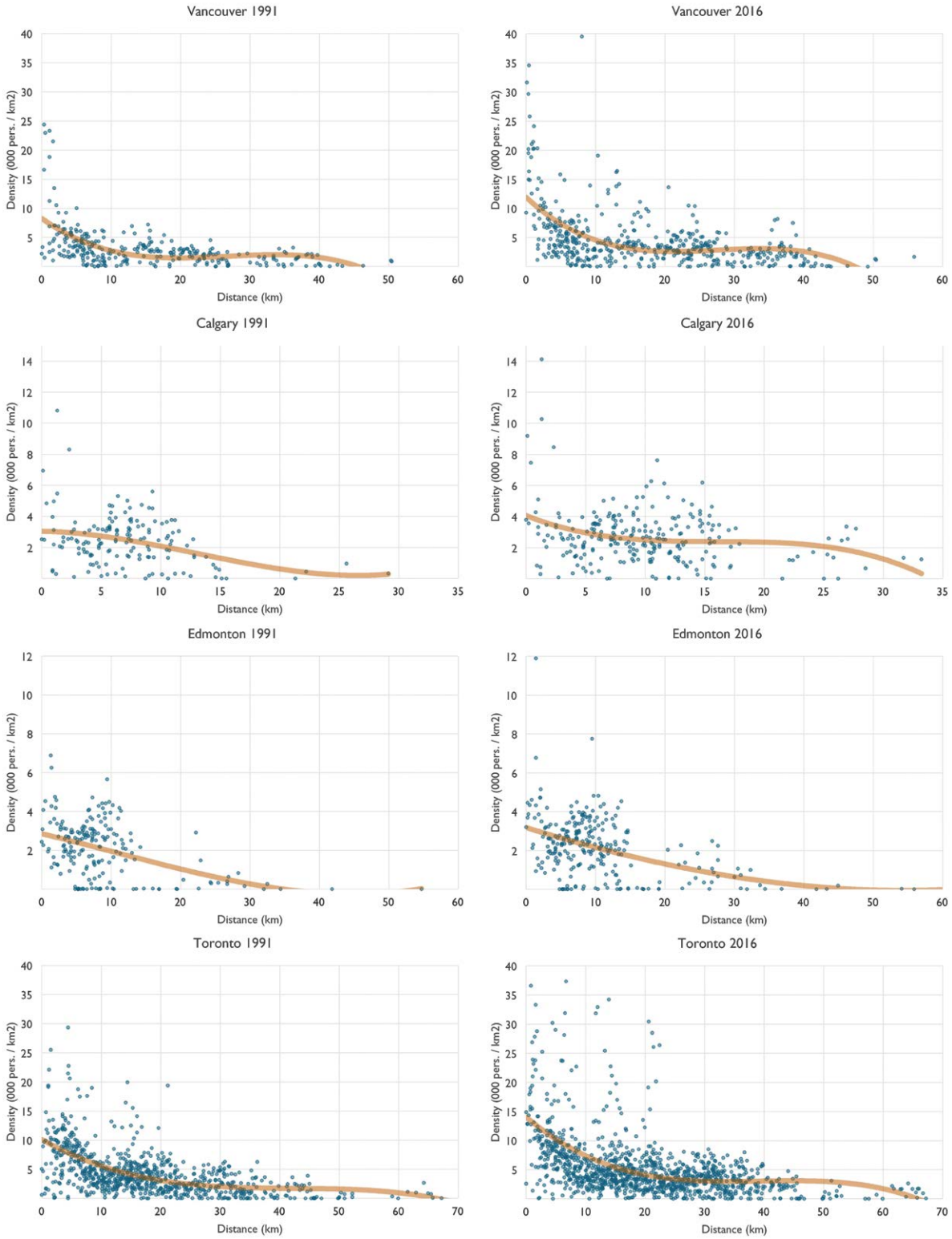
Source: Metro Vancouver (2016)

Figure 67: Greater Golden Horseshoe Growth Plan Area



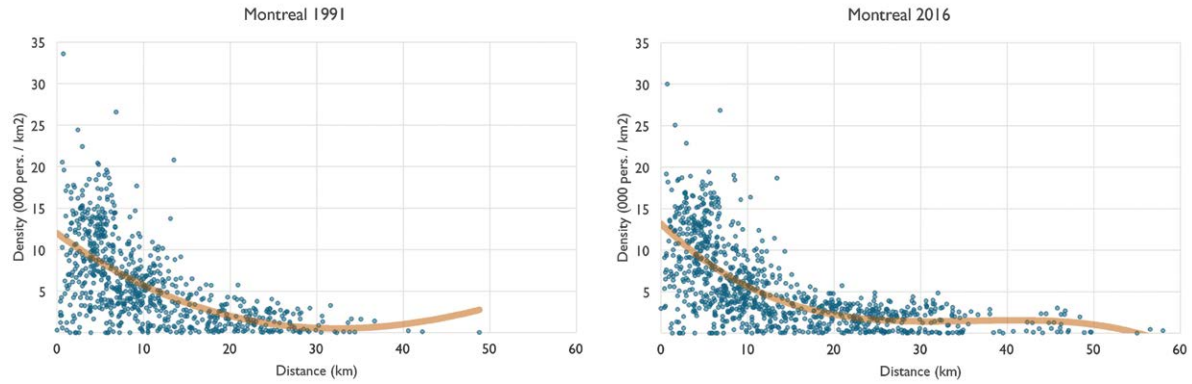
Source: Ontario Municipal Affairs (2015) and Statistics Canada (2016)

Figure 68: Population density by Census Tract, and cubic estimation



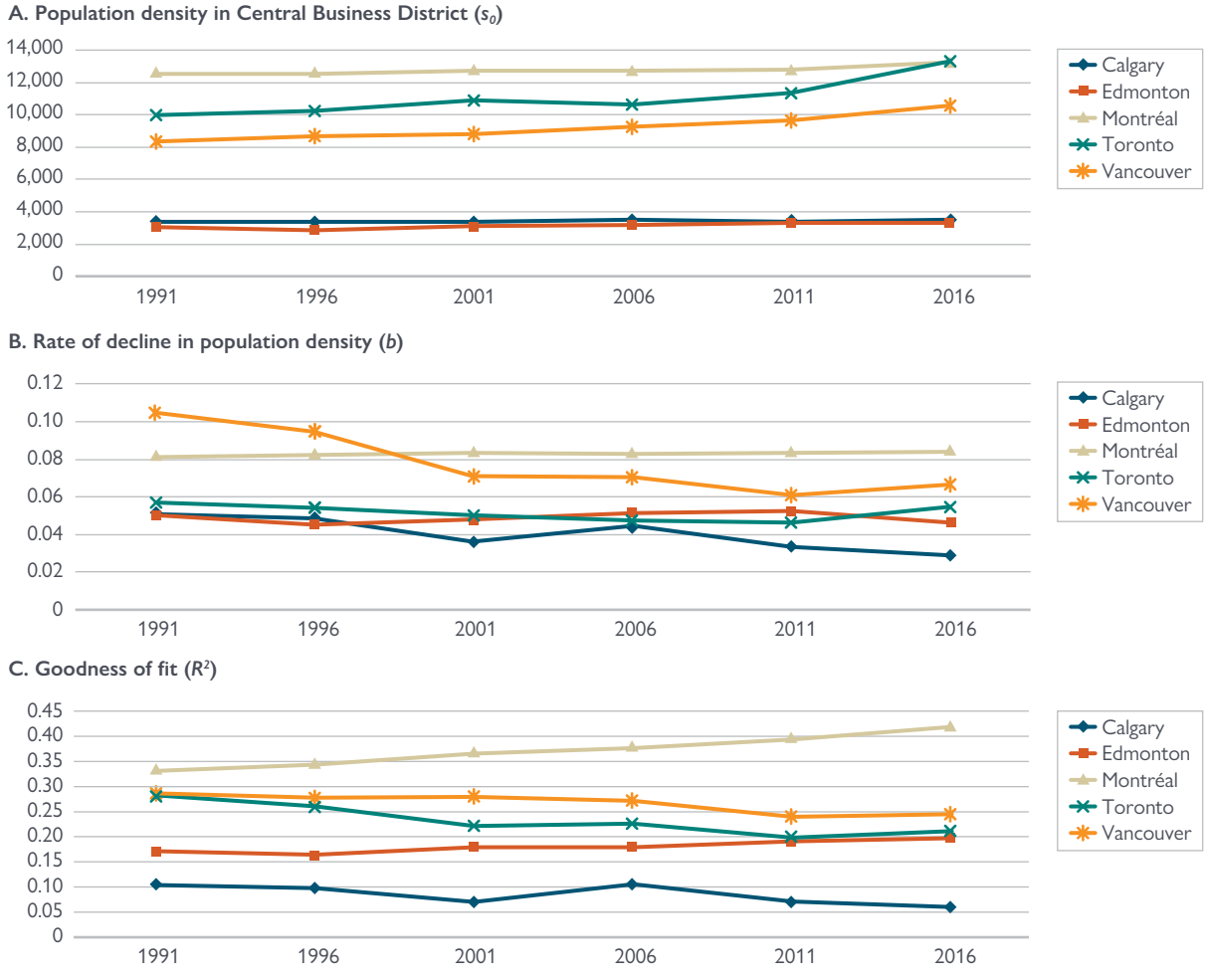
Sources: CMHC calculations based on Statistics Canada Census data

Figure 68: Population density by Census Tract, and cubic estimation (cont.)



Source: CMHC calculations based on Statistics Canada Census data

Figure 69: Changes in population-density relationships, large Canadian cities



Sources: CMHC calculations based on Statistics Canada Census data

10.5 INTERNATIONAL DATA FROM THE OECD

In *Regions at a Glance*, the OECD publishes detailed analyses as part of its efforts to further understand how regions and cities contribute to national economic growth and well-being (OECD, 2016a). To enhance international comparability, the OECD introduced common definitions of urban areas based on geographic data provided by member countries (OECD, 2011). Well-being is covered by various indicators ranging from income and jobs, through the environment and civic engagement, to health and housing. Clearly, there is scope to dig deeper into these data and draw on international experience to develop greater understanding for policymaking.

However, OECD data also illustrate the challenges of international comparisons and standardization. Table 36 data from the OECD shows a different ranking for Canadian cities' population-density rankings from Figure 64, which was based on Statistics Canada data, because the OECD has adjusted Canadian data to facilitate international comparison (OECD, 2016b).

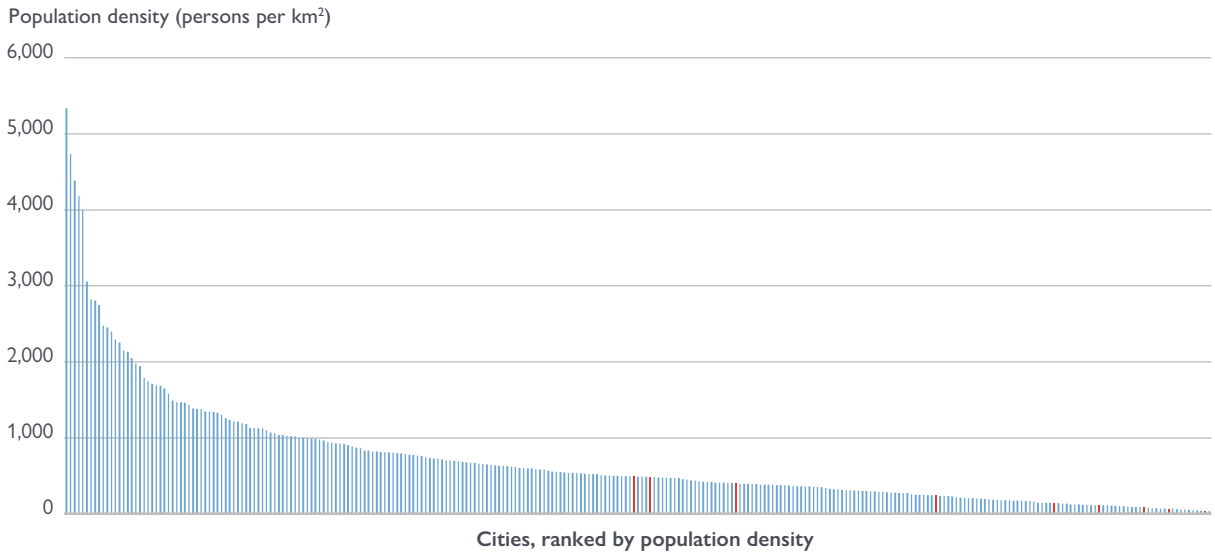
Table 36 also suggests that the population densities of Canadian cities are quite low compared to those of some other leading international cities: obviously, cities around the world reflect a wide pattern of different histories, ages and development stages. This is illustrated in Figure 70, which shows population densities for the 281 largest metropolitan areas in the OECD database with Canadian cities shown in red. As discussed in Section 10.2 above, the data suggest that some of the cities considered highly livable, such as Barcelona, also have high population densities.

Table 36: Population density of select metropolitan areas

RANK (OUT OF 281 METROPOLITAN AREAS)	METROPOLITAN AREA	POPULATION DENSITY (PERSONS PER KM^2)
1	Seoul Incheon	5338.72
4	Tokyo	4181.17
5	Mexico City	3999.52
6	The Hague	3054.86
7	Barcelona	2824.24
20	London	1791.85
23	New York	1691.35
60	Paris	995.74
140	Vancouver	489.7
144	Toronto	482.02
154	Melbourne	439.49
165	Montréal	400.85
167	Sydney	395.83
253	Calgary	113.61
271	Edmonton	64.77

Source: OECD

Figure 70: Population density of 281 metropolitan areas in OECD, Canadian cities in red



Source: OECD
Notes: Canadian cities, ranked by population density, are Vancouver, Toronto, Montréal, Hamilton, Québec, Calgary, Ottawa-Gatineau, Edmonton and Winnipeg.

10.6 DATA GAPS

10.6.1 Population density

At the gross level, the data examined in the previous section provide a reasonably accurate population density picture across Canadian cities. For a more detailed analysis, however, densities at the net level would be required. Hess and Sorensen (2015) show that space occupied by parks and streets have been trending higher in Toronto over recent decades. And so a different picture emerges: net densities did not decline over time by as much as gross densities. As Hess *et al.* (2007) argue, "Consistent, region-wide definitions and data are needed to develop a detailed understanding of existing trends in population and jobs density, land use, development patterns, and housing issues."

Analysis would be simplified by maintaining the size of Census Tracts. Currently, Census Tracts are re-defined or occasionally split, which makes time-series or panel-data analysis challenging (Martin *et al.*, 2002).

10.6.2 Multiple indicators of urban growth

So far in this chapter, population density has been the main metric analyzed. But there are multiple other ways of looking at how cities evolve, including land-use mix and accessibility, the mix of housing types and street system connectivity (Hess and Sorensen, 2015). Bento *et al.* (2005), for example, suggests that an integrated approach has to be taken to reduce automobile use. While individual factors—population centrality, jobs-housing balance, city shape, and road density—make some contribution to car use, it is only their combined effects that has an impact so that changing from the characteristics of Atlanta to the characteristics of Boston lowers annual vehicle miles travelled by 25 per cent.

Clifton *et al.* (2008) argue that although data are being made available to economists, transportation and urban planners, and designers to work together, there are still so many disparate measures operationalizing the same constructs that standardization in operational definitions and measurement protocols would be necessary to advance urban research.

Population density should not be interpreted exclusively from the economic perspective presented here. As noted by Knaap *et al.* (2007), there is scope for a significant expansion in quantitative research that focuses on patterns of urban form. This would also include residential and pedestrian proximity to commercial uses, land use mix, and street network patterns.

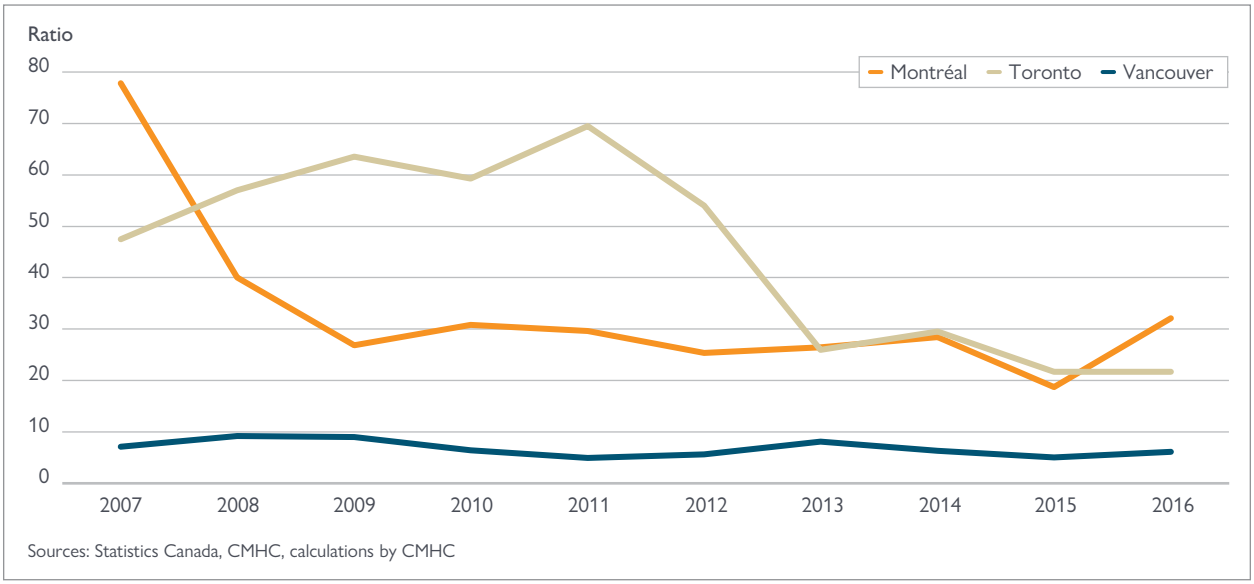
10.7 IMPLICATIONS OF DENSIFICATION FOR LAND PRICES

Higher density and concentration of housing in city centres, all else equal, will tend to raise land prices. So, as discussed in Chapter 6, the price of underlying land is critical to understanding the evolution of home prices.

High land prices give incentives to construct higher-value structures on that land. Ideally, this should mean providing additional units of housing (increasing density) rather than more expensive single-detached homes. It is, at the moment, difficult to obtain data on how lands are redeveloped, but CMHC has modified its Starts and Completions Survey to gather data on conversions and demolitions to develop an understanding of this phenomenon.

A proxy for what is happening is to use the building permits data from Statistics Canada. A permit is required for each completion and demolition. If there is a ratio of one completion for every demolition then it is likely that one single-detached home is being replaced with a larger single-detached home; a high ratio would indicate increased densification as, say, one single-detached home is replaced by condominium buildings. The data in Figure 71 suggest that the rate of densification is relatively high in Toronto and Montréal whereas it is much lower in Vancouver.

Figure 71: Annual Completions-to-Demolitions Ratio

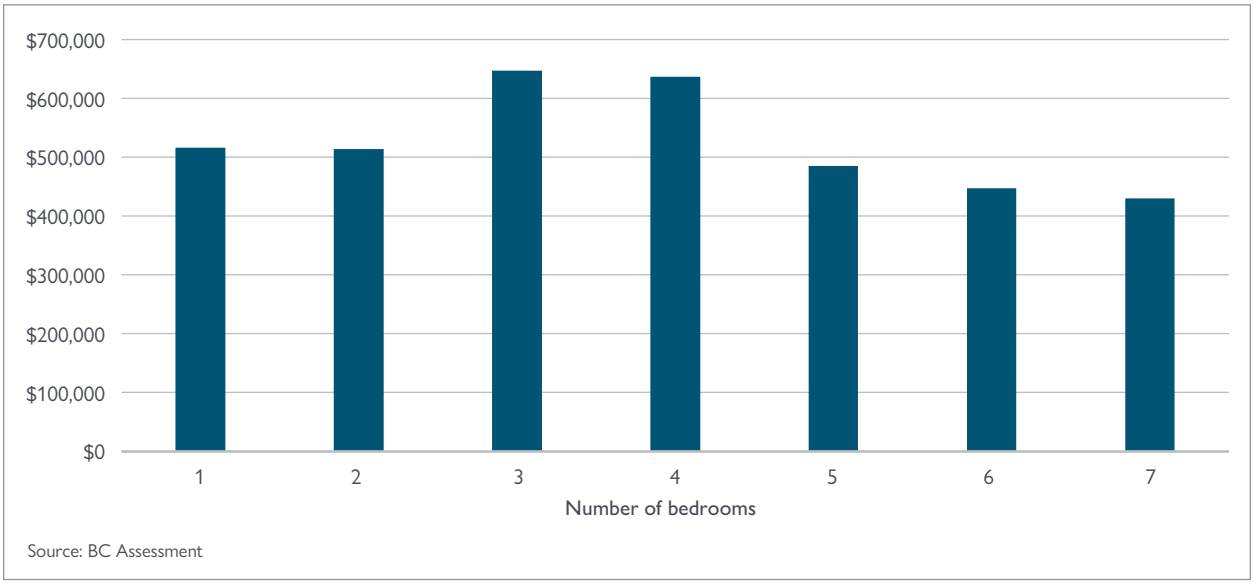


Sources: Statistics Canada, CMHC, calculations by CMHC

As discussed in the introduction to this chapter, it is not necessary that home prices increase as a result of imposing constraints on land, but the imperative to densify could be counter to what households want. As incomes rise, economic analysis suggests that demand for private space will also increase (it is income elastic). Analysis in England suggests, for example, that income elasticities for internal space and for gardens are relatively high (Cheshire and Sheppard, 1998). Rouwendal and van der Straaten (2008) look at data for Dutch cities and find that willingness to pay for parks and public gardens increases with income, although not as fast as that for private residential space. As incomes rise in general, competition for space will increase leading to greater demand for single-detached housing if other forms of housing to not meet households' wants.

As households grow older with higher incomes and larger families, they are also likely to want to move to larger, perhaps 3-bedroom homes. It appears, however, that there is a gap in the market in moving from 2- to 3-bedroom homes, notably because there are relatively few 3-bedroom condominiums. Figure 72 shows the prices of dwellings in the City of Vancouver divided by the number of bedrooms (dwellings include all types of housing including single-detached and apartments). In a market without any frictions, one would expect to see a relatively constant number. The data suggest, however, a sharp jump when increasing in size from a 2-bedroom dwelling with an extra $100,000 required for an extra bedroom. This suggests a shortage of 3-bedroom dwellings, and a substantial willingness to pay for 3-bedroom units. In general, there appears to be a shortage of adequate dwelling space for some households in Vancouver. Although we do not have comparable data for Toronto, we suspect that the same pattern is occurring there.

Figure 72: Average House Prices per Bedroom, City of Vancouver, 2016, all dwelling types



Source: BC Assessment

10.8 CONCLUSION

This chapter has reviewed population density over recent decades in the five major centres discussed in this report. Toronto and Vancouver have changed their development strategy, and are now moving toward more compact forms of development. Montréal has been the more compact city in Canada for some time.

Increased density creates challenges, however, as homebuyers may perceive denser cities as less livable. Our commissioned study from *Urban Strategies* suggests that this is now always the case if innovative design is followed. Nevertheless, data from Vancouver suggest that there remain challenges in ensuring adequate supply of what Canadian households want. We emphasize that this is not a challenge for Vancouver alone, but is widespread in cities around the world.

10.9 APPENDIX: GIS METHODOLOGY

Population density calculation

Population counts by Census Tract (CT) were obtained from the Census Datasets download page for each census year available. They included catalog item numbers: 95F0171X, 95F0183XDB, 93F0050XCB2001011, 94-575-XCB2006005, 98-311-XCB2011010 and 98-400-X2016005.

Census Tract boundary files were obtained from the Boundary files download page for each census year available. CT boundary files for previous years were obtained by request from GEO Help.

"There are two types of boundary files: cartographic and digital. Cartographic boundary files portray the geographic areas using only the major land mass of Canada and its coastal islands. Digital boundary files portray the full extent of the geographic areas, including the coastal water area. The boundary files use the Lambert conformal conic projection. Boundary files using geographic projection (latitude and longitude coordinates) are available upon request."

The boundary files received were of mixed type and had different (sometimes absent) coordinate systems. They were standardised to represent the Cartographic boundary and all were transformed to an Albers Equal Area projected coordinate system to ensure an accurate calculation of area using a linear unit (metres).

The population counts were then joined to the boundary files and the population density was calculated based on the square metres area of each CT, then brought to a density of population per square kilometre.

Census Tract distance from Central Business District

The distance from each CT to the CMA'S CBD was obtained by converting each CT boundary polygon to a point representing its centre (constrained within). *Current* CBD locations were determined from crowd-sourced information (i.e. wikipedia) as illustrated below; they were not adjusted to reflect movement in time for previous years. Straight-line (as the crow flies) distance was calculated in the GIS. The same coordinate system as specified above was used for distance calculations. Even if it is not optimized for distance calculation, that coordinate system is global enough (across Canada) and the CMAs are close enough in latitude between the standard parallels that distance distortion to distance should not be significant. The resulting population-density-over-distance was then plotted for each census year for which the data was prepared.

Table 37: Identifying Central Business Districts (CBDs)

CMA	LONGITUDE	LATITUDE	STREET LOCATION
Vancouver	-123.1222	49.2798	Granville St. between Smithe St. & Nelson St.
Calgary	-114.0632	51.0446	Centre St. South at 9 Ave SW
Edmonton	-113.4904	53.5462	103a Ave NW at 100 St. NW
Toronto	-79.3817	43.6519	Queen St. W at Bay St.
Montréal	-73.5674	45.5019	Boul. René-Lévesque O. at University St.

Starts Density calculation

Housing construction starts (see definitions below) were extracted from the standard tables published by CMHC in the Housing Market Information Portal for the years 2012 to 2016. The data were extracted at the CT level and the count of new units for the 5 year period was summed from the 5 individual years' tables. This operation was done for two categories: All Intended Markets, and Apartments only. The 5 year unit counts were joined to the 2016 CT boundary file to obtain their area and distance from the CBD. The starts density was calculated on a unit-per-square-kilometre basis. The 5 year unit starts-density-over-distance was then plotted against the 2011 population-density-over-distance. Absolute unit counts by CT were also plotted against their distance from each CMA's CBD.

Survey Definitions

For the purposes of the Starts and Completions Survey, a *dwelling unit* is defined as a structurally separate set of self-contained living premises with a private entrance from outside the building or from a common hall, lobby, or stairway inside the building. Such an entrance must be one that can be used without passing through another separate dwelling unit.

For the purposes of the Starts and Completions Survey, a *start* is defined as the beginning of construction work on a building, usually when the concrete has been poured for the whole of the footing around the structure, or an equivalent stage where a basement will not be part of the structure.

11 Agglomeration Economics, Income and Wealth Inequality, and Housing

CHAPTER OBJECTIVES:

- Review international research evidence on economic changes within cities. So far, the report has concentrated on city- or CMA-level analysis, but economic research on what happens within cities has been limited in Canada.
- Examine the role of housing-related research within a broader analysis of urban economics.
- Discuss research on possible interactions between multiple facets of global cities' recent histories, including economic development, rising home prices and increasing inequality.
- Highlight the increasing fluidity of choices by businesses and households, and stress that housing systems and choices will need to become more flexible in response.

KEY FINDINGS:

- Agglomeration economies are powerful, so city sizes may be too small. But these forces are also highly localized within cities, so dispersing economic activity of some industries across a city may curtail economic growth.
- These changes are likely generating significant wealth and increasing income inequality. Using such wealth to preserve existing housing systems is likely to increase house price pressures, increasing wealth inequality further.
- Incomplete understanding of these changes leads to risks when designing policy.

11.1 INTRODUCTION

So far, this report has concentrated on housing at the city (or CMA) level, but understanding some of the forces at play and their impacts requires digging deeper within our cities. Choices on housing are also contingent on structural trends in the wider economy that interact with cities' spatial dynamics. Further research on these critical issues will have to turn to more microeconomic analysis, and place the study of housing within a broader research agenda on urban economics.

As discussed in Chapter 4, cities have become hotbeds of innovation, attracted highly skilled workers, experienced greater inequality and seen rising home prices. These trends appear inter-linked but are not yet entirely understood.[37] This chapter gives some highlights of the newest academic research on what is happening within cities, drawing mostly on international research.

[37] Duranton and Puga (2014) concludes that little is known about the details of these spatial patterns of decentralized employment, for instance.

Unfortunately, there is limited academic research in Canada on these topics, perhaps because detailed and robust economic data on and within cities are sparse. So we caution that what happens in other countries may not be happening here.[38] Because of differences between Canadian and U.S. cities—Canadian cities have maintained dynamic city centres compared to urban blight in some U.S. cities, for instance—forming such policy advice in Canada requires new research. This chapter therefore suggests areas of pressing research requirements in Canada, highlighting policy risks absent such information.

11.2 ECONOMICS AND CITIES[39]

Successful cities are driven by powerful *agglomeration economies*. The phenomenon of agglomeration economies captures the myriad interactions in cities that make them productive. These include the pool of rich talent available in cities that fosters competition for job places, the happenstance interactions between different designers and engineers, the easy spread of information, and so on.[40] These economies are potent: they are at the core of the financial districts driving development of New York and London, and the success of Silicon Valley in California. Although these are the best-known examples, strong agglomeration effects are at the core of modern cities.

Indeed, the goal of many cities is to harness these forces to create dynamic clusters of innovation. Innovation hubs have attracted aspiring youth to come together to build new technologies that can create outsized gains to their creators. Working together and collaborating on these projects heighten the importance of face-to-face contact in some instances. Some types of agglomeration economies may be becoming more important. Grieser *et al.* (2016), for example, finds that riskier and more complex industries experience the greatest gains from knowledge spillovers. The presence of industry risk or complexity tends to lead to the clustering of firms' headquarters and their value-added activities such as research and innovation. Co-locating with related firms facilitates communication and the sharing of private information. Dense urban structures facilitate face-to-face interaction and knowledge sharing, reducing project uncertainty, which is more important for more complex industries in relatively more uncertain environments.

Firms can obtain substantial benefits from agglomeration economies. But these benefits may be under-supplied in a completely free market since firms have no incentive to generate these agglomeration benefits, and newly arriving firms can free-ride, benefiting from the existing pool of talent created. This suggests that governments have a role in supporting businesses in these clusters, such as by supporting higher education. Critically, it also suggests that cities can be too small.[41] Ahrend *et al.* (2017) finds that labour productivity increases with city size, and that cities affect economic performance beyond their boundaries.

Agglomeration economies can differ by industry, and hence their benefits to the local economy can vary depending on a city's industrial structure. Face-to-face contact in some financial and business services is imperative, so these industries' agglomeration economies are highly localized, close to Wall Street or Bay Street, for example. Close proximity may not be as critical in the high-tech industry, so there is a bit more sprawl to Silicon Valley, while in Calgary and Edmonton, firms related to the oil and gas industries require considerable land, so the agglomeration effects are even more spread out, as discussed in the previous chapter. Ahlfeldt *et al.* (2015) take advantage of both detailed data for Berlin and the natural experiment of the reunification of the city to assess carefully the extent of agglomeration forces, taking into account the presence of local amenities, and finds that production externalities are substantial but highly localized.

[38] Research such as Beach (2016) found differences in the patterns of inequality between Canada and the U.S., for instance, and it is probable that local dynamics of immigrant behaviour in Canada differs from the U.S.

[39] As discussed briefly in Chapter 5, economists have a basic framework for examining the economics of city structure (the Alonso-Muth-Mills model). Much of the discussion here draws on that basic framework with some recent advancements in the theoretical literature.

[40] These agglomeration economies are reviewed in numerous articles such as Glaeser (1998) and Rosenthal and Strange (2004).

[41] The downside of cities, such as congestion, will be looked at in the next chapter.

As well as access to ideas and workers, Glaeser (1998) argues that firms make choices on locations based on land costs and savings in transport costs for inputs and outputs. With products becoming more virtual than physical, transport cost savings may not be as important as they once were, so manufacturing plants have tended to move away from cities. Companies that use land intensively (big-box retailers with large parking lots or large manufacturing plants) are also likely to move away from city centres with high land costs—to *decentralize*—while service industries with intense face-to-face contact where ideas can be communicated are likely to remain *centralized*. Glaeser and Kahn (2001) finds that industries that have more skilled workers and that are more IT-intensive tend to be centralized. Hence, employment patterns have changed with some jobs remaining downtown and others migrating to the suburbs (Niu *et al.*, 2015). Baum-Snow (2017) finds that these forces are working at very local levels (i.e., at areas smaller than a CMA). Businesses in some industries, notably financial services, are being drawn to city centres while retailers will move to be close to consumers. Other businesses are moving outward to the suburbs to economize on land costs. Rossi-Hansberg *et al.* (2009) looks at local U.S. data to show that city centres are becoming management and administrative hubs. Production plants are increasingly moving out to the suburbs where land prices are lower, which has implications for employment and travel patterns as well.

These patterns perhaps help explain the results of Behrens and Bougna (2015) who look at the location pattern of Canadian manufacturing industries. Manufacturing in Canada is less centralized than in other countries, and has become even less so. Again, their findings show that patterns differ by industry, with some industries like machinery, and computer and electronic manufacturing highly localized while wood products and petroleum and coal products are not. Their data are limited to manufacturing, and do not cover the service industry. In Toronto, the Canadian Urban Institute found that "[t]he head offices, publishing firms, and engineering companies have largely moved out to suburban areas, sometimes elsewhere in the City of Toronto, but mostly in the '905' region. For the most part, what remains are businesses in or affiliated with the financial services sector" (CUI, 2011).

Data and research gap: An important data and research gap in Canada, hence, is detailed analysis of the evolution of places of employment by industry, and their effect on household location decisions.

11.3 SKILLS AND WAGES

Agglomeration economies means that firms can pay higher wages in cities. De La Roca and Puga (2017) outline three reasons why firms are willing to pay higher wages in larger cities: 1) there are agglomeration economies that are associated with larger cities; 2) workers who are more productive choose to locate in bigger cities; and 3) there are dynamic learning economies that enable workers to accumulate valuable experience in larger cities. Using Spanish data, they find that the first and third effects are the most important. So, when workers move to another region, they retain what they have learned. In U.S. data, Baum-Snow and Pavan (2013) also find limited evidence for the second channel.

The extent to which there are higher wages can depend on the prevalence of particular industries. If there is a greater presence of some industries with strong agglomeration economies then wages are higher and more dispersed. This is more likely to be the case in larger cities with more exposure to the financial services or high-tech industries. Breau *et al.* (2014) looks at the links between incomes of Canadians and a proxy for innovation, and finds that more innovative cities have a more unequal distribution of earnings. Using U.S. data, Brinkman (2014) finds that while demand for skill had increased within most industries, the finance and professional services industries in particular had increasingly concentrated their high-skilled workers into large cities.

11.4 HOUSEHOLD CHOICES ON HOUSING CHARACTERISTICS AND LOCATION

Households obviously make location choices like businesses do. They will tend to choose housing close to their place of work to minimize commuting time, but they also value amenities and the characteristics of their homes. The amount of income a household earns will affect these choices. Higher income households may want larger homes with better interior finishing, more bedrooms and gardens, and be able to pay for accessing *amenities*, short-hand for access to quality schools or to local parks, nightlife, retail and cultural centres, sporting events, live performances, and so on (Rosen (1979) and Roback (1982)). In economic jargon, demand for housing size, characteristics and amenities is *income elastic*.

These demands also influence in which cities people choose to live as well. They may move to cities with better mountain and lake views or with closer access to outdoor pursuits (Davidoff, 2016). The presence of desirable amenities draws people to these centres, and further increases provision of amenities in these locales. The increased number of high-income earners in city centres makes it economic to increase provision of niche amenities as market size increases. Glaeser *et al.*, 2001) argues that cities are not only important for production but also as centres of consumption.

These household choices are all conditional on the local economy, which is influenced by the wider economic forces described above. Changing agglomeration dynamics and firm choices affect their employees' choices of where to live through a variety of factors from increasing incomes and changing tolerance for commuting times (Anas *et al.*, 1998). So, for example, the sprawl of housing in Edmonton and Calgary may reflect the greater sprawl of industry and jobs in those cities: in general, Gleaser and Kahn (2001) finds a high correlation between industry and housing sprawls in U.S. cities. Although density is valued in all cases, the practical scale or metric of density varies by industry. These findings may help explain the different patterns of sprawl in Canadian cities found in Chapter 10.

How these choices by firms and households are reflected in cities' structures is also contingent on local circumstance and history. Albouy *et al.* (2013) compares Canadian cities to see how the contribution of productivity and amenities differ. Victoria yields the highest quality of life, followed by other CMAs in British Columbia (Vancouver, Kelowna and Abbotsford), and then Toronto, Calgary and Montréal. Turning to productivity — the output per hour worked — Toronto ranks highest followed by Calgary, Oshawa, Vancouver and Ottawa-Hull. Combining these effects, they find that the most valuable CMA per hectare is Vancouver, followed by Victoria, Toronto, Calgary, Kelowna and Montréal.

11.5 HAVE TRENDS CHANGED?

But, the trends in agglomeration and amenities are not constant. They evolve with changes in the global economy, and how households, businesses and governments react. The development of new technologies has had profound impacts on our economy and society, and not least on our cities, through changing patterns of income and wealth.

Many U.S. cities have become rejuvenated with new sources of economic growth, such as Pittsburgh (Andes *et al.*, 2017). New life can also be local with gentrification of many formerly destitute areas, such as in Washington, D.C. Higher-income households move into low-cost neighbourhoods and renovate buildings, and once a critical mass is reached, the value of all homes in the area will increase. Edlund *et al.* (2015) argue that the reduced tolerance of commuting by high-income households has driven many to live in the city centre. Also likely to play a part is rising incomes, which increase the opportunity cost of commuting.

Baum-Snow and Hartley (2017) look at patterns of change in U.S. cities. While the population had been moving out of downtown until 2000, college graduates and high-income households have then returned to city centres while those without college degrees have continued to leave. There are improved job opportunities for city centres, but they also find that the valuations of amenities in downtown neighbourhoods had increased. Notably, there are different income elasticities of demand for downtown amenities.

Couture and Handbury (2017) argues that non-tradable services are rising in importance for the young and college educated. These generate socializing opportunities with other young professionals (homophily), but there is also a role played by delayed family formation, rising incomes and improvements in the quality and diversity of non-tradable services. In their model, these changing preferences of young professionals for non-tradable services like restaurants, bars, gyms, and beauty salons account for between 50 to 80 per cent of their growth near city centres. In turn, Couture (2017) argues that the main benefit of density is indeed this variety available that yields higher consumption.

Cities have always been centres of positive agglomeration effects leading to higher relative wages there. Has this become more potent? Moretti (2013) found that relative demand had increased in key cities for skilled workers. Baum-Snow and Pavan (2013) finds that the relationship between city size and inequality has strengthened in U.S. data over the previous three decades. Baum-Snow and Pava (2017) use U.S. data to show that "skill groups and industries disproportionately located in larger cities experienced larger increases in their wage dispersion in larger cities than in smaller cities". In turn, Baum-Snow *et al.* (2017) finds that the link between agglomeration economies and high skills have tightened in the U.S. over the last three decades. Clearly, the combination of rising incomes in cities relative to rural areas, and increased dispersion of income within cities will together lead to increased inequality in the country overall.

While much of our discussion so far has focused on what happens to those with high levels of skills, there is also a risk of a downside to those with fewer skills or those who are affected adversely by technological change. In some cases, technologies have obviated the need for face-to-face contact: freelance contractors can now work on software in cheaper parts of a city or indeed in a different country without a need for local residence. Technology and the market economy have also fragmented companies. Businesses no longer feel the need to hire permanent workers and the 'gig economy' has grown in importance. In the gig-economy, or the sharing economy, workers complete short-term contracts with no guarantee of long-term pay (Kobie, 2017). An important difference perhaps, is that tasks that are easily contractible can be outsourced whereas others where a much higher degree of trust is required remain located in city centres.

As pointed out by Behrens and Robert-Nicoud (2014a) those who cannot adjust to technological change also tend to be concentrated in cities. U.S. research has tended to find that cities attract migrants disproportionately from the top and bottom end of the income distribution. Kristian Behrens and Frédéric Robert-Nicoud further argue that "[l]arge cities are more unequal than the nations that host them [...] because large cities disproportionately reward talented superstars and disproportionately 'fail' the least talented. Cities should thus be the primary focus of policies to reduce inequality and its adverse consequences for society." (Robert-Nicoud and Behrens, 2014b).

Collectively, these forces make cities the locus of rising inequality. It is not clear that these forces have been as prevalent in Canada overall as in the U.S. because of growth in the largely rural resource sector, at least until 2014. It appears that the spatial distribution of inequality within cities in Canada is little researched.[42]

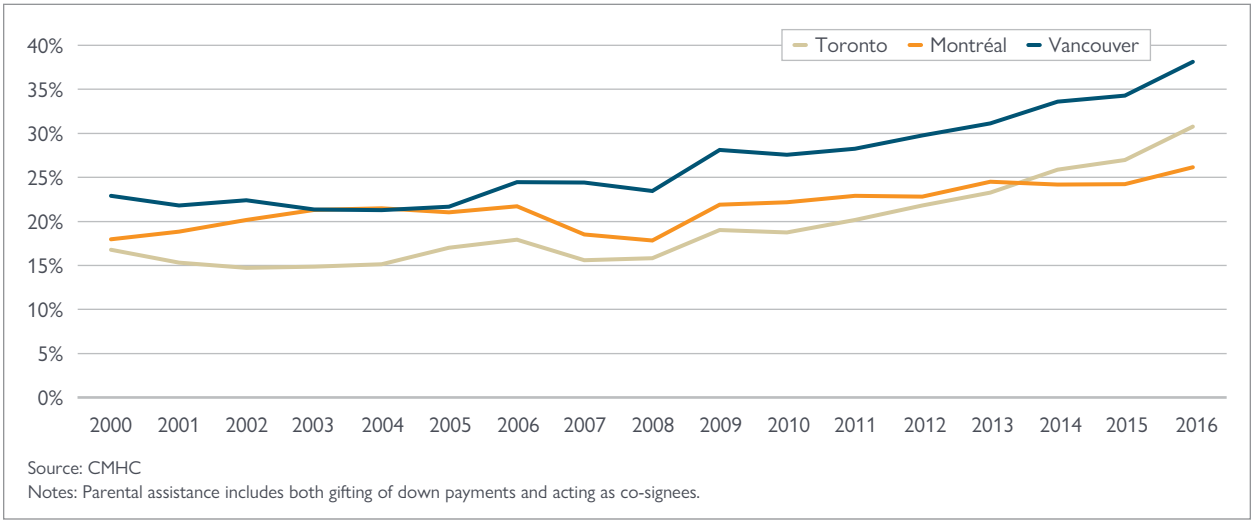
[42] Reviews of the increased inequality in Canada include Fortin *et al.* (2012), Beach (2016) and Veall (2012). Inequality differences across cities is in Canada is discussed in Bolton and Breau (2012) and Murphy and Veall (2015).

11.6 HOUSING

The structural dynamics discussed above lead to fluidity in demand for housing across housing types and locations within cities. Unfortunately, the time lags in changing the stock of housing and the long-lived nature of housing mean that changing forces in the economy are more readily reflected in changing prices of housing rather than in changing quantities. Moretti (2013) finds that skilled workers have seen increased demand for their skills in U.S. cities, but housing costs have also increased so that the rise in inequality is markedly smaller when incomes are measured in real rather than nominal terms.[43] In other words, the rich have not gained as much as thought because their housing costs have gone up so much. Such forces can be reinforced if communities value maintaining the vision of their community rather than accommodating changing needs. A key risk therefore is that housing costs deter households from moving to cities or discourage them from staying, thereby depriving the economy of agglomeration benefits of larger cities. Hsieh and Moretti (2015) estimate the importance of city growth in the U.S. to overall economic growth, and estimate that there are substantial costs of regulations that inhibit growth of those cities.

Opposition to local redevelopment curtails supply of new homes, ultimately driving up the price of existing homes if demand continues apace. This dynamic leads to further impacts on patterns of wealth inequality described above, since the wealth of existing residents increases. Such wealth can be transferred to the children of existing residents as well, through parental contributions to children's mortgage down payments and acting as co-signees. Figure 73 shows that an increasing proportion of first-time homebuyers are using assistance from their families to buy a home.

Figure 73: Shares of first-time buyers using family assistance



Source: CMHC
Notes: Parental assistance includes both gifting of down payments and acting as co-signees.

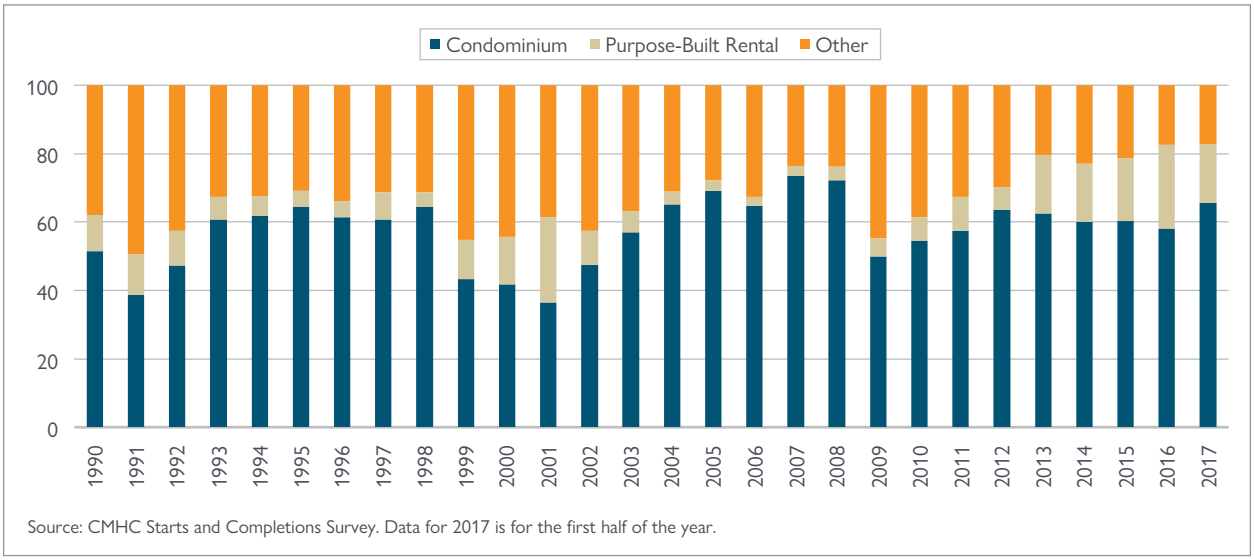
These trends come together with housing in analysis such as Diamond (2016). In the U.S., the wage gap in favour of those with college degrees has increased, resulting in highly educated workers moving to cities that already have a high level of skilled workers. Those cities also experience rapid wage growth and substantially higher housing costs. While lowering wage gains in real terms, these cities also experienced greater amenity gains in terms of more restaurants and bars, improved air quality and lowered crime rates. So we see a combination of high wages—driven by productivity—and high amenities. In combination, this increased desirability of living in cities leads to higher home prices.

[43] Hence, at the national level in the U.S., the overall rise in inequality based on real wages has been less than the increase based on nominal wages.

In turn, as households with large incomes and wealth congregate in large cities, and the value of their homes grow significantly, they may also be reluctant to put the value of their housing asset at risk by accommodating change in the local population. In U.S. data, Lens and Monkkonen (2016) find that land use regulations, notably density restrictions and more independent reviews for project approval, increase income segregation by community.

Lower-skilled workers relocate to more affordable, lower-amenity areas. These are not the only adverse effects on workers as hinted at above. Technology change happening in parallel increases the fragility of work so the absence of long-term jobs makes it difficult to obtain long-term credit, and the need to potentially move from one part of a city to another makes long-term housing impractical. This raises the importance of a fully functioning rental market, and explains why the City of Vancouver has actively re-zoned small-family zoned land to multi-unit districts in recent years, supporting growth in purpose-built units with Vancouver seeing strong gains in purpose-built rental starts since 2012 (Figure 74).

Figure 74: Vancouver housing starts, shares by intended market (%)



Source: CMHC Starts and Completions Survey. Data for 2017 is for the first half of the year.

Those from other parts of the country, whatever their skill levels, find it harder to access the local housing market, and therefore would be less likely to consider moving to a high-priced city. Ganong and Shoag (2017) argues that incomes in poorer U.S. states had traditionally been converging to richer states', as less skilled workers move to the richer states, boosting wage growth in poorer states. This convergence has slowed in recent decades, as housing costs in richer states increased. Convergence with states without restrictive housing policies continued apace: low skilled workers are moving to states with high incomes net of housing costs.

11.7 RISKS

This chapter highlights how Canadians' choices on housing are driven by all sorts of other trends in the economy. These trends are based on theory and the experience of other countries. Because of the absence of detailed research on these in Canada, we can only summarize risks in making policy.

The importance of agglomeration economies to modern cities could mean that constraining city size (in terms of population) will lead to large economic costs. This will constrain job creation and higher wages. These agglomeration effects are not well understood, however, but evidence seems to suggest that they are highly localized—at a scale smaller than a CMA. Consequently, policies to disperse employment across a CMA may also lead to lower growth. Restricting housing growth will likely lead to less mobility, which again will have economic costs.

12 Market Failures in the Supply-Side of Housing

CHAPTER OBJECTIVES:

- Review role of governments on the supply side of housing.
- Examine governments' overall objectives, and see how policies could be designed to implement those objectives.

KEY FINDINGS:

- Structures of some policy instruments may not be aligned with governments' objectives, and not all policy tools are utilized.
- Implementing a broader set of policy instruments would require close coordination across all levels of government.

An earlier chapter showed differences in supply elasticities across large Canadian cities. This chapter tries to explore why that might be the case. Given that there are differences across Canadian cities (and a limited number), we cannot undertake aggregate statistical analyses. Instead, we draw inferences based on academic research.

Some of the issues raised in this chapter are partly summarized in a recent article in the *Houston Chronicle* by Paul Krugman, shortly after Hurricane Harvey hit that city:

> *"Houston's sprawl gave the city terrible traffic and outsized pollution footprint even before the storm. When the rains came, the vast paved-over area meant that rising waters had nowhere to go. So is Houston's disaster a lesson in the importance of urban land-use regulation, of not letting developers build whatever they want, wherever they want? Yes, but. To understand that 'but', consider the different kind of disaster taking place in San Francisco. Where Houston has long been famous for its virtual absence of regulations on building, greater San Francisco is famous for its NIMBYism — that is, the power of 'not in my backyard' sentiment to prevent new housing construction. The Bay Area economy has boomed in recent years, mainly thanks to Silicon Valley, but very few new housing units have been added. [...] We should have regulation that prevents clear hazards, like exploding chemical plants in the middle of residential neighbourhoods, preserves a fair amount of open land, but allows housing construction. In particular, we should encourage construction that takes advantage of the most effective mass transit technology yet devised: the elevator. [...] One thing is clear: How we manage urban land is a really important issue, with huge impacts on American lives." (Krugman, 2017)*

12.1 THE GOVERNMENT ROLE IN HOUSING

The overall goal of governments is to maximize Canadians' well-being through improving living standards, health, shelter, safety and security. Improving living standards is critical, as it provides resources to improve the other aspects of well-being. Key to higher living standards is a greater number of jobs, and more output being produced by each of those jobs. Two additional elements buttress well-being: financial stability and fair outcomes. Financial stability ensures money flows to where it can contribute most to economic output while greater inequality risks lowering growth in consumption, and even imperils support for policies that sustain growth in living standards.

Housing can play a prominent role in growing living standards over time. While housing in and of itself is not a productive asset, a flexible housing system fosters mobility of workers. Facilitating such easy movement is critical to making sure that Canadians obtain the greatest rewards for their skills, and that those skills are fully deployed.

Facilitating access to workers and enabling businesses to co-locate together foster the powerful agglomeration economies discussed in the previous chapter. Consequently, employment density can be correlated with economic growth (Ciccone and Hall, 1996) while housing density can lower the tax burden on productive activity.

A poorly working housing system can also damage living standards. The last recession showed how excessive debt related to housing placed the whole economy at risk. While Canada largely escaped the damage experienced by the U.S., our current high debt levels make the economy vulnerable when the next global crisis strikes, if not even contributing to it.

The substantial fallout from a housing-driven financial crisis means that ensuring a financially sound and flexible housing system takes on greater importance. While safeguarding all aspects of well-being is important, the potential cost of a financial crisis—which also risks damaging governments' capacity to address health, environmental and other social challenges—means primacy has to be given to preventing the housing system from introducing undue risks to the economy.

Those high home prices can also drive other sources of instability as well. International evidence suggests that the rise in house prices is intimately tied to rising wealth inequality, as discussed in the last chapter. House prices that increase because of undue restrictions on supply suggest that resources will be diverted away from more productive activities. Rewards come to those fortunate to have been long-term landowners rather than from hard work, innovation and effort.

Housing also plays a role in determining environmental damage as well (Box 12.1). Poorly insulated houses with old heating or cooling equipment can lead to higher GHG emissions, so preserving them and curtailing supply of new housing will increase harmful emissions. And housing located far from places of employment is associated with increased car use.

Box 12.1: Environmental policy and housing

Housing can have multiple environmental impacts. First of all, the insulation of the house and the efficiency of the heating and cooling equipment in a home influence the amount of energy consumed. If the energy consumed is generated by burning fossil fuels then greenhouse gases will be generated. The location of housing can also influence transportation choices. Housing far from the place of work or without easy access to mass transit would encourage car use and increase associated greenhouse gases and air pollutants. Glaeser and Kahn (2010) show in U.S. data that restricting development in areas with generally low GHG emissions will push development to areas with high GHG emissions. Central city residences are associated with lower levels of emissions relative to suburbs. Allowing increased density in city centres will therefore generally lower Canada's GHG emissions.

Addressing this location aspect is far more challenging, however, as housing is locked in once it is built. Planning policies encourage appropriate location of housing, but has no further effect once housing is built. To provide continued incentives to lower emissions requires policies such as carbon or road pricing to economize on car use, encourage location of future housing closer to workplaces (Avin *et al.*, 2014). Molloy and Shan (2013) find that a 10-per-cent increase in gas prices leads to a 10-per-cent decline in construction in locations with a long average commute relative to other locations, but to no significant change in house prices (the supply response prevents the change in housing demand from capitalizing in home prices). Anas (2013) shows that fuel taxes are particularly potent at concentrating jobs and population in the central city. Planning alone does not provide incentives to improve automotive efficiency or encourage the adoption of electric vehicles.

Ensuring that housing plays its role in improving well-being therefore requires looking at every way in which it can affect well-being. This requires careful judgment of the myriad ways in which the private sector and governments manage housing's contribution to the economy. Box 12.2 suggests a handful of indicators that could be monitored at the CMA level to evaluate the impacts of housing on the local economy. Unfortunately, there is limited reporting of these data at the CMA level and, as noted in a previous chapter, land price data are hard to come by in Canada.

Box 12.2: Indicators of well-being

A pulse-check of housing markets could be done using a small number of aggregate indicators. Key metrics—at the CMA level—should be:

- **Strong growth in GDP per capita, to capture growth in living standards;**
- **Declining emissions of GHGs;**
- **Increased population density; and**
- **Limited growth in land values, to capture an efficient housing market (Glaeser and Gyourko, 2017).**

12.2 WHY SHOULD GOVERNMENTS TRY TO AFFECT HOUSING SUPPLY?

Private landowners, developers and builders play the leading role in developing and building the houses that Canadians want. While all governments help ensure that housing needs are met, the affordability of market-provided homes will be achieved ultimately by across-the-board increases in housing supply. Down the line, increasing supply of new housing will eventually lead to more housing for poorer households as richer households move from older to newer homes, a process known as *filtering* (Rosenthal, 2014). But, the social benefits of each type of housing may differ from their private benefits, so the mix of housing provided by the market may not fit what would benefit society as a whole.

While the private sector is a powerful force to improve living standards, governments help by addressing shortcomings in market outcomes. These *market failures* are particularly prevalent in the housing sector and the urban environment because of physical proximity.[44] Market failures mean that targeted government policies in the housing market can improve well-being (Henderson (2009) and Burge and Ihlanfeldt (2013)).

From the perspective of economics, the primary role of government is to address market failures such as *externalities*. The incentive to skimp on safety features (such as fireproofing, which led to a negative externality on other buildings) led to the development of building codes. The key characteristic of *public goods* is that individuals cannot be excluded from them, and that consumption by one person does not reduce others' consumption of them, so they tend to be under-provided. Examples include the provision of robust and accurate data on housing so that market participants can make sound decisions. There can also be land-based public goods, such as parks and preserving historic locations.

[44] Rossi-Hansberg *et al.* (2010) used data from an urban revitalization project to estimate that housing externalities fell by half approximately every 1,000 feet. An initial dollar of home improvement would generate between $2 and $6 in land value by way of externalities.

Coordination failures can occur if the market is allowed to operate freely: a factory owner may want to put a polluting plant next to a residential area in order to be close to its workers, so municipal planners restrict what can be done on different lands. Similarly, there are challenges in providing public infrastructure, as infrastructure needs to be provided when and where new houses are built. Again municipal planners coordinate this process so that infrastructure can be built in tandem and in close proximity to new housing.

As individuals move to the city to purchase a new house, whether from other parts of the country or internationally, they may put upward pressure on current infrastructure. These *congestion externalities* could come in the form of increased pressure on local transport, infrastructure such as sewerage, classroom size, etc.

Associated with congestion externalities are *environmental externalities*. Incremental population growth will tend to increase car use, and therefore increase local air pollutants such as ozone, and emissions of global concern such as greenhouse gases. Combes *et al.* (2016) try to estimate the cost of increasing city population.

Some of these externalities can become intertwined, as in the case of *public infrastructure* (roads, water infrastructure, etc.). Because these projects can benefit all, they can be public goods and therefore need support of governments. But, as Charles Tiebout (1956) pointed out, these local public goods can be subject to congestion. With congestion, pricing of externalities can be introduced such as road pricing that can, in turn, be used to pay for infrastructure.

While thorough discussion of appropriate financing of public infrastructure is beyond the scope of this analysis, ready availability of public infrastructure such as water supply and local roads (servicing) is critically important to housing supply. Traditionally, significant infrastructure was built by municipalities with the upfront capital costs then recovered later from developers through development fees on the construction of new homes. Significant delays in the system mean, however, that there are also significant risks to municipalities if the eventual growth in the local economy is insufficient to repay the initial capital outlay, saddling municipalities with significant debts.[45]

As well as taking action to prevent or curtail negative potential outcomes from an unrestrained market, it is also important to recognize that the market could under-provide as well, or that there are *positive externalities*. As discussed in the previous chapter, there is large potential for the wider economy from co-locating skilled workers, leading firms and their supporting industries in cities.

Curtailing growth of cities, or making property too expensive, will deprive the economy from these wider benefits.[46] The OECD estimates that estimates that just over half of Canada's GDP growth comes from the fifth of the most dynamic regions in terms of GDP growth rates. The importance of these regions is greater in Canada than all bar four countries in the OECD (OECD, 2016a). Moreover, attempting to curtail firms' behaviour as they seek to benefit from these agglomeration economies—by forcing firms to be close to where their workers live rather than to each other—could be costly (Bertaud, 2004).

[45] The dynamics of this are complex, and are explored in the Spanish context in Hortas-Rico (2014). In that context, municipalities must rely on upper-tier governments for increased grants to cover the capital costs.

[46] Growth here should be interpreted in terms of economic activity and population, and not in terms of geographical area.

12.3 WHY SHOULD THE FEDERAL GOVERNMENT BE INTERESTED IN HOUSING SUPPLY?

Addressing some of these market failures is more appropriate at the federal level. First of all, GHGs are of national if not global concern, and consequently efficient policy responses are best coordinated at the national level because the adverse impacts spill over provincial borders. Given that policies to address climate change should be implemented to lower economy-wide costs by equating marginal abatement costs across emission sources, setting policies at the local level could be costly. Failure by past federal government to introduce carbon pricing encouraged local governments to take action through increased regulation and land planning, but these are not the most appropriate and efficient policy tools to lower GHG emissions.

Secondly, agglomeration economics in business have the potential to generate spillover benefits that can extend to the whole country, much as developments in Silicon Valley benefit the United States if not the world. While the federal government has a key role to play in curtailing environmental damage, it has a commensurate role in promoting agglomeration benefits.[47]

A third concern for the federal government is the core market failure highlighted in many countries in the last recession when households had excessive debts.[48] When house prices deviate too much from their long-term fundamentals, it risks causing excessive speculation and debt. Growing demand will always drive up prices, but in normal (elastic) markets, this would encourage more supply so prices revert to previous levels. If supply is restricted, an upward trend in prices can foment speculative exuberance, as there is no corrective mechanism.[49] Consequently, there is a clear federal interest in an efficient housing supply system so that supply responds to demand changes preventing excessive debt.

12.4 WHAT IS THE RANGE OF POLICY OPTIONS AVAILABLE TO ACHIEVE THESE OBJECTIVES?

There are a wide range of potential policy instruments that could be used to address the externalities outlined above. These will be discussed here at a more conceptual level; their extent in Canada is discussed in the next chapter. We concentrate on potential policies, and do not discuss legal or institutional restraints (in Canada, land use generally falls under provincial jurisdiction). The standard options for dealing with market failures are:

- Regulation;
- Taxes, fees and subsidies; and
- Compensation through negotiation.

[47] Sánchez and Andrews (2011) show how mobility is higher in countries with more responsive housing supply.

[48] Technical consideration of this market failure is laid out in Bianchi and Mendoza (2017) and Hanson *et al.* (2011). Highly leveraged financial firms, especially those that rely primarily on short-term debt, are forced to dump assets simultaneously when hit with a common shock, and that these firms do not properly take into account the problems that this fire-selling creates when picking their initial capital structures.

[49] For discussion linking housing supply elasticity with bubbles, see Glaeser *et al.* (2008), which was criticized by Davidoff (2013). Such criticisms seem to be overcome in the works of Nathanson and Zwick (2017) and Ihlanfeldt and Mayock (2014).

Extensive zoning and planning controls are the most common approaches used by municipal and provincial governments. Taxes and fees could also be used to discourage certain forms of housing development. Thirdly, compensation could be transferred from those who gain to those who suffer from change (Coase, 1960). Municipalities can employ a mixture of these policies; their current planning process could be seen as a combination of regulation and compensation; municipalities try to intermediate between the development process and compensating existing residents.

The types of taxes and fees imposed by municipalities on housing currently are, broadly, property taxes and development fees (next chapter). Property taxes are based on the value of homes, and development fees are levied on new construction to pay for expanded infrastructure stock. Since development fees are one-off fees on new development, they target one-off increases in spending on infrastructure, notably land servicing.[50]

With the range of market failures facing cities in particular, it is unclear that the appropriate mix of these policies has been reached across Canadian governments (Table 38). The main policy tool of municipalities has been through planning regulation, which they use when attempting to address a range of market failures. While there may be justifiable reasons to be concerned about urban sprawl, for instance, relying on planning alone may not always be appropriate. Indeed, as discussed in the next Chapter, some of the tax and fee structures imposed by municipalities may in fact promote sprawl (Blais, 2010).[51] Song and Zenou (2009) show how lower property taxes in suburbs, for example, can encourage urban sprawl. The structure of these fees could be examined to see whether fees should be imposed to discourage some of the negative externalities discussed above. An approach implemented in Albuquerque in the U.S. was to have zone-based development fees by varying the fee across geographic zones to account for different costs of adding infrastructure. Burge *et al.* (2013) found that this approach increased density in centrally located areas and lowered it at the fringe. There was risk of spillovers onto neighbouring municipalities, however, which suggested that a regional approach should be used.

There are important differences between regulation and various types of fees. First, fees raise revenues for the government whereas regulations create economic rents that could go, in this case, to the owners of land.[52] This revenue-recycling effect can be large if revenues are used to correct other market failures (Bento *et al.*, 2009).

Secondly, development fees and land-use regulations are static in the sense that once the building has been put in place, there is no further incentive to change behaviour. Consequently, these are not suitable policies when ongoing incentives for change are required, such as a continuing incentive to lower GHG emissions. Carbon pricing, for instance, would give an ongoing incentive to economize on fossil fuels.

Thirdly, the geographical distribution of policies has to be considered. To tackle the problems of road congestion, for example, requires a policy that covers the entire region covering most transportation choices. Higher development fees or regulations in a part of a region will not affect congestion in another.

Fourthly, imprecise targeting of policies can lead to adverse effects.[53] This concern is exacerbated if there is inadequate data or research to identify and quantify the market failure precisely. In other countries, even policies to protect environmentally sensitive areas through regulation have been criticized for being inefficient. Clearly, the objective of improving environmental outcomes is desirable, but the policy approach may not be appropriate. A sizable part of England has been set aside for a greenbelt, but a third of this greenbelt is covered by intensive industrial agriculture, which is not necessarily beneficial to the environment (Cheshire, 2016). Similar arguments have brewed in British Columbia, as reviewed by Condon *et al.* (2011).

[50] Discussion here draws on Gregory Burge and Keith Ihlanfeldt (2013).

[51] In a meta-analysis of research, Stevens (2017) suggests, for example, that compact development has a statistically significant negative effect on driving but that the effect is small.

[52] Distribution consequences are complex, as analyzed in Bento and Franco (2006).

[53] Bento *et al.* (2014), for example, look at the impact of allowing single-occupant low-emission vehicles in high-occupancy vehicle lanes. Although this encouraged adoption of such vehicle, the beneficial impact was far outweighed by the congestion impacts.

Table 38: Policy solutions to externalities that affect sustainability adversely

EXTERNALITY THREATENING URBAN SUSTAINABILITY	TIME SPAN	GEOGRAPHIC EXTENT	PREFERRED POLICY OPTION(S)
Incompatible land use (separation of polluting plans from housing)	Immediate and over time	Local	Usage-based zoning
Local public goods (parklands, wetlands, etc.)	Over time	Local	Local development fees
Congestion	Immediate and over time	Region	Regional-based development fees; Road pricing
Need to improve infrastructure	Immediate and over time	Local/region	Regional-based development fees
Environmental damage	Immediate and over time	Local/regional/national	National policies for pollutants with wide reach

Source: Adapted from Burge and Ihlanfeldt (2013)

12.5 WHAT ARE THE RISKS FROM POLICY ACTION?

In meeting their goals of improving well-being, governments run risks because of incomplete knowledge of the economy. Here we focus on risks particular to housing supply, which could offset or reinforce each other. Bertaud and Malpezzi (2001) outlined a detailed methodology for looking at the total impacts of taxes and regulation, and conclude that "land use regulations, each of which is seemingly reasonable and innocuous in isolation, can when taken together impose larger taxes on developers and ultimately, consumers." These concerns are portrayed here as risks rather than definite costs: although there is international evidence to validate the existence of these risks, there are limited Canadian data to quantify them.

Adverse impacts of decision delay

In our consultations, some builders suggested that they did not see property taxes and development fees as major barriers because they are certain and fixed.[54] Instead, a major concern for them is uncertainty and delay in the regulatory process, which can be particularly important in delaying irreversible investment such as housing.[55] Significant delays can lead to investment being abandoned.

Lengthy delay also implies that the land has to be held through the approval process, tying up large amounts of capital without a clear return, increasing the cost of the investment. The opportunity cost of holding capital will likely be capitalized in the value of land (ultimately necessitating more expensive structures to be built in order for the project to be profitable). Since financial institutions will be reluctant to lend given this uncertainty, taking land through the development process is often only open to well-financed large companies, and therefore risks cartelizing the development industry (Dowall, 1982). We have heard that the number of landowners in the GTA is quite small, but we are unable to substantiate this.

[54] This does not mean that there are no adverse general-equilibrium effects. For example, Quigley and Swoboda (2006), in turn, argue that the restricting development in one area has knock-on impacts outside it as land prices are increased elsewhere.

[55] Bar-Ilan and Strange (1996) discuss how lags between the time of starting and investment and finishing it (e.g., in building a power plant) could lead to over-investment because firms do not want to risk losing out on periods of high demand.

Forecasting errors on demand and supply

The time to build infrastructure means that planning for infrastructure and its location has to be done long before actual demand materializes. Although difficult to avoid in practice, forecast mistakes will have real resource consequences if demand falls short. In particular, forecasting patterns of employment over time and location appears to be particularly difficult. The previous chapters outlined how economic forces are changing our cities, so making predictions based on limited data is becoming even harder.

Growth in the number of dwellings in the City of Vancouver itself has been outpacing growth plan projections, in some cases quite significantly, each year for the past 5 years. But municipalities like Richmond, North Vancouver, White Rock and New Westminster have been adding new households more rapidly than anticipated. For the most part, these higher growth areas tend to be closer to key employment centres. Alternatively, areas that have been experiencing slower than anticipated growth include Burnaby, Surrey, Coquitlam, Pitt Meadows, Port Moody, and Port Coquitlam. Thus far in the growth timeline, the underlying assumption in the Growth Strategy report of populations growing faster in suburbs to the east has not materialized.

To evaluate risks in Toronto, we contracted with the Canadian Centre for Economic Analysis (CANCEA) to evaluate risks involved in long-term growth projections in Ontario (CANCEA, 2017). Risks include, among others, changes in labour force participation rates, location preferences, types of housing stock, the mix of industries and their land use, and so forth. According to most of their simulations, Toronto will end up with considerably higher population and number of jobs than envisaged in current plans (Ontario, 2017a). Within the GTHA, there is again considerable uncertainty where population and jobs will be. Some GTHA regions could undershoot, and some could overshoot current plans. In all cases, the resulting density would be very sensitive to the amount of developable land, particularly for regions with significant greenbelt coverage.

A common approach when attempting to judge the appropriate balance between supply and demand is to compare trends in the formation of new households with the number of houses constructed. This approach is based on demographic rather than economic methods. In balanced well-functioning markets and over the short term such an approach is generally valid. But, if there is an increasing trend in incomes that raises effective demand—richer households will demand larger and more spacious homes—then such methods will lead to a gap between what is provided and what is demanded (Cheshire, 2009).

Box 12.3 discusses further challenges in assessing whether there is an appropriate balance between supply and demand. Because of these factors, it is difficult to judge empirically whether there is "adequate supply"; rising home prices suggest there is not. If new supply does not meet what Canadians want, they will pay more for the existing supply in the resale market that does.

Box 12.3: Determining whether there is sufficient supply

A critical challenge when assessing the adequate quantity of housing supply is determining what exactly is 'adequate'. Lags in the system imply that decisions on what to build today will be done based on projections of expected demand several years into the future. Since supply necessarily has to be forward looking, judging supply by comparing to historical supply (such as based on CMHC housing completion rates) is likely to prove inadequate, particularly as past housing supply may have been too low. Comparing housing supply to population and demographic projections could also prove to be incomplete:

1. Housing markets have frictions so there are always some households moving and could therefore be in possession of two houses. If growth in housing supply were to only just match population growth, housing markets would be illiquid;
2. Completions, which are a measure of gross housing supply, could be misleading if there is a large number of demolitions. Data in Chapter 10 suggest that the rate of demolitions was particularly high in Vancouver;
3. An important factor driving demand for housing is increased income and wealth, so not accounting for income growth may mean that the projected supply of housing does not meet the wants of Canadians; and
4. High housing costs will imply that population and population growth are too low because households have been deterred from moving to the area (Monkkonen, 2016). So, in high housing cost areas, projected population growth is too low.

These concerns suggest that housing supply plans need to be constantly monitored and updated.

Zoning rules can create large economic rents

Zoning policy effectively give government the right to control new housing when a change in zoning is required. Municipalities use that control to ensure that the new development conforms to long-term plans and meets livability requirements. Rezoning of land will see an 'uplift' in the value of land since the land can then be used to build a higher-value structure. Determining who gets that land-value uplift is contentious, particularly because of its scale; is it the landowner, the builder, the local community, the municipality and/or the ultimate purchaser of housing units? Solving this problem is difficult. On the one hand, ensuring that the local community obtains some benefit would facilitate the construction process; on the other hand, taking too much of the land uplift could discourage the project from being initiated because of heightened risk for the builder. Lengthy battles over the sharing of land uplift risk delaying increased housing supply.

Lack of transparency on future supply could drive speculation

In analyzing bubbles in the stock market or housing, Ed Glaeser (2013) notes that one of the key mistakes made by speculators is that they underestimate the supply response. In financial markets, uncertainty and doubt over underlying facts lead to disagreement about true values, which in turn gives rise to speculation. It has long been argued that short-term inelastic supply can lead to speculative bubbles, but new research highlights the importance of uncertain future supply on speculation as well (Nathanson and Zwick, 2017). Las Vegas was surrounded by federal lands, but it was uncertain whether permission could be obtained to build on them. Builders, developers and investors perceived future land supply shortages and therefore bought land anticipating higher future prices, pushing land prices up much earlier than when land availability might be exhausted. This argument highlights the critical importance of land price data and of examining policies in a dynamic context.

Having transparent and complete data on supply could lower such speculative practices. Gao *et al.* (2015) explore further how lack of knowledge about supply elasticities can lead to mistakes by households and investors because they misinterpret what an increase in the price of housing means. Although not explored in their paper, it is possible that this would lead to excessive optimism about the state of the local economy, and therefore to house prices becoming increasingly detached from fundamentals.

12.6 RISKS OF OVER- OR UNDER-BUILDING ARE ASYMMETRIC FOR GOVERNMENTS

As supply and demand adjust for most goods and services, market imbalances are quickly resolved. It is far more difficult to restore balance in housing because of the long lags between realizing demand exists and the new homes being ready for occupying. Prediction mistakes lead to either too much or too little supply where the extent of that mis-match can be influenced both by a range of policies by all levels of government. Policy processes therefore need careful weighting of risks of under- and over-supply.

Over-supply will lead to hardship for builders and developers, as happened in Canada during the 1990s following over-building in the late 1980s. Over-building has broader economic costs as well since resources will be tied up in empty homes and housing estates, as was observed in Ireland and Spain following their building frenzy before the last recession. Lags in the time to build new homes and to pass through the approval process could ultimately lead to over-building, and DeCoster and Strange (2012) point out that builders may be subject to the herding and psychological biases (leading over-building) that were discussed for consumers in Chapter 9. Having a large (elastic) supply response could therefore lead to real resource costs through over-building in boom times, although Glaeser *et al.* (2017) point out that housing bubbles tend to be shorter and fewer in housing markets with more elastic supply.

Under-supply risks creating macrosystemic risks, which are of particular concern to the federal government. Glaeser *et al.* (2008) argues that price booms tend to be concentrated in regions with inelastic supply. This concern is heightened since—in an economy showing long-term positive economic and population trends—it seems to take more time to correct under-supply than to correct over-supply. Moreover, given the positive externalities referred to above, it is likely that city sizes are, from a national perspective, too small.

There are, however, risks to municipal governments from over-building. In anticipation of future economic and population growth, municipalities spend money to improve infrastructure. If employment gains do not materialize then municipalities will be saddled with excessive debts. At present, it seems that the only means by which municipalities can regulate future supply is through the planning system; they can lengthen approval times if they are concerned that they cannot recover large upfront spending on infrastructure.

On the balance of risks, and taking a national perspective, it would seem appropriate to attach less risk to over-building relative to under-building at the moment. Short-term over-building will yield long-term benefits if the population continues to grow. But the risk in either case comes from any fallout on the financial system. Over-building could be induced by excessive lending to developers, but reforms in the late 1990s appear to have corrected for this.

The greater challenge is to curtail lending when house prices are increasing, and there is under-building. Glaeser (2017b) argues that the larger costs of real estate bubbles come from financial dislocation rather than from overbuilding: "curtailing investment in real estate directly can be difficult and even harmful. Larger welfare gains could be realized from ensuring that the financial system faces less risk from potential real estate downturns."[56]

12.7 COORDINATION ACROSS GOVERNMENTS

Each level of government is limited in its actions. A local municipality risks losing households and businesses to other regions if its policies are too onerous, which suggests that policy action should be taken at a higher level of government (including metro, provincial and federal). Unfortunately, higher levels of government do not have the understanding of local issues and concerns to always address local concerns, suggesting policies should be made at a more local level. There is no clear and obvious answer to this dilemma other than increasing information flow and policy coordination between levels of government.

With significant risks coming from the housing market, developing new structures and policies to address this dilemma is imperative. As argued by the New Zealand Productivity Commission (NZPC), there is a greater need for balance between local and national interests in the planning system: "The planning system needs to recognise that both central and local governments have an interest in the growth of cities, and ensure prompt and credible responses to increases in the demand for housing" (NZPC, 2015).

Solving these coordination problems requires the cooperation of all levels of government. While the federal government has not taken significant action over the past few decades to address climate change, municipal and provincial governments have taken action to develop more compact urban spaces. By developing livable communities in downtown areas and curtailing urban sprawl, they acted to lower GHGs and local air pollution, and protect species in protected areas. Higher levels of government have access to a wider range of policy instruments, such as road pricing and carbon taxes, so action on these by other levels of government would have afforded greater flexibility to municipal governments in their response to local concerns. An example of cooperation between municipalities and a national government is given for England in Box 12.4.

This situation also then suggests that a more holistic strategy should be deployed. Metro Vancouver, for example, calls for "the federal government and the province and their agencies to develop a formal mechanism to collaborate with Metro Vancouver, TransLink, municipalities, and the private sector on a regional economic strategy to retain and attract investment and employment to the region" (p.26, Metro Vancouver, 2017).

Box 12.4: England's New Homes Bonus

To attempt to unlock bottlenecks in housing supply, and to overcome NIMBYism, England introduced a New Homes Bonus in 2011, a transfer from the national to municipal governments to encourage housing supply. It is based on the amount of extra property tax (Council Tax) revenue raised for new-build homes, conversions and long-term empty homes brought back into use. There is also an extra payment for providing affordable homes (Wilson *et al.* (2017) and DCLG (2014)). Total payments were £1.23bn. The incentive structure embodied in that policy addresses concerns through incentivising municipalities to increase incremental supply, but it has been criticized in England as being too small and therefore unlikely to provide a sufficient impetus to supply (Hilber, 2015). The English program is proportional to property tax revenue generated from incremental supply.

[56] Clearly, there are limits as overbuilding of durable capital such as housing, depriving capital from productive sectors and leading to a demand-driven recession (Rognlie *et al.* (2017).

12.8 DATA ON SUPPLY

To determine whether risks outlined above are a reality and their extent depends on a wide range of data. Although much of these data reside with municipalities, those data may not be reported publicly or may not be in a form that sheds light on risks. Data that would be particularly relevant may be more aggregated, or would relate more to government process (such as length of time to pass through approval processes).

From our analysis and discussions with some municipalities, we found that:

- There is limited availability of data on supply, including on government processes, which many municipalities recognize and struggle with;
- Some provinces and/or municipalities pursue a range of policies without reporting regularly on their impacts; and
- Municipal government have limited resources (and incentives) to collect and disseminate relevant data.

A review of Ontario's planning rules, led by David Crombie, noted that "[m]unicipalities emphasized the need for more technical and financial support to comply with the requirements of the plans" and their recommendations included: "Developing a comprehensive monitoring program [... and ...] Creating an oversight forum to monitor and report on implementation and deliver public education about the four plans" (MMAH, 2015).[57] In our consultations with municipalities, some have also indicated a need for increased cooperation and development of a research agenda to address pressing needs in their communities.

[57] The four plans include the Growth Plan for the Greater Golden Horseshoe, the Greenbelt Plan, the Oak Ridges Moraine Conservation Plan and the Niagara Escarpment Plan

13 What is the Overall Picture in Canada on Housing Supply?

CHAPTER OBJECTIVES:

- Explore policy approaches toward housing supply, including the availability of land, and the structure of fees and taxes, and examine uncertainty in regulation.
- Summarize policy approaches adopted in other countries to improve housing supply.

KEY FINDINGS:

- The data on the availability of developable land supply in Toronto are unclear, but there is limited land available for new homes in Vancouver. In either case, however, redevelopment of existing lands will become more important, and help achieve densification objectives. It is therefore imperative that the process of redevelopment operate efficiently. CMHC is participating in a new Data and Evidence Working Group that was established this year as part of Ontario's Fair Housing Plan.
- The structure of fees charged by cities does not appear to be penalizing low-density development or represent a progressive tax on wealth.
- Other countries, notably England, are trying to change their policies to encourage increased housing supply. This challenge of increasing both housing supply and density is a worldwide challenge, however.

13.1 INTRODUCTION

This chapter reviews some of the policies on the supply side of housing for Canada. Analysis is based on available data and reports, newly commissioned reports, and discussions with related parties. Because of the incredible complexity of these systems, we do not attempt a comprehensive discussion but concentrate only on salient points. In addition, the terminology in this area is complex and specific, so we have tried to use more general language to ease communication.

We draw a distinction between Edmonton and Calgary on the one hand, and Toronto, Vancouver and Montréal on the other. The latter three cities are adopting more compact forms of development, and are therefore more comparable. Analysis in this chapter is focused on these three cities. This is not to say that valuable lessons could not be learned from the two Albertan cities; we believe that some aspects of the planning approval processes work relatively efficiently there.

To oversimplify, new homes can come from 1) taking raw land, usually agricultural land, and building completely new homes, or 2) tearing down old housing or industrial structures and replacing them with homes. Importantly, many planners anticipate that much future housing supply will come from the second option. A further key distinction for raw lands is whether the land is *serviced* or not: whether there is provision of roads, water and sewerage pipes, schools, electricity lines, etc. In this regard, redeveloping existing land will cost less since much of the infrastructure is already there (although it may need to be enlarged or renovated as well).

This typology leads to different government processes. On the one hand, it appears that the planning process can happen relatively quickly if there is no rezoning in building new homes, and there is servicing. On the other hand, the process can be complex, uncertain and lengthy if rezoning is required, notably through the appeals process. If infrastructure provision is required, then the process can be lengthier still. The facility with which these processes occur, however, could vary by jurisdiction (we have no data to check this).

In general, policies for new developments are set directly by the provinces while redevelopment and rezoning falls within the purview of the municipal governments. Hence, when there is a change in the purpose for which land is used, agreement of municipal government is required. In addition, it appears that these rezoning processes and the associated fees charged, where applicable in certain municipalities, must work by negotiation without pre-set fees in British Columbia and Ontario; with pre-set fees, the policies would be considered taxes and thereby regulated by the provinces.

The evidence provided to support these observations comes from a variety of sources, including theoretical considerations from the previous chapter. We have also reviewed any outstanding documents and analysis that have been published. We have talked to some municipalities and provinces, and to those in the building and development industries. These sources generally align with the arguments presented here, but further data would be invaluable. We rely, for example, on anecdotal experience on the length of time to pass through government approval processes because there is an absence of data from government agencies on these.

In this chapter, we report on some available facts within the control of municipalities and provinces that might influence the supply of homes. These include:

- Land availability (because some cities limit the total land area that can be developed);
- Development fees, property taxes and other charges; and
- Regulations and changes in them.

The challenges facing Canadian cities are not unique. The supply responsiveness of new housing has been criticized as being too low in the Netherlands. Box 13.1 summarizes high-level themes from a report on the supply side there. There have also been numerous reports in England on the supply of housing, such as Barker Review (2004, 2006).

Developing data and understanding of the supply side of housing for Canada has proven difficult for us. Some of the challenges include:

- Opaque processes understood only by specialists;
- Limited data on various aspects of supply;
- Lack of common understanding of key issues and terms;
- Data that are sometimes available, but only in forms accessible to researchers and/or are not available over time; For example, detailed data on current zoning rules are only available in the form accessible to GIS researchers (and no historical data are available);
- Other critical data are debated, such as data on the availability of land in the GTA; and
- Lack of data on time taken for approval process, although there are commitments in Ontario to pursue this topic further in 2018.

The following outlines our attempts to understand the processes, but cannot be guaranteed to be entirely accurate or comprehensive because of the sheer complexity of processes.

Box 13.1: Potential reform in the Netherlands

The Netherlands has been criticized as a country with a low elasticity of supply. Vermeulen and Rouwendal (2007) state that "we do not find any evidence that housing supply is responsive to prices." As a result, the Dutch government asked its advisory body for policy advice, which are summarized in Boelhouwer and Hoekstra (2009).

It is difficult to translate conditions from one country to another, particularly for a commodity as localized as housing, but the focus of attention in the Dutch report may be relevant. As well as criticizing subsidies to demand, it focused on: the availability of land, misplacing of housing whereby housing construction was concentrated in areas with relatively low economic growth and house prices, concern that the quality improvements in new housing demanded by government to benefit society as a whole were not paid for by the government but by new homebuyers, and concern over time spent in approval processes.

13.2 THE STRUCTURE OF POLICIES IN CANADA

13.2.1 What are the policy frameworks in place in Canada?

The OECD has developed a typology to compare planning systems across countries (OECD, 2015). Firstly, the OECD notes that only Canada and a few other countries (Australia, Belgium, Chile and the U.S.)[58] do not have *national policy and perspectives* on planning. Other countries delegate many decisions to municipal or regional levels, but general guidance, vision, or performance criteria are developed in most other countries at the national level. The OECD advocates an integrated approach across at least three levels of government with national governments setting an overall vision for urban policy, but effective policy requires collaboration and coordination across all levels. An example of a governance structure to promote a national urban policy in the Federal State of Austria is in Box 13.2.

Secondly, the OECD looks at the planning philosophies adopted. It characterizes Canadian planning policy as following 1) a *comprehensive integrated approach* (concentrating on spatial co-ordination rather than economic development), and 2) *urbanism* (concentrating on issues of urban design, townscapes and building control). A sub-category of *urbanism* is new urbanism, which aims at walkable neighbourhoods, mixed-use development and sustainable communities with healthy living conditions. Unlike other countries, the approach of *regional economic planning* is not adopted in Canada.

For Toronto and Vancouver, these types of planning have been reflected in Metro Vancouver's *Metro 2040: Shaping Our Future* (Metro Vancouver 2017a), and planning in Toronto reflects the Ontario *Places to Grow – Growth Plan for the Greater Golden Horseshoe* (Ontario, 2017a). The OECD typology is reflected in the Growth Strategy for Vancouver: "The Regional Growth Strategy is intended to support a sustainable economy and a number of its strategies are important in contributing to that goal. However, it is important to recognize that this is a Regional Growth Strategy concerned primarily with land use and transportation and not an economic development strategy."[59]

These philosophies are in turn reflected in, for example, performance indicators with the relative absence of economic indicators such as land and home prices. This description of policy has wider policy implications, specifically the absence of economic analysis of the supply side. Indeed, economists in the U.K. have gone as far as suggesting that the effect of high land prices should be included explicitly into the planning process (Cheshire and Sheppard, 2005).

[58] Note that this does not reflect all federal countries (e.g., Austria, Germany)

[59] p.25, Metro Vancouver (2017a)

Box 13.2: National Urban Policy in Austria

Austria is a country with a federal government. It developed the Austrian Spatial Development Concept (ÖREK) in 2011 to provide strategic guidance to steer spatial planning and development at the national, Länder and municipal level. Its main objectives include compact and polycentric settlement structures, the development of infrastructure, regional development and the management of population growth. It is a participatory process with members at multiple levels of government. It emphasises coherence between multiple levels of government and fosters cooperation between them in the development and implementation of spatial strategies.

Sources: OECD (2017) and ÖROK (2015)

13.2.2 Is land available?

Chapter 10 argued that one of the key indicators of how well housing markets are functioning is the price of land. A complementary, but subsidiary, metric is the quantity of land available for development. Given that increased importance will be laid on redevelopment and infill construction, it is less clear that obtaining more greenfield land is necessary. There is debate in Ontario, however, on how much of such land is available, notably of serviced land (Clayton, 2015). So key starting questions are: is there land available to build upon; where is that land, and is that land ready to be built upon with appropriate regulation and servicing?

a) Assessing available land in Toronto

In a report written in April 2015, the *Neptis Foundation* compared and contrasted the implementation of policies to slow urban expansion. It noted that "The [Ontario] Growth Plan's performance indicators report contains less data and is less robust than Metro Vancouver's performance indicators report. It has little land-based data and contains mostly aggregated statistics. There is no information on the amount of land that has been urbanized or designated for urbanization since the time the plan came into effect, a basic metric that would indicate whether the plan is succeeding in its primary goal to reduce expansion at the urban edge. In contrast, Metro Vancouver's performance indicators report tracks several land-based metrics including detailed information on the total amount of land being added to or taken out of industrial use or mixed employment areas, a measure related to the region's overall strategy for protecting the industrial land base." (p. 32, Burchfield and Kramer (2015)).

In Vancouver, Metro Vancouver reports annually on an extensive number of indicators including detailed inventories of land use. For 2011, it estimated that there were 7,850 hectares that remained largely undeveloped.[60] Two thirds of that land was in Langley and Surrey to the east of Metro Vancouver, and south of the Fraser River. Although there does not appear to be significant greenfield land available, it is clear where they are.

For Onatrio, the *Neptis Foundation* estimated that 107,000 hectares of land had been set aside by the municipalities of the Greater Golden Horseshoe to accommodate growth to 2031. About half of that land, 56,200 hectares, is located in the Greater Toronto and Hamilton Area (GTHA). This land is the "designated Greenfield Area", which is land made available by the Government of Ontario for housing and employment outside the existing urbanized area of the region's cities and towns.[61] These data were gathered from satellites (Neptis, 2016). A drawback of this approach is that it is unclear 1) whether it captures gross or net lands available (as discussed in Chapter 10), and/or 2) whether servicing is available. Given the location of these areas in the Neptis report, it seems unlikely that servicing is available.

[60] It is unclear whether land is serviced or not. Details are on p.34 of Metro Vancouver (2015b).

[61] Performance indicators for the Greater Golden Horseshoe were published in Ontario (2015).

In contrast, the consultancy group Malone Given Parsons estimates that 17,200 hectares remain in vacant Greenfield Areas to accommodate residential growth. They aggregate their data from local analysis (Malone Given Parsons, 2017). Moreover, they concentrate on the net amount of land (after deducting parkland, marshlands, etc.) as discussed in Chapter 10. They also argue that the available land is not serviced and remote, concerns also raised by Amborski (2016).

The amount of land available therefore is not clear. Consequently, it is unclear whether housing supply could be increased on these lands in the near future because of the absence of servicing. And, as discussed in prior chapters, this could be leading to speculation in land. Unfortunately, we have no data to examine this claim.

b) Assessing available land in Vancouver

Land in the Metro Vancouver region has been assigned to one of six regional land-use designations. They are intended to reflect municipal and regional commitments and aspirations. Two potential sources of land within these designations is the Agricultural Land Reserves (ALR) and greenfield land (which is within the general urban designation).

As discussed in Chapter 10, a significant proportion of the Vancouver region is set aside for agricultural use. In the Vancouver CMA, the ALR accounts for about 21 per cent of the total land cover. In Metro Vancouver as of 2015, 32 per cent of total land area (90,497 ha[62]) has been designated by the Metro Vancouver regional growth strategy as land within the *Urban Containment Boundary* (UCB). Between 2011 and 2015, 72 ha were added to the urban containment area as a result of changing land use designations for individual parcels.

Within the UCB, there were 7,490 ha remaining for 'greenfield' development as of 2015 constituting 11 per cent of total land area marked as 'general urban'. Between 2011 and 2015, 411 ha (5.5 per cent) of remaining land were absorbed to development, accommodating 14 per cent of regional dwelling unit growth within the same period (Metro Vancouver, 2015). All of the remaining land is located in 6 municipalities. Surrey and Langley Township have over 2,000 ha each available for greenfield development, Maple Ridge and West Vancouver have just under 1,500 ha each, with West Vancouver's lands having limited development potential, and Coquitlam and Tsawwassen have less than 1000 ha still to be developed.

c) Employment lands

Traditionally, industrial plants may have created large amounts of pollution or noise. Consequently, lands where these plants were located were kept separate from lands for homes; lands became zoned either for industrial use or for housing. With technological changes around the world, some of the plants on industrial lands have closed. What to do with those lands poses difficult challenges: should they be retained as industrial lands in the hope that new industrial plants come back, or should they be remediated at great cost and transformed into land for housing? As discussed in Chapter 11, fundamental technological and economic change suggest that large-scale land-intensive manufacturing is unlikely to return to city centres.

Montréal has made a clear decision that industrial lands need to be redeveloped for housing, and it estimates that there is sufficient land for future housing through such redevelopment.[63] It has recently redeveloped Griffintown, for instance (pp. 234-235, City of Montréal, 2004). By contrast, it seems that there is more caution in Toronto and Vancouver; indeed it seems that they see protecting employment lands as an important goal. Metro Vancouver states its challenge: "Given the ongoing pressure to convert industrial lands to other uses and the limited industrial land base, protecting the region's industrial land supply is imperative to accommodate the growing economy and employment." (Metro Vancouver, 2015). The City of Toronto's consultations led it to establish key directions to: promote office space on rapid transit, preserve the City's Employment Areas for business and economic activities, and accommodate the growth of the retail and institutional sectors to serve the growing population of the City and the Region.

[62] For comparison, this is almost 50 per cent more than the total Agricultural Land Reserve (ALR), which now stands at 60,893 ha.

[63] CMM (2015) notes, for example, how important redevelopment is to accommodating growth.

In the wider Toronto area, there appears to be no aggregate publicly available data on the amount of employment land available or are in a format ready to disseminate. For the Metro Vancouver region, maps are provided in Metro Vancouver (2015).

In Vancouver, lands used for the port underpin economic linkages between Canada and economies on the other side of the Pacific Ocean. But equally, industrial lands that had been used for sawmills and the CP rail yards were transformed through a variety of means to provide land for Expo 86, and were then transformed over the subsequent 20 years into the current Vancouver metropolis north of False Creek (Business Vancouver, 2016).

Determining which view on preserving employment lands is more appropriate would be facilitated by greater detail on the type of employment by location: is employment in central Toronto and Vancouver more likely to be service industries with manufacturing leaving, or could some manufacturing plants remain? Moreover, this is also a critical question with respect to land set aside for retailing: with the advent of online shopping, will the amount of land devoted to retailing and associated parking decline with more housing put in its place?

Forecasting these dynamics is difficult. They not only rely on anticipating technological and global changes that could continue to reduce the scale of manufacturing, but also the impact of rising land prices on location choices of business. Higher land prices would encourage land-intensive firms to relocate. Data on employment locations are available from the Census of Canada. Blais (2017) uses some of these data for regions of Toronto, but it is unclear if there has been widespread analysis of these data across Canada. Sweet *et al.* (2017) examines some employment trends using data from InfoCanada. Consequently, further research is required on this topic.

13.2.3 Fees and taxes

We first give a brief and stylized summary of taxes and fees used currently in Canada's large cities. Then we provide high-level estimates of the extent and pattern of these fees.

13.2.3.1 What are the taxes and fees in place?

Taxes and fees are used to achieve multiple government objectives. *Property taxes* are a tax on housing wealth, and higher property prices should be reflected in higher property tax revenues (also allowing local governments to recover some of their expenditures on local infrastructure and amenities). Increasing property taxes, and increasing them proportionately more for higher-valued property, would be equivalent to a progressive tax on wealth. Some households may struggle to pay higher property taxes, however, as they have significant capital tied in their homes but do not have much income, such as older households. Other taxes used are *land transfer taxes*, a tax imposed when a property is sold, but increasing them would likely discourage mobility.

As discussed in the previous chapter, *development fees* are levied on new housing to provide funding to cover costs induced by growth. Additional housing will imply additional infrastructure costs and more congestion; development fees are intended to cover these costs. They are intended to only cover incremental costs.

A particularly important form of future housing supply is likely to be rezoning of employment land or existing housing or industrial structures into denser housing structures, also known as *infill*.[64] Infill housing will also generally be lower cost as much of the infrastructure exists (although some, such as pipes, may need to be upgraded for a larger population). Rezoning of property to, for example, allow higher density will increase the value of the associated land (leading to higher property tax revenues). Municipalities may try to capture that land uplift through a variety of means that, for simplicity, we will follow Moore (2013) and call *density for benefit agreements (DBAs)*. The fees gathered through this process are variously called Community Amenity Contributions (CACs) in British Columbia (BC, 2014) or "Section 37"

[64] The development of vacant lots or portions of vacant lots in established urban areas. A vacant lot may have been vacant historically, created by a severance, or result from demolition, fire and/or some other means.

in Ontario,[65] and are subject, in many cases, to negotiation. Hence, these are not the same as *density bonusing* or *inclusionary zoning*, which are more predictable and systematic, used in Montréal and in the U.S. Mattinson (2015) argues that the process in Vancouver is technocratic while the process in Toronto falls under the control of local councillors.

DBAs could come in the form of direct financial contributions in exchange for rezoning permission, or contributions *in lieu* such as additional affordable housing, parkland, day care, public art or contributions to other social objectives. Exacting these payments is usually done through negotiation, which leads to uncertain outcomes and delay. Moore (2013) finds that DBAs in Vancouver are used to redistribute wealth while they are used to provide visually desirable amenities in Toronto.

While development fees are broadly governed by the provinces, DBAs fall within the purview of municipalities. Provinces establish guidelines on their use, and also recognize risks: the guide from British Columbia states "how CACs, if not handled carefully, can potentially decrease the supply of new housing and lead to increases in housing prices" (BC, 2014). In its consultation document in 2013, the Province of Ontario noted "the application of section 37 (Density Bonusing) has sometimes been characterized as being *ad hoc* or unstructured. As well, questions have been raised about whether the payments are being used for the intended purpose and whether the appropriate accountability and reporting measures are in place" (Ontario, 2013).

While the objectives of these schemes are laudable, DBAs risk introducing uncertainty for developers and altering the type of housing built. Additional costs can either be direct through demanding provision of below-market-price affordable housing or indirect through uncertainty in the negotiating process. In turn, developers may react by increasing the finish of their proposed new structure so that the resulting housing is priced higher. Although we have no evidence to support this claim, we believe that profit margins are greater for more expensive homes so there is a risk that increased supply would be diverted to more expensive homes. Hence, while agreement to provide more affordable housing might keep the average price of housing down, the shortage of relatively low-priced denser housing structures (the 'missing middle') may have been exacerbated. It is also possible that risks may lead to the project being foregone entirely. These concerns are not addressed in the only available study that we found of their impacts (Coriolis, 2014).

Given the economic logic laid out in the previous chapter, the basis for levying these charges is not entirely clear, and as discussed in the Dutch case in Box 13.1. If densification is seen as a social benefit (because of arguments laid out in the previous chapter), then based on the logic of the last chapter, academics argue that there should not be a significant levy against it.

13.2.3.2 What do the data show on taxes and fees overall?

We commissioned Altus Group to provide estimates of government fees (explicit and implicit) in Toronto, Vancouver and Montréal. Blais (2010) argues that the structure of fees provides implicit encouragement to sprawl. While development fees are higher for single-detached housing than for condominiums, they do not increase as much as the increased floor-space required for such structures. The main reason for this is that the demands placed by single-detached housing for incremental servicing is proportionately less than for new dense structures such as condominiums. Development fees are intended to recover incremental infrastructure costs. In other words, the structure of the charges is not well targeted to address urban sprawl.

In our consultations with builders, their concerns tended to focus on the costs, length and uncertainties related to the approval process. In Durham Region, development charges increased at an average rate of 7.3 per cent per year between 2004-2017 while in York Region, the increase was about 11 per cent. Charges for townhomes grew slightly slower, while those for small apartments rose slightly faster in both regions. Lower-tier municipalities had additional development charges. The cost of studies is also a concern. In Hamilton, an application for subdivision can require potentially 13 reports (environmental assessments, traffic, drainage etc.).

[65] After Section 37 of the *Ontario Planning Act*, 1990 (Ontario, 2017c).

Altus was asked to estimate fees according by various scenarios (Table 39). First of all, they were asked to look at fees for new developments (i.e., from undeveloped land) and from redevelopment (i.e., that required rezoning). Secondly, they were asked to develop their estimates according to different density scenarios. In their work, these were classified as low-density development (single-detached units), medium-density development (traditional freehold townhouses), and high-density development (condominium apartment building). These results represent rough averages in the respective CMAs, as not all lower-tier municipalities were surveyed. Moreover, a number of assumptions had to be made in undertaking this analysis, and results should therefore be treated as indicative.

Table 39 records the data in terms of 1) the actual dollar-level of fees, 2) as a share of the average price of such a unit, and 3) in terms of fees per unit area of land taken up. These data do not include any federal charges relating to new housing (such as GST) or that could be applied (such as mortgage insurance). Moreover, they do not include DBA charges for Toronto because fees were too uncertain to be quantified, but do include DBA charges for Vancouver (recall that these are relevant when comparing redevelopment scenarios).

Findings from the table include:

- Charges are meaningfully higher in Toronto compared to Vancouver, and then considerably higher than in Montréal. After taking the value of property into account, charges are very roughly comparable in Toronto and Vancouver, but meaningfully lower in Montréal;
- The charges are highest in absolute value for low-density developments;
- In the GTA, charges are lower for redevelopment than for new development (but the data do not include DBA charges), but are higher in Vancouver. Charges are roughly equivalent in Montréal;
- To the extent that homes form an important part of the distribution of wealth, fees based on the value of property are slightly progressive in Montréal, roughly neutral in Vancouver but regressive in Toronto; and
- Denser developments have higher fees proportional to area in Toronto, flat-to-declining in Vancouver, and flat in Montréal.

It would appear, based on this evidence, that the structure of fees, at the margin, are not targeted to address concerns of increasing density and any adverse distributional impacts of rising wealth inequality. The charges do not appear to reflect the possibility of lower infrastructure costs associated with redevelopment.

Table 39: Summary of Findings, Government Charges Study, by Greater Metropolitan Area

	NEW DEVELOPMENT SCENARIO			REDEVELOPMENT SCENARIO		
DENSITY:	LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
Average Charges per Unit			Dollars per Unit			
Greater Toronto	100,900	80,400	62,800	58,500	57,900	56,300
Greater Vancouver	86,700	48,500	23,200	105,800	63,300	31,400
Greater Montréal	18,100	12,800	7,100	18,500	12,900	7,100
Average Charges per Square Foot			Dollars per Square Foot			
Greater Toronto	40	45	70	23	32	63
Greater Vancouver	35	27	26	42	35	35
Greater Montréal	7	7	8	7	7	8
Average Charges as % of Sales Price			Per cent			
Greater Toronto	7.4	9.6	11.1	4.2	6.9	10.0
Greater Vancouver	3.6	4.9	3.5	4.0	5.4	4.5
Greater Montréal	3.0	3.1	2.6	3.1	3.2	2.6

Source: Altus Group Economic Consulting

13.2.4 Regulations and time delays

In our ongoing consultations with cities and builders, a key concern was the time it takes to get a project ready to market (i.e., prior to immediately starting construction, also known as the *project opening*). Informally, builders in Montréal suggest that delays of around 2 years are common. In Toronto, property that is already appropriately zoned can be developed quickly, but rezoning can take 3 to 5 years. These numbers do not seem to be disputed by the respective cities. It was very difficult for us to substantiate these claims.

There are efforts to try to improve supply, however. Box 13.3 shows, for example, how flexible zoning can be applied in some cases, and discussion in Chapter 2 highlighted how Montréal moved quickly to develop more high-rise residential buildings.

In the absence of other data, we formed a hypothesis that any land that had recently been bought would then be moved as rapidly as possible towards construction of housing. To this end, we commissioned Altus Group to undertake an analysis for Toronto and Vancouver of the timelines between residential land transactions and new low-rise home projects. Lack of data for Montréal, Calgary and Edmonton excluded them from the study. The analysis relies exclusively on information in Altus Group's commercial investment-sales transactions database and new homes database. We asked Altus to limit the scope of the analysis to low-rise homes simply because price pressures associated with them are greater. We first introduce the data, and then provide some caveats.

Box 13.3: Zoning reform in Vancouver

Municipalities in BC have begun to experiment with a different way of rezoning parcels of land. The City of Vancouver, as an example, has experimented recently with the idea of more "flexible zoning". The Norquay Village area, which now has its own zoning bylaw, involved mass rezoning of existing single-detached lots by the City of Vancouver to encourage development of row houses and townhouses – effectively creating greater density capacity all at once for many lots. As this area of the city has its own zoning bylaw, the rezoned lots have guidelines on the number of units that can be created on each lot as well as guidelines on height of the completed dwellings and thus greater certainty is created around what the land value should be based on the allowed number of units and market prices. Additionally, the CACs applied to these newly rezoned lots are based on a Target Rate Rezoning Negotiation framework which provides, to some extent, additional cost certainty to developers, and means the City can still capture the value of the land uplift from rezoning. City of Vancouver staff noted that the approach would increase the diversity of housing options in that area while acknowledging that this mass rezoning would save developers of parcels in this area approximately "6 months of cutting through red tape" (Jang, 2017).

Figure 75 shows data for the GTA. Key findings include:

- About 60 per cent of projects opened (i.e., started selling at the pre-construction stage) in 2015 to mid-2017 did not have any associated land sales transactions recorded in the database in the 15-year period preceding the project opening; and
- About 30 per cent had an associated land deal within 5 years of project launch. Some of these may be purchases where the previous owner brought the land through much of the development phase.

The amount of land acreage of low- and medium-density land traded in recent years has increased in the past two years, but remains low compared to amounts recorded during early 2000s (Figure 76). Based on the data available, the average annual number of acres traded prior to 2006 (the year the Provincial Growth Strategy was introduced) was 7,200 compared to 3,800 post 2006. It is perhaps surprising given the price upswing in Toronto that the volume of land has not increased by more.

Figure 75: Summary of Land Sales Points for Single-Family New Home Projects Opened in the GTA

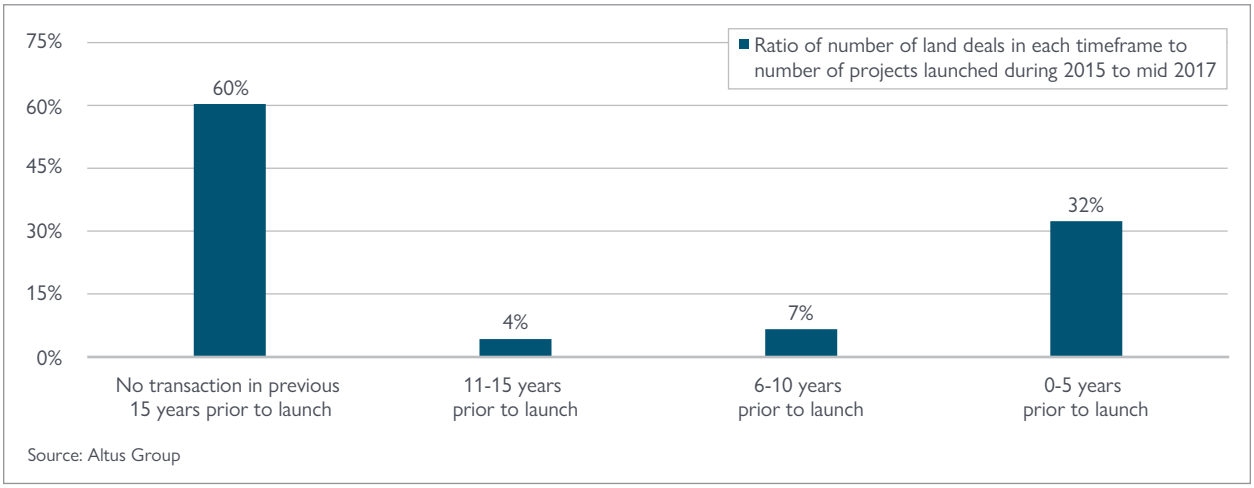
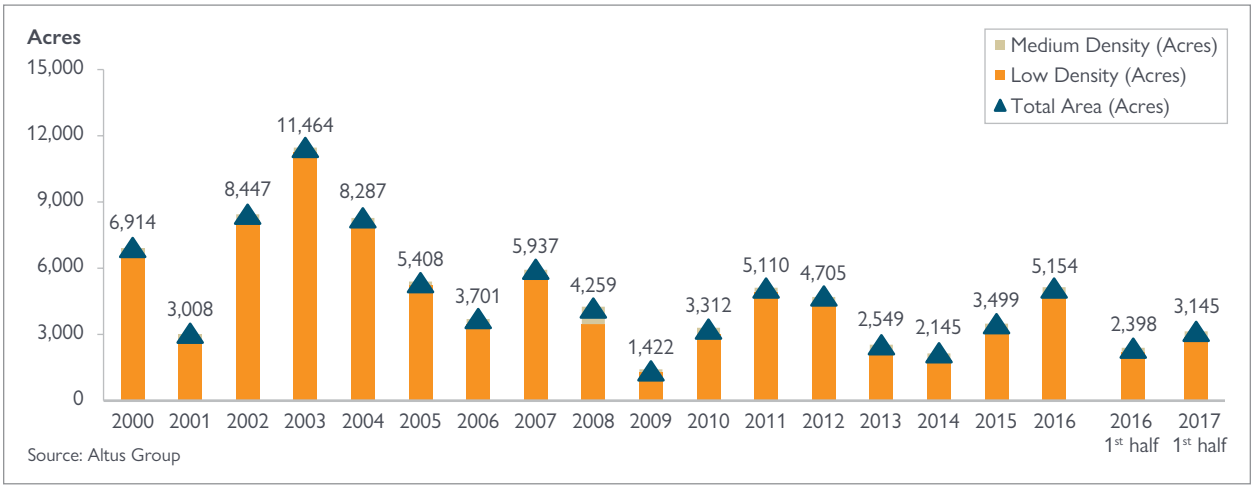


Figure 76: Low- and Medium-Density Residential Land Sales Transactions in the GTA



Results are broadly similar for each of the five regions in the GTA, with the exception of the City of Toronto, where relatively more land deals occurred closer to the launch date. Interestingly, within the city of Toronto the split was more even: 50 per cent projects that started selling between 2015 to mid-2017 had land transactions associated with them in the past 5 years. However, it must be kept in mind that the amount of single-family development in the City of Toronto is limited. It also points to the fact that servicing is more readily accessible in built-up areas of the City of Toronto and therefore any delays associated with servicing will be more pronounced in some 905 areas where brand new servicing and zoning is required.

Key findings for Vancouver (Figure 77 and Figure 78) include:

- About 60 per cent of all projects opened in 2015 to mid-2017 had an associated land deal within 5 years of project launch. Again, some of these may be purchases where the previous owner brought the land through much of the development phase.
- The results for Surrey, where the largest number of projects has occurred, were broadly similar to the overall market results.

Unlike in Toronto, the amount of low- and medium-density land traded in recent years in Vancouver has been steady and on an upward trend. This could signify a potential increase in land available for single-family project launches going forward.

Figure 77: Low- and Medium-Density Residential Land Sales Transactions in Vancouver

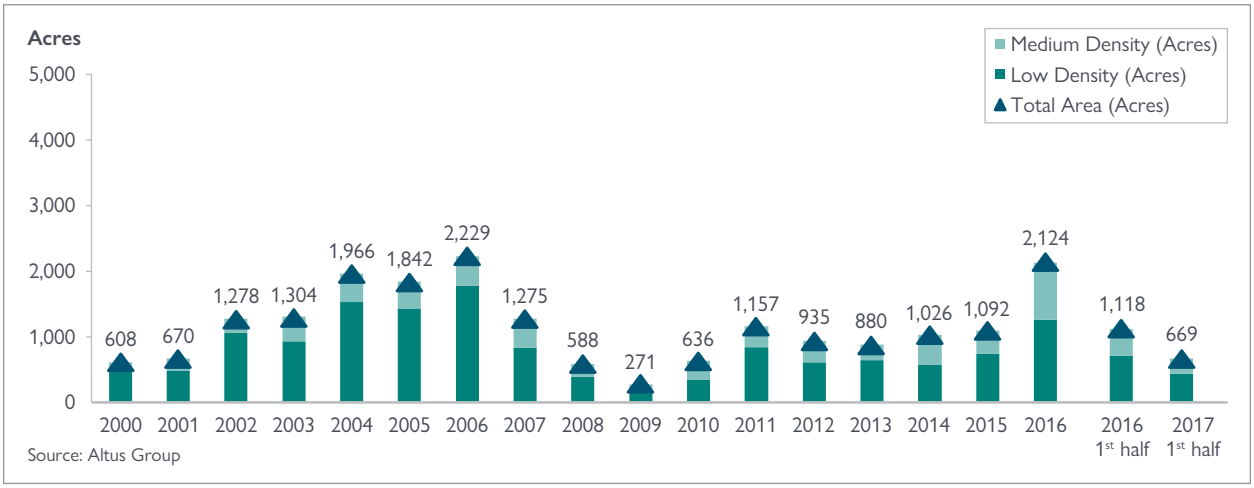
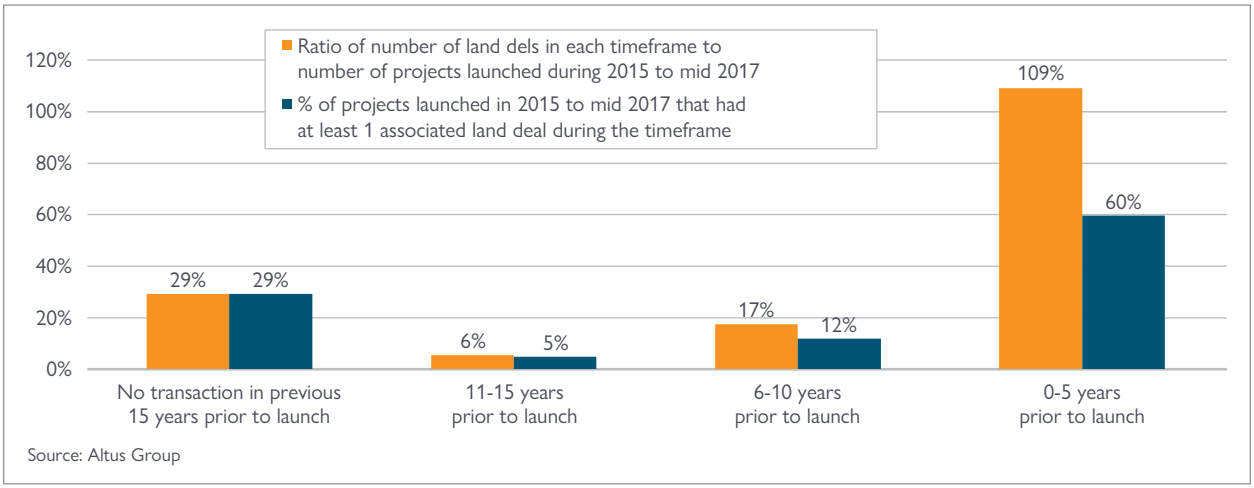


Figure 78: Summary of Land Sales Points for Single-Family New Home Projects Opened in Vancouver CMA



While the analysis has provided some interesting new evidence, caution needs to be used in interpreting the information and understanding its limitations. In particular, the reasons why a significant portion of new projects launched do not have land transactions within the past 15 years may be based on a variety of reasons including:

- The long lead times needed to take land through to the point of being "build ready";
- Servicing constraints in some municipalities that may have delayed land development;
- Non-land related to planning applications and approval processes that may have affected project start; and
- Cases where very large tracts of land were purchased many years ago, with the intent that they would be gradually developed over time by the proponent to maintain business over the long term.

In addition, the analysis has only been undertaken for a relatively short period of time (projects launched in 2015 through mid-2017).

Approval delays are only a subset of explanations for the delays as demonstrated by the Altus findings. The overall time line for the majority of recent projects spanning 15 years in the GTA may also be associated with land hoarding. Our extensive discussions with the building community have suggested otherwise. Developers have been quick to dismiss land hoarding, as there is no incentive to pass on high profits available now in favour an uncertain future. The lower time span associated with projects in Vancouver compared to the GTA could suggest that servicing delays are playing a key role in delaying projects coming on to the market. In Vancouver, most low-rise developments have taken place within built-up areas where services are already in place. Similarly, zoning is also likely to be already in place in urban cores compared to some 905 areas in the GTA where new servicing needs to be provided.

13.3 ACTIONS IN OTHER COUNTRIES TO INCREASE SUPPLY

In this section we briefly review some policies adopted in other countries aimed at increasing supply. We do not advocate for any policy, but rather highlight some innovations that have been introduced in other countries.

Some countries have tried to move from a regulatory approach to a fee-based approach in order to: increase the degree of certainty that builders and developers face; increase transparency of the overall process that is currently difficult to understand; provide more tools for municipalities to control the timing and type of supply; and provide revenues for local governments to address infrastructure needs. Burge and Ihlanfeldt (2006) finds that development fees can increase construction rates by reducing exclusionary regulations and increasing the percentage of proposed projects receiving local government approval. In the Canadian context, such a policy change was also proposed by Slack (2002). The U.K. has attempted to move away from DBAs (called Section 106 there) and toward development fees (called the Community Infrastructure Levy) (Wales, 2015).

Development fees are intended to cover only the costs from new development. They are not intended currently to address any market failure from urban sprawl of single-detached housing. In exchange for greater planning certainty and diminished regulation, Burge *et al.* (2013) argues development fees could be raised substantially for construction of single-detached houses. Such a system could also provide incentives to builders to address the 'missing middle' by building more row houses, stacked apartments, etc.

In theory, economists argue a land tax would be a more efficient than the current property taxes, and indeed was an important source of taxation in many of the provinces in Western Canada at the onset of the twentieth century (Dixon, 1914). A property tax is levied on both the land and the structure built on it. Hence, a land-only tax removes taxation from the structure; it does not penalize land improvement. A land tax encourages the construction of higher-valued structures on the land through replacing single-detached with multi-family housing, effectively lowering the per-household tax burden. A land tax would also discourage both speculation in land and hoarding of land as the carrying costs of vacant land would be increased. Moreover, it would address distributional concerns as it would be a progressive tax on wealth.

Land taxes have been proposed as an efficient form of taxation, but are rarely applied today.[66] Municipalities in Denmark levy a tax on land value of between 1.6 per cent and 3.4 per cent. A review of Australia's tax system recommended the introduction of a graduated land tax (with no tax on agricultural land), but argued that zoning, planning and development approval policies and infrastructure charges should first be reviewed to ensure they do not unnecessarily reduce housing supply (Australia, 2010).

[66] Skaburskis and Tomalty (1997) provide a history of the idea in Canada.

After determining that England has a problem of housing supply (after the Barker Reviews cited in the chapter introduction), the *Joseph Rowntree Foundation* commissioned a survey of supply-side policies conducted elsewhere in the world (Rowntree Foundation, 2013). Its survey covered 11 countries (excluding Canada). Box 13.4 shows a typology of supply policies used in other countries.

Some of these policies have been used in Canada, such as inclusionary zoning and growth management. The Rowntree report also notes that careful design and implementation of many of these policies are required. Importing a policy from another country would be difficult as the institutional circumstances in England would have to be thoroughly understood first, such as the growing tendency in England for developers to buy 'options to buy' land rather than purchasing land outright. Some of the policies come in a range of varieties: land-value capture is a goal of many municipal policies, but the most efficient policy from the economic perspective of a land tax is rarely applied.

One of the options that does not seem to have been used by Canadian governments is *land assembly*. With many plots having single-detached housing on them, a denser housing development would require purchasing several houses, combining the lots, changing the zoning rules, and building a new dense property structure. Land assembly is the process of combining the lots in order to be ready for development. This process is time-consuming and risky, as some of the homeowners may hold out for a higher bid on their land to capture most of the land uplift.[67]

An option in this context is for local government to undertake the land assembly. Single-detached housing could be bought at market price and/or 'expropriated' in law at market price: zoning rules would then be changed, and the resulting assembled land sold to private developers at market price for building of dense structures. By paying market price and then using its legal power of expropriation at market price, municipal government would prevent the hold-up problem. By reselling the land after re-zoning, it would capture the land uplift. A problem with this approach is the need for large amounts of capital.

13.4 CONCLUSION

This chapter has reviewed policies on supply. Unfortunately, there is little public data to understand fully what is happening. While there are concerns about the availability of land, more informative data would be on the price of land. Ultimately, increased densification will come about through efficient processes or redevelopment and rezoning. We believe, however, that there are significant delays in these.

It does not appear as if the fee structure on housing is set to encourage densification nor to be a progressive tax on wealth. Consequently, builders and developers can face incentives at the margin to construct large single-detached homes on greenfield land. Further research is required to understand fully what the impact of maintaining employment lands will be on local employment and housing prices. These challenges are not unique to Canada, and many cities around the world are grappling with the problem.

[67] Brooks and Lutz (2016) find that 'to-be-assembled land' trades at a 15-40 per cent premium in Los Angeles, suggesting that significant frictions prevent assembly.

Box 13.4: Typology of policies to address housing supply used in select countries

1. Growth management
Growth management boundaries are used by most countries to prevent urban sprawl, but successful management requires planners to be pro-active in monitoring and adjusting land supply.

2. Land assembly
Land assembly is the process of combining several plots to form single plots so that, for example, a larger structure can be built. This can be problematic because of hold-outs. In countries such as Germany and the Netherlands, municipal governments have bought land. In the Netherlands, the municipality buys land through compulsory purchases based on current land values, provides needed infrastructure, and then sells the land back to developers to recover costs of infrastructure provision.

3. Infrastructure provision
Some governments ensure that infrastructure is place prior to planned development.

4. Compensation and incentives
Compensation could be used to offset local resistance.

5. Land value capture
There is a wide variety of schemes to capture land uplift. Notably in New Zealand there is a land tax. Such a tax gives an incentive to develop land to its highest value use but the uplift in the value of the land is captured by the government.

Source: Adapted from p.5, Whitehead *et al.* (2013)

14 Affordable Homeownership in High-Priced Markets: Policy Tools

CHAPTER OBJECTIVES:

- Examine what governments can do to address the challenges to homeownership affordability posed by high-priced housing markets.
- Identify strategic policy tools aimed at addressing those challenges.

KEY FINDINGS:

- High priced markets, even if largely supply side driven, fuel higher indebtedness of borrowers who take on larger loans relative to income to enter the market.
- Proposed Federal support for affordable ownership falls into three key areas:
  - Supporting land use planning with improved data, modelling and analysis
  - Improving housing development approval processes
  - Remaining vigilant on housing-related risks to economic stability

14.1 INTRODUCTION: WHY SHOULD GOVERNMENTS CARE ABOUT HIGH-PRICED MARKETS?

Our analysis has found that key factors on both the demand and supply side of housing have contributed to the increase in prices since 2010 in some housing markets in Canada. Demand-side factors such as population and income growth and a low interest rate environment explain much of the recent price growth in Canada's major urban centres. For cities such as Toronto and Vancouver, however, other factors also appear to be at play. Speculation and investor demand are certainly part of the story, a natural outcome when there are perceptions of persistent land and housing shortages. Supply-side challenges including land supply and zoning regulation also emerge as factors that contribute particularly to high-priced markets.

But are elevated house prices in high-priced markets a challenge or market failure that warrants government intervention? The answer to that question varies depending on one's interest in the housing market. Homeowners generally benefit from consistent growth in the value of their homes. This is important because for many Canadians their home is their most important asset. Housing markets, however, are not immune from price corrections driven by external economic shocks. High priced markets, whether supply or demand driven, fuel higher indebtedness both from borrowers who take on larger loans relative to income to enter the market and homeowners who take advantage of these higher prices to extract equity. Both increase vulnerabilities of higher household debt and in turn help drive even higher prices. Macroprudential policy has a role to play both in reducing demand side pressures on prices, and in ensuring that the lending that is taking place in these markets is prudent and doesn't create broader systemic risks which could crystalize in the event of an economic shock, higher interest rates, or a rapid fall in house prices.

As discussed in previous chapters, housing markets tend to be much less flexible (or elastic in economic terms) than most other markets. When the demand for most consumer goods rises, it typically does not take long for suppliers to respond with additional production. Creating additional dwelling units to respond to unanticipated increases in housing demand typically involves production times measured in years, not weeks. Greenfield building sites need to have infrastructure in place to respond quickly to increased demand, but maintaining an emergency supply of serviced land is expensive: just-in-time land inventory lowers carrying costs for municipalities and developers. Navigation through rezoning and other approvals processes, as well as the securing and scheduling of materials and skilled labour, and actual building of the dwellings take time. Government investment in data, modelling, planning and scenario tools can provide insight into the future of markets and help citizens gain a better sense of the longer term consequences of current decisions.

Canada is not alone in experiencing these challenges. CMHC conducted a thorough review of the measures that have been implemented in Canada and in other countries to gain a better understanding of what governments can do to address the issue of rising home prices. These measures range from those that were designed to mitigate some of the demand drivers affecting house prices, to those focused on helping specific groups overcome higher costs. The results are mixed and difficult to interpret, given the challenge of measuring impacts on housing markets that are subject to a wide range of market forces. Certainly, no one simple measure emerges as an obvious candidate for addressing the challenges posed by high-priced markets, and some are more likely to do harm than good. We offer our policy options to stimulate further public discussion.

14.2 POLICY OBJECTIVES

Current federal government policy goals for the housing sector are well-aligned with objectives of other levels of government: promoting access to affordable housing options, while maintaining financial market and economic stability. Housing markets work best when there is a home available for every household, and housing prices reflect the underlying cost of land and construction.

14.2.1 Promoting Balance in Housing Markets

Sound housing market policy outcomes are fundamentally dependent on ensuring that the supply of dwellings is balanced with the number of households needing shelter. Given long lead times needed to create increased housing supply, forecasting housing demand accurately is vitally important as excesses and shortfalls can generate significant price instability. Planners and developers need to anticipate what households will need (or want) and what they can afford. Some components of demand are reasonably predictable: natural population growth and age composition, and housing preferences based on historical standards. Less predictable components are economic growth, job growth, migration, and wage growth in a region, particularly three to ten years in the future, as required by housing development lead times.

14.2.2 Maintaining Financial Market and Economic Stability

While the goal of ensuring Canadians have access to affordable housing is extremely important, the federal government also plays a key role in managing the risk of collapse in the financial sector like the one that triggered the Great Recession in the US. Recent federal government interventions have focused on limiting credit flows to the housing sector in the interest of financial stability. The changes have made it more difficult for Canadians to over-extend themselves and qualify for loans they may not be able to service in the event of a shock. Addressing these issues reduces demand-side pressures, helps maintain more balanced housing markets, supports price moderation and reduces the risk of a long and severe recession exacerbated by high levels of consumer debt. Housing markets that are out of balance create transfers of wealth, but they don't create better economic and social outcomes. Promoting balanced housing markets serves both access and stability objectives.

14.2.3 Related Public Policy Objectives

Housing affordability is part of a range of policy objectives that shape development of urban environments. By shaping our population centres and hubs of economic activity and growth, regional land planning and use has great influence on productivity and prosperity, environmental impact, and the nature of our society. Municipal and regional plans must simultaneously address multiple objectives including:

- Promotion of economic growth in ways that reduce economic inequality;
- Respect for the environment through reduced greenhouse gas emissions, and preservation of sensitive areas, agriculture and recreational spaces; and
- Promotion of social inclusion and opportunity for all in society.

Arriving at an overall regional or municipal plan that address each of these policy objectives to the satisfaction of citizens and several levels of government that provide funding to support those plans is not an easy task. Without data and tools to provide sound information and support evidence-based decisions, the task becomes even more challenging.

14.3 WHAT MEASURES HAVE ALREADY BEEN TAKEN?

Government measures aimed at addressing the challenges of high-priced housing markets tend to focus on the specific drivers affecting either housing demand or supply. This report has highlighted a number of factors on the demand-side that play an important role in accounting for the rapid rise in house prices in Canada's major centres, including macroeconomic variables such as migration trends and growing population, low interest rates, and rising disposable incomes.

14.3.1 Recent Demand-Side Initiatives in Mortgage Finance

The Government of Canada has taken steps to address vulnerabilities associated with high household debt and market imbalances, strengthen the prudential framework for lenders, manage risks, and mitigate factors that could potentially be fuelling more speculative investments. In the last two years, these steps have included:

- Introducing more stringent debt-servicing eligibility thresholds for borrowers seeking government-backed insured mortgages. These changes reduce risk to borrowers and the financial system by making them less vulnerable to economic shocks such as a sudden increase in interest rates. But they also mean that some Canadians, particularly in high priced markets where higher debt servicing ratios are more common, may need to wait longer to enter the housing market, save more for a down payment, or settle on a smaller home (all of which puts downward pressure on house prices);
- Increasing the amount of capital that federally-regulated lenders and mortgage insurers must hold against exposures in high priced markets to make them less vulnerable to a significant correction in market prices. Depending on how institutions choose to reflect the additional costs, these changes could increase the cost of mortgages in high-priced housing markets, thereby reducing market demand;
- Tightening the rules on the capital gains exemption for the sale of a primary residence, to ensure that permanent non-residents are not eligible for the exemption on any part of a gain from the disposition of a residence; and
- Changes to residential mortgage underwriting guidelines of Office of the Superintendent of Financial Institutions to require stress testing against higher interest rates to help manage financial risks of federally regulated lenders. This change extends measures to the uninsured space that have been effective in reducing loan to income ratios in the insured mortgage space. These changes may also result in some borrowers with uninsured mortgages having to either delay purchases or consider a smaller mortgage and lower priced home. Borrowers in high priced markets with higher debt service ratios are more likely to be affected by these changes.

These changes moderate demand in ways that yield other public policy benefits, such as greater stability in housing markets, the financial sector, and the economy and improve the fairness and integrity of our tax system.

14.3.2 Government Initiatives to Increase Housing Supply

Through the National Housing Strategy (NHS), federal and provincial/territorial governments' commitments on affordable housing focus support on those areas of greatest need and impact. NHS consultations revealed that a majority of Canadians support a vision for housing where all Canadians have housing that meets their needs, and which they can afford. Affordable housing is a cornerstone of sustainable, inclusive communities, and an economy where all can prosper and thrive.

Our review of demand pressures in this report noted that global cities tend to attract high-skill, high-wage workers who have the means to bid up prices when housing is scarce. The appropriate policy response is clearly not to discourage the growth of good jobs, but to recognize that housing price growth makes it difficult for the less advantaged to find affordable housing. The government reinforced its commitment to housing in the NHS with a $40 billion plan under the NHS that will strengthen the middle class, fuel our economy and give more Canadians across the country a place to call home. Increases in the supply of assisted housing and other forms of affordable housing will help address issues related to income disparities and the housing challenges of the less advantaged, and relieve some demand pressure in high priced housing markets.

14.4 DEALING WITH HOUSING MARKET FUNDAMENTALS

Growth in housing prices has been driven by economic fundamentals of job and population growth generating increased housing demand from a growing, increasingly wealthy population. Supply has not kept pace. Economic growth has become more concentrated in large urban centres with a ready supply of talent and attractive, livable environments. Our analysis suggests that land supply restrictions such as land-use regulation, restrictive zoning, and geographic constraints are factors that help explain price fluctuations in high-priced markets relative to other markets. Some of the effect of land restriction may be psychological, instilling in buyer's minds that land resources are limited even if land supply is adequate to meet expected demand for many years. Research has found that markets with inelastic land supply—whether because of geography or regulatory constraint—are more volatile and more prone to speculation.[68]

Supply-side measures are policies that can directly or indirectly increase the supply of homes, or respond more quickly to housing shortages as signalled by rising prices. The factors that give rise to supply constraints are complex, and the solutions may not be readily apparent. The impact of land regulation and urban plans—including such factors as rezoning restrictions, density limits, development fees and the time it takes to approve new supply—warrant closer scrutiny. Collaborative investments in standardized data collection, improved modelling and cost-benefit analysis can help citizens and decision-makers understand longer term consequences of current decisions and processes.

14.4.1 Improved Information and Support for Land Use Planning

> *"When it comes to public policy decisions, what I believe in, for every city, is cost-benefit analysis. I believe that about high-speed rail, and I believe that about land-use planning. The ultimate question is: whatever our argument is for saying "no", can we plausibly put down numbers that tell us that, in this neighbourhood, the benefits of preventing a development are high enough that we don't want it to happen?"*
>
> *– Edward Glaeser* [69]

[68] Stephen Malpezzi and Susan M. Wachter, 2005. "The role of speculation in real estate cycles," *Journal of Real Estate Literature 13*, 143-164, 2005.

[69] Simon Jenkins, "The trials and triumphs of the city: Edward Glaeser in conversation," The Guardian, 21 May 2015, www.theguardian.com/cities/2015/may/21/what-are-cities-doing-so-right-and-so-wrong-the-experts-go-head-to-head?CMP=share_btn_link

A key observation throughout this Report has been the absence of some of the essential data, analysis and modelling needed to understand and act on housing market dynamics. These gaps complicate housing planning and contribute to housing supply inelasticity. This observation was consistently heard in the NHS consultation process as well as in other consultations and discussions CMHC organized or attended over the past 18 months. Even in the most responsive markets, housing supply takes time to bring to market. Better data on demand and supply factors, and realistic modelling of delivery on new supply would support improved warning systems of imbalances in various market segments.

Regional planners in major urban areas have to consider not just the need for dwellings, but also how the type and density of their housing supply will affect the livability and sustainability of their economic region and its sub-communities. Creating plans that generate buy-in from all key stakeholders is challenging and time-consuming. It is also necessary. The regional plans in other global cities like Auckland, New Zealand, Portland, Oregon, and the San Francisco Bay Area—each facing challenges similar to those in Toronto and Vancouver—also consider the complexity and trade-offs of fostering affordable homeownership and rental solutions along with other key social and economic objectives.

While housing needs are highly diverse in terms of both size and location, our consultations suggest that current efforts to estimate future demand often focus on basic counts of dwelling units. While young families may be able to afford to buy an average condominium, it may not have the features they need, such as enough bedrooms or being close enough to parks, schools or public transit. Investment in information would support demand projections that are well-identified in terms of size and affordability, lessen the uncertainty inherent in planning, and allow supply to respond in a timely and appropriate manner to underlying demand.

The National Housing Strategy consultations suggested that CMHC is in a unique position to develop the research and data-gathering capacity needed to fill these data gaps. For instance, CMHC recently worked with several property management companies to expand its *Condominium Apartment Survey* in order to bring clarity to the prevalence of foreign ownership in the Canadian housing market. This is an example of the benefits of a coordinated, multi-level approach to data gathering and analysis. It also highlights the lack of standardization in many key housing market concepts, as the survey results differed from those of previous studies on foreign ownership due to differences in the definition of foreign residents, sample size, geographic coverage and housing type. All levels of government would benefit from continuing partnerships and working housing industry stakeholders to establish common information standards for understanding housing market dynamics.

Another opportunity is this area is for the federal government to facilitate through CMHC the development of urban modelling and planning platforms that provide an economic region perspective of land use and transportation infrastructure, and support a region-wide perspective of housing market demand and supply balance (see box). Current regional and municipal data on zoning changes, development approvals, and the timing of anticipated supply are needed to run such models, and would represent a significant in-kind contribution of data that are currently either not publicly available or with varied definitions and formats or both. If the pilot confirms the value of such models, ongoing federal government funding would offer value by supporting a network of users across the country, as well as stimulate greater academic and research interest in urban decision-making in Canada simply by making better data available.

The value of these microsimulation models and the associated incentive to fuel them with up-to-date data goes well beyond dealing with issues associated with high-priced housing markets. Such models also support *ex-ante* and *ex-post* evaluation of shared government infrastructure investments in housing under the NHS, and in transportation and other municipal infrastructure proposals under programs of the Canada Infrastructure Bank.

Options available to the federal government include:

- Encouraging provinces, regions, and cities to pursue more integrated, comprehensive infrastructure planning and decision making at the economic region level; and
- Using funds announced in Budget 2017 to support collaborative investment in comprehensive data collection and urban planning tools to provide clearer insight into the costs and benefits of land use decisions, and stimulate more informed public debate.

Policy tool: Microsimulation models

Regional microsimulation models are uniquely positioned to provide key insights into the Canadian housing market and support effective policy development aimed at market stability and access. In their application to urban development, microsimulation models can simulate complex relationships among fast-moving real estate markets, municipal and provincial policies, and federal investments to create policy scenarios that estimate an array of social, economic and environmental outcomes. The Government of Canada should consider a role in enhancing research programs and working at all levels of government to put these evidence-based tools directly into the hands of decision makers, and provide a basis for more informed public discourse on planning decisions.

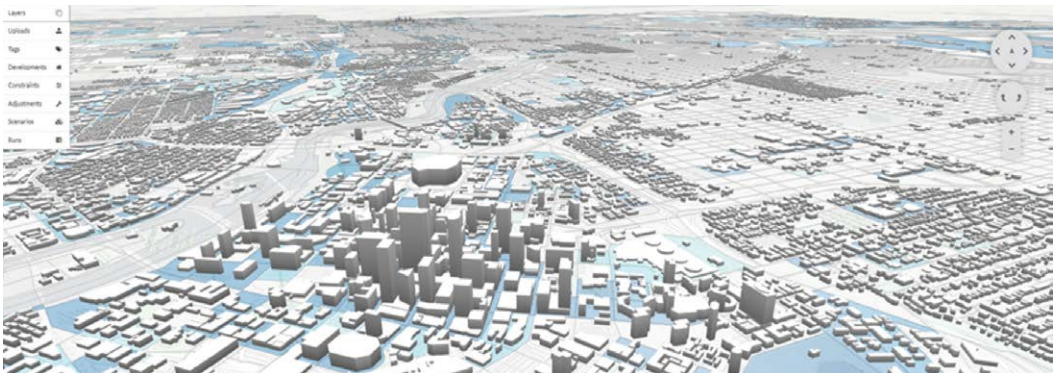
Municipal planning organizations across the United States (e.g. San Francisco, Seattle, Houston), Europe (e.g. Paris, Zurich) and in other parts of the world (e.g. Johannesburg) have already turned to microsimulation models of both land use and traffic in order to strengthen decision making on local housing issues.

And, increasing access for Canadian cities would:

1. **Generate new insights by linking market, municipal, provincial and federal data**
2. **Better prioritize investments in affordable housing**
3. **Leverage outputs from Statistics Canada's Canadian Housing Statistics Program**
4. **Facilitate city-level performance tracking**
5. **Strengthen participatory democracy**

The Government of Canada (through CMHC) has committed to working with UrbanSim (University of California – Berkeley) and the constituent governments of Metro Vancouver to implement a pilot microsimulation model for the Vancouver region, in anticipation of support for similar models for other Canadian cities. While typically custom microsimulation models are resource-intensive to build—requiring large investments in both IT and subject-matter expertise across statistics, computer programming, machine learning, and big data—leveraging this open source platform would provide a fast, cost-effective solution for any Canadian economic region. This platform would also allow for ongoing collaboration with the research community to continuously improve the underlying behavioural models.

Further, widespread adoption of a standardized platform by municipal and provincial governments could act as incentive for all jurisdictions to actively engage in supplying the most up-to-date data. As a policy tool, accessible microsimulation models have the ability to inform and democratize policy debates and counter NIMBYism with YIMBYism (Yes In My BackYard).



14.4.2 Market Incentives to Encourage Supply

Our analysis indicates that many Canadian regions, including Vancouver and Toronto, focus on zoning and regulation as primary tools to shape development rather than economic incentives such as well-defined taxes, levies, or subsidies to shape developer and citizen behaviour. For example, rather than land use restrictions regions could impose highway use or parking levies to encourage more dense development around urban cores.

The City of Vancouver has recently moved in this direction with its dwelling vacancy tax. Where excessive speculation or land hoarding is removing the supply of land or dwellings from active markets, additional taxes on vacant lands or empty dwellings can encourage a more efficient use of the existing supply. Florida, California, Illinois and Michigan have all enacted vacant property registration ordinances that require individuals to register—and often pay additional fees on—vacant land. These measures are designed to incent owners to put vacant properties to more productive uses. Similarly, local councils in France were given discretionary power to impose a tax on under-developed land to reflect the higher per-capita infrastructure and transport costs associated with servicing low-density development, discourage urban sprawl, and increase the provision of new homes. In some areas that are zoned for higher densities, the tax is mandatory.

Effectively-applied taxes could also reduce incentives to hold land purely for capital appreciation purposes. Further, including sunset clauses on development approvals can help stream new housing onto markets more quickly and help to deal with developer incentives to avoid bringing new supply online in competition with one another.

Options available to the federal government include:

- Work with provinces and regions to pursue policies based on market incentives to shape development, rather than a system of zoning restrictions and regulations and lengthy negotiations to overcome them.

14.4.3 Direct Government Support of Housing Supply and Access

The NHS provides opportunities for the federal government to assist in making non-government lands ready for housing development. While both Ontario and British Columbia already recognize the benefits of utilizing surplus industrial land (see text box on Vancouver's Portico development for an example), the federal government could contribute further to the remediation of brownfield sites in these high-priced markets by, for example, playing a role in the assessment phase to increase the land supply that could be used for residential development. Such support would, of course, recognize that all necessary precautions must be taken to ensure that any contamination is safely remediated.

Beyond the existing support for homeowners, the Government of Canada is exploring ways to facilitate access to mortgage loan insurance for borrowers who are more challenging to qualify, such as self-employed individuals. Today's job market requires many Canadians to adopt alternative means of generating income, including by running their own businesses. Approximately 15% of Canadians are self-employed and may have difficulty accessing financing to buy a home, since their income sources may vary or be less predictable than those of salaried borrowers. To address this issue, the federal government is examining if there are barriers to housing finance for self-employed borrowers and options to expand access to mortgage loan insurance.

Options available to the federal government include:

- Increasing supply of affordable housing and extending existing programs to more Canadians as described in the National Housing Strategy to offer families more choice in housing and reduce market pressures on timing home purchase decisions.

Portico – Vancouver, British Columbia

The Portico development transformed an underused brownfield (the former Pacific Press site) into a higher density, mixed-use, infill development that is pedestrian- and transit-friendly. Located in the Fairview district of Vancouver, at the base of the Granville Street Bridge, Portico is a gateway to the city core. The Fairview district consists of mostly low-and high-rise condominium and rental apartment buildings and a large number of commercial and industrial buildings. At 118 dwelling units per hectare, Portico's residential density is more than double that of the entire Fairview community, at 52.2 dwelling units per hectare. Moreover, the City of Vancouver (like the City of Toronto) does not have a significant supply of greenfield land, so growth is largely accommodated through redevelopment and infill. Housing opportunities have been created by rezoning some areas that were traditionally industrial and commercial to allow for residential development. With regard to this community's connection to transit, city council approved significant road network modifications to re-establish the former street grid, linking it back to the surrounding community. The changes also provided opportunities for new public open space amenities.

14.5 IMPROVING MARKET RESPONSE

As cities grow and consume available land supply, market pressures and incentives develop to repurpose already developed land to higher valued uses. Converting land from one use to another almost always inspires heated debate as some interests line up with existing use and other see greater value in the proposed use. As with broader land use planning, individual project proposals also need to be judged on a cost-benefit basis, including impacts of the project not proceeding, and finding ways to compensate in some form those whose welfare would be significantly compromised when a new development goes forward.

Resistance to rezoning areas in the urban core that are currently zoned for detached, single-family homes makes it difficult to achieve required densities in areas near urban cores and transportation hubs. Other inefficiencies, including excessive design specifications and intra-regional variations in codes and requirements, also appear to slow development approvals. Further investigation is required to provide an exact diagnosis of the issues, but it is clear that municipalities in affected regions need to harmonize their regulations, adjust zoning for denser development and streamline their processes, particularly for affordable development, to support more responsive supply.

Optimal uses of land change as cities grow, yet current processes seem to restrict supply by giving undue control to narrow interests. Options available to the federal government include:

- Working with provinces and regions on developing forward-looking, housing data and market modelling to better anticipate housing market imbalances in both rental and ownership markets based on projected demand and expected or modeled housing supply;
- Examining financial incentives that would reward cities and economic regions that encourage denser, mixed-use urban development;
- Developing modelling tools to counter NIMBYism and support more informed debate on how specific development proposals may affect neighbourhood character, real estate pricing, and other urban goals.

14.6 PRESERVING ECONOMIC STABILITY

Challenges in coping with basic underlying economic growth in our cities have led to consequences and risks that also need to be managed. Rising prices, low interest rates, and slow supply responsiveness accelerate demand and generate incentives to extend excessive levels of credit, and opportunities to speculate on land and housing with relatively low carrying costs. These contribute to land and housing cost escalation that impedes long term economic growth and citizen welfare. Rising prices attract speculative investment, domestic and foreign, though the foreign component has been challenging to measure in Canadian markets.

Price increases have also made housing much more capital intensive, and lead to questions of whether there are opportunities to adapt conventional notions of homeownership and mortgage arrangements to emerging market realities. We owe it to Canadians to ensure that innovative and viable mortgage products come to market to provide greater homebuyer choices on the amount of risk they take on, including opportunities to share that risk with lenders or other institutions at mutually acceptable prices.

14.6.1 Macroprudential Vigilence

As noted above, the federal government has taken actions affecting mortgage credit to promote longer term economic stability. Ongoing monitoring of housing markets and debt levels, and taking additional action if necessary, remains a key role for the government.

Options available to the federal government include:

- Continue to monitor vulnerabilities and intervene if necessary to maintain financial system and economic stability via mortgage insurance “sandbox” rules and other measures.

14.6.2 Innovation in Mortgage Options

Much recent academic literature has focused on improving mortgage contracts to incent parties to act in ways that promote better private and social outcomes. Some of this literature is directed toward the fact that housing costs represent a large fraction of disposable incomes, and disruptions in housing or housing finance markets can trigger significant swings in consumer spending on other goods. Structuring mortgage contracts to adapt payments to changing market conditions is one way to spread the risk from borrowers to lenders and investors. While innovation in this area is in the early stages, the overall objective is to reduce the volatility of housing and housing finance markets, and introduce macroprudential characteristics and market-stabilizing measures into mortgage contracts.

Current policy does permit innovation in this area through CMHC's Flexibilities for Affordable Housing Programs.[70] These programs allow for creative solutions in alternative forms of down payment and supporting rent-to-own options where the sponsor supports prospective homebuyers while they save for a down payment or enhance their credit ratings and capacity to borrow.

The challenge in mortgage innovation is in developing products that all sides of the transaction find attractive given expectations on future home prices. Relatively few episodes of significant and long-term price declines in Canada likely have most homebuyers willing to take on downside risks and unwilling to pay for others to absorb those risks. More research is required, but CMHC is committed to further investigating the potential of adjusting mortgage contracts to improve economic stability and increase long-term economic growth.

14.6.3 Purchase Support Programs

A number of jurisdictions provide various forms of assistance to help individuals and families purchase their first home. This is especially tempting in markets that have experienced high price growth, or where housing affordability has become a challenge. But programs such as the down payment assistance plan recently implemented by the B.C. government, which are designed to facilitate or subsidize demand, are not recommended unless backed by an aligned increase in dwelling supply. Without measures to increase the responsiveness of housing supply, most of the assistance afforded by these programs will end up in the hands of sellers and real estate agents through higher prices, adding to house price inflation pressures. Further, at the federal level, costs of such programs would likely involve transfers from residents of low cost to high cost housing areas that are difficult to justify, and would exacerbate tendencies to concentrate wealth and opportunity in a few regions. Under current conditions, current resources devoted to demand support programs would be better used to resolve supply issues, such as finding ways to address lengthy approval processes.

Options available to the federal government include:

- Providing no additional support programs for homeownership in high priced, supply-constrained markets (notably including first time homebuyers) and discourage provinces / territories from doing the same.

14.6.4 Speculation

Demand for housing is partly influenced by its value as a vehicle for capital appreciation. Sustained increases in house prices generate expectations for further gains, causing house prices to be increasingly driven by their perceived value as financial assets rather than their "use value" as residential accommodation. While investment that supports an additional supply of rental accommodation is helpful, speculation that effectively removes dwellings from supply, particularly in low vacancy markets, can create further imbalance in housing markets. Investment in rental units by small investors does not remove dwellings from supply, and offers additional rental stock for those without the inclination or financial means to own their homes.

Drawing on the experiences of international jurisdictions, the federal government could further analyze the suitability of taxing transactions to discourage speculative demand. For example, Hong Kong charges a special stamp duty on residential properties that are resold within 24 to 36 months. Such measures could complement the recent change that requires the declaration of a principal residence to claim the capital gain exemption on the sale of a primary home.

Our analysis has found that investor demand and speculative activity (both domestic and foreign), as measured by currently available data, have had a limited measured impact on prices. This not to say that speculation is of no concern. While investors look for opportunities for returns where demand is growing and supply is fixed or slow to respond, increased speculation is more likely to amplify the impact of persistent market imbalances rather than

[70] Details are available at: https://eppdscrmssa01.blob.core.windows.net/cmhcprodcontainer/sf/project/archive/publications/65950_en.pdf

serve as a key cause. Although policy measures aimed at purely speculative demand that doesn't serve to increase supply could mitigate those effects, current evidence suggests they are not likely to have a substantial impact on affordability in high-priced markets like Toronto and Vancouver.

Restricted supply in the face of rising demand creates opportunities for speculation in housing markets in forms that can reduce the availability of housing for participants in the local economy by buyers who leave dwellings vacant, rarely occupied, competing with local hotels for short-term visitors, or delay approved development in expectation of higher future prices. This reduction or delay in dwelling supply is not typically anticipated in regional or municipal development plans. Measures restricting these activities are implemented by provincial or municipal governments.

Federal government support in this area should focus on continued efforts for better data on the beneficial ownership of land and incenting land use that recognizes the importance of land in housing and economic development.

Options available to the federal government include:

- Working with provinces and municipalities to evaluate approval "sunset" clauses to prevent private land-banking.

14.6.5 Measures Targeting Foreign Ownership

Canada is an open economy that welcomes foreign investment to spur economic growth and create jobs. Media stories have created a sense that non-resident purchases of real estate have played a significant role in price appreciation, particularly in Vancouver, and recent data indicates that foreign buying accounts for roughly one in ten home purchases in some municipalities or districts. Comprehensive data to consistently measure this source of demand and supply has only recently begun to be collected. This improvement in data collection is welcome for a variety of reasons, including better understanding of the size and trends in non-resident purchases of Canadian real estate.

Foreign investment in residential real estate can introduce instability into local housing markets, especially if the investments are concentrated in relatively limited areas and are purely speculative in the sense of sequestering supply from the market. Foreign investment can be subject to disruptively rapid increases or withdrawals based on factors outside the housing market such as changes in exchange rates and political or regulatory changes in the country of origin. Both registration and taxation of non-resident purchases create an opportunity to monitor foreign investment trends, and give regional planners more insight into whether non-resident activity is a significant supply or demand factor in local real estate markets. The beneficial ownership of land is often obscured by use of numbered companies, and concentration of land ownership has been difficult to monitor. Real estate lending by Canadian financial institutions supported by foreign incomes and wealth is not well understood.

Improved monitoring and awareness does not necessarily mean greater restriction or regulation. If foreign developers invest in housing projects that support more affordable housing in Canada, should we treat such investment differently than Canadian firms with similar projects? In a market with significant shortages of affordable dwellings, restrictions on foreign investment seem counterproductive as long as dwellings are occupied.

Australia and New Zealand have chosen to require foreigners who wish to purchase residential property to apply for a purchase permit and limit purchases to new supply, to leverage foreign investment to encourage new construction. New Zealand also requires non-residents to register real estate purchases, but it doesn't currently restrict purchases. These registration mechanisms can help improve data on foreign real estate investment activity and inform local planning scenarios, while also creating mechanisms to implement restrictions if the activity proves to be excessively disruptive.

Options available to the federal government include:

- Continue to work with provinces and Statistics Canada to improve data and monitoring of real estate transactions, land ownership, and foreign capital flows.

14.7 CONCLUSION AND POLICY SUMMARY

Helping Canadians meet their housing needs is an important responsibility that can benefit from public discussion and collaboration across all levels of government. Housing is clearly interconnected with other government priorities such as economic growth and macroeconomic stability. Federal collaboration with all partners is therefore needed to develop and coordinate a cohesive policy framework. There is a strong temptation in some housing markets to provide greater assistance to those on the margins of homeownership. However, policies that encourage such demand risk adding to house price pressures, generating extra profits to suppliers without triggering supply, and exposing vulnerable people to excessive financial risk. Strategic policy tools that are aimed at addressing elevated house prices should therefore focus instead on ways to improve the responsiveness of supply.

The Government of Canada has few policy levers at its disposal to directly target supply challenges, particularly on a region-by-region basis. Consultations for the National Housing Strategy suggest that increasing the supply of rental housing could ease some of the pressure to own posed by low vacancy rates and high rental costs. But there is also an opportunity for the federal government to work with provincial and municipal partners to better understand the challenges that give rise to an unresponsive supply and drive price appreciation. This approach would enable governments at all levels to develop an effective and cohesive policy framework to better understand and support solutions to affordability challenges. There is also a potential to leverage investments in mass transit and other infrastructure to help alleviate supply challenges.

The federal government, through CMHC, can play a key facilitating role by stimulating discussion and addressing important data and analytical gaps to improve the capacity of cities to better anticipate—and respond to—strong demand. This could include developing more granular analyses of the growth and nature of housing demand and supply, model housing market scenarios, and develop knowledge base of best practices for addressing housing market supply challenges.

In addition to addressing gaps in information, analysis and knowledge, there is also an opportunity for governments, industry, and housing advocates to work together to better understand how policies around zoning, densification (including overcoming resistance), land development, transportation, infrastructure, environment and other housing-related activities can help achieve outcomes that more effectively meet the evolving demand for living space in globally-attractive cities like Vancouver and Toronto.

The policy options for the federal government summarized below are intended to stimulate broad policy discussion across all levels of government, housing advocates, industry, academia, and the general public:

Land Use Planning: Urban land is a scarce resource that must be efficiently and responsibly managed, recognizing significant externalities associated with land use decisions. Options available to the federal government include:

- Encouraging provinces, regions, and cities to pursue more integrated, comprehensive infrastructure planning and decisions at the regional level;
- Using funds announced in Budget 2017 to support investment in comprehensive data collection and planning tools to provide clearer insight into the costs and benefits of land use decisions, and stimulate more informed public debate; and
- Examining financial incentives to reward cities and economic regions that promote denser, mixed-use urban development.

Housing Development and Approval Processes: Optimal uses of land change as cities grow, yet current processes seem to restrict supply by giving undue control to narrow interests. Options available to the federal government include:

- Working with provinces and regions on developing forward-looking housing data and market modelling to better anticipate short to medium term housing market imbalances in both rental and ownership markets based on projected demand and expected or modelled housing supply;
- Increasing supply of affordable rental housing as described in the National Housing Strategy to offer households more choice in housing and reduce market pressures to rush purchase decisions; and
- Working with provinces and regions to increase supply and further identify and address bottlenecks in development approval processes, including:
    - Pursuing policies based on market incentives to shape development, rather than on a system of zoning restrictions and regulations and lengthy negotiations to overcome them;
    - Evaluating approval "sunset" clauses to prevent private land-banking; and
    - Developing modelling tools to counter NIMBYism and support more informed debate on how specific development proposals may affect neighbourhood character, real estate pricing, and other urban goals.

Speculation and the Role of Credit: Rising prices, historically low interest rates, and slow supply response generate incentives to extend excessive levels of credit and opportunities to speculate on land and housing. Options available to the federal government include:

- Continuing to monitor vulnerabilities and intervening if necessary to maintain financial system and economic stability via mortgage insurance "sandbox" and other measures;
- Providing no additional support programs for homeownership in high priced, supply-constrained markets (notably including first time homebuyers) and discourage provinces / territories from doing the same; and
- Using funds announced in Budget 2017 to work with provinces and Statistics Canada to improve data and monitoring of real estate transactions, land ownership, and foreign capital flows. The beneficial ownership of land is often obscured by use of numbered companies, and concentration of land ownership has been difficult to monitor. Real estate lending by Canadian financial institutions supported by foreign incomes and wealth is not well understood.

15 Conclusions and Next Steps

This report has outlined several reasons for escalating home prices in high-priced housing markets. Traditional fundamental factors—such as economic growth, low mortgage rates and population flows—play important roles in accounting for higher home prices. CMHC has been monitoring these fundamental drivers of house price growth through our Housing Market Assessment (HMA) to ensure that Canadians are not subjected to undue vulnerability from the housing sector, a vulnerability heightened by what happened in several other countries during the last recession.

This report is a further step in developing new tools to enhance our capacity to monitor and understand the Canadian housing market. Since new vulnerabilities can arise, we need to be constantly on our toes to watch out for new warning signs that may lead to housing and financial market imbalances.

Our analysis has reinforced our interest in understanding how credit growth can encourage growth in house prices. But it also highlighted to us that we need a deeper understanding of how changes in the global economy—whether they are changing demand for resources, or promoting financial services and high-technology industries—are affecting growth in our cities.

We also found that changes on the supply side of housing play a role in explaining changing price patterns. Our cities are evolving toward denser housing, increases in the price of land, concerns about the environment, and changing living patterns with households wanting to be close to leisure and entertainment amenities in city centres as well as to their workplaces. Our work highlights our need to develop a keener understanding of supply dynamics in cities. In this report, we used what metrics were available to us to understand the supply side of the market, but we understand that more could be done.

Consequently, CMHC will continue to take steps to improve the use and availability of data. This effort will not only serve to help us improve our analyses, but will hopefully also foster deeper interest by academics and researchers to understand the dynamics of the housing market and their inter-linkages with the wider economy. We have, for instance, been hampered by the absence of historical and detailed price data, and we will take steps to publish work we do to develop these time-series data. Creating historical data sets would also attract research students to work on housing-related research. In addition, CMHC has started to publish annual estimates of conversions and demolitions, but we will also estimate annual historical data on the stock of housing.

We heard during our engagement with key stakeholders of challenges in understanding many aspects of modern cities. Improved research will both need and enable more data, make the housing market more transparent, and lessen concerns regarding risks coming from this market. Our work has highlighted the importance of land prices to understanding market dynamics in large cities, but there is not a scientifically sound index of land prices available currently. Developing such indices is not just a matter of gathering data, it also requires ensuring that they are based on sound statistical principles. Several projects have been directly animated by the work done for this report. But we cannot rely on CMHC work alone.

We benefited directly from comments provided on our report by academics, but we also need to foster independent academic and external research. Data provision will help, but we will also directly encourage more research and collaboration with academics. We will establish a working paper series to publish more advanced internal research undertaken by CMHC to make it available and open to scrutiny by academics. We also need to see how we can set the groundwork with academics for the exciting technologies that could further extend our understanding of the housing market, such as the prospect of using visual data to understand how our communities work.

During this work, we have strengthened already strong partnerships at the federal level with the Bank of Canada, the Department of Finance and Statistics Canada. Since housing has attained such a prominent part of the Canadian financial system, we will build on these relationships with other levels of government.

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Alternative Text and Data for Figures

Average Seasonally Adjusted Price of a Home on Canada's Multiple Listing Service (MLS®)

A clustered bar chart compares the average seasonally adjusted MLS® price of a home for the first quarter of 2010 and the second quarter of 2016 in Vancouver, Calgary, Edmonton, Toronto, Montréal and Canada. Prices in Toronto and Vancouver increased markedly, which contributed to the increase in the global Canada's average price. The increase in prices between 2010 and 2016 is much lower in Calgary, Edmonton and Montréal.

Sources: CREA MLS®, real estate boards. All data for CMAs.

Real Average Prices From 1988 to 2016; Predicted Prices From 2010 to 2016

A line chart illustrates the evolution of real home prices in Vancouver. The chart is composed of two quarterly times series: the actual prices from 1988 to 2016 and the predicted prices from 2010 to 2016, which are obtained from the Workhorse model. The gap between actual and predicted prices between 2010 and 2016 illustrates the forecasting errors of the model. The model does a reasonable job in predicting prices in Vancouver.

A line chart illustrates the evolution of real home prices in Toronto. The chart is composed of two quarterly times series: the actual prices from 1988 to 2016 and the predicted prices from 2010 to 2016, which are obtained from the Workhorse model. The gap between actual and predicted prices between 2010 and 2016 illustrates the forecasting errors of the model. The actual prices during this period are consistently higher than the predicted prices. The part of the price growth explained by the fundamental factors included in the model is lower in Toronto than in Vancouver.

Source: Actual prices from CREA, MLS®.

Average Housing Starts in Toronto and Vancouver

	VANCOUVER		TORONTO	
	CONDOMINIUM APARTMENTS	SINGLE-DETACHED	CONDOMINIUM APARTMENTS	SINGLE-DETACHED
2004-2006	8,893	5,388	13,388	16,331
2014-2016	10,396	4,722	18,014	10,312

Source: CMHC

Estimated Long-Run Supply Elasticity of Housing Starts from Different Models

	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER	GROUP MEAN
OLS Panel	0.88	1.97	1.37	0.44	0.31	1.06
SUR Panel	0.82	1.95	1.46	0.53	0.35	1.09
SUR Time Series	0.94	2.15	2.10	0.35	0.22	1.15
2SLS Time Series	0.93	2.22	2.11	0.52	0.28	1.21
Model Average	0.89	2.07	1.76	0.46	0.29	1.13

Source: CMHC based on data from Statistics Canada, Conference Board of Canada, Canadian Real Estate Association, and CMHC. OLS panel refers to separately estimating a stock-flow model with a demand equation and a supply equation in a panel; SUR panel simultaneously estimating the model in a panel; SUR time series simultaneously estimating the model by CMA; and 2SLS time series simultaneously estimating the model using instrument variables by CMA.

Figure 1: Average Price of a Home

A clustered bar chart compares the average seasonally adjusted MLS® price of a home for the first quarter of 2010 and the second quarter of 2016 in Vancouver, Calgary, Edmonton, Toronto, Montréal and Canada. Prices in Toronto and Vancouver increased markedly, which contributed to the increase in the global Canada's average price. The increase in prices between 2010 and 2016 is much lower in Calgary, Edmonton and Montréal.

Sources: CREA MLS®, real estate boards. All data for CMAs.

Figure 2: The Stock of Housing in Large Canadian Cities, 2016

	EDMONTON	CALGARY	TORONTO	MONTRÉAL	VANCOUVER
Single-detached house	57%	58%	40%	33%	29%
Semi-detached house	6%	6%	8%	5%	2%
Row house	9%	9%	9%	3%	10%
Apartment detached duplex	2%	4%	4%	8%	16%
Five or more stories	5%	6%	29%	9%	17%
Less than five stories	19%	15%	10%	41%	25%
Other single-attached house	0%	0%	0%	0%	0%
Movable dwelling	1%	1%	0%	0%	0%
	100%	100%	100%	100%	100%

Source: Statistics Canada, CMHC calculations. Occupied Housing Stock by Structure Type, 2016.

Figure 3: Median price Growth by Dwelling Type (2010-2016)*

	CONDOMINIUM APARTMENTS	SINGLE-DETACHED
Vancouver	23%	86%
Calgary	6%	14%
Edmonton	-2%	11%
Toronto	26%	69%
Montréal	15%	17%

Sources: CREA MLS®, real estate boards

* Average of price growth for each month from, 2016 over 2010. Data for Montréal include all condominium apartments and single-family homes.

Figure 4: Market Share for Homes Worth $1 Million or more

	TORONTO	VANCOUVER	MONTRÉAL	CALGARY
2 first quarters of 2010	3%	14%	1%	2%
2 first quarters of 2016	17%	35%	2%	3%

Sources: CREA MLS®, real estate boards. Data for the first two quarters of 2010 and 2016.

Figure 5: Average Annualized Price Changes, by housing type, by price range

	PRICE RANGES	SINGLE-DETACHED	ALL OTHER TYPES
Vancouver	<$1M	7.0%	4.3%
	=>$1M	11.0%	12.6%
	Total	8.4%	6.1%
Toronto	<$1M	8.1%	6.4%
	=>$1M	12.0%	11.7%
	Total	8.8%	7.0%
Montreal	<$1M	2.4%	2.3%
	=>$1M	8.7%	9.1%
	Total	2.4%	2.4%

Source: CMHC calculations using the PSAD database.

Note: Price ranges based on property sold between March 2016 and February 2017.

Figure 6: Total Annual Housing Starts

YEAR	VANCOUVER	CALGARY	EDMONTON	TORONTO	MONTRÉAL
1990	17,970	7,004	5,921	18,723	21,101
1991	14,769	4,750	4,285	18,814	17,882
1992	18,684	7,034	6,764	20,770	14,520
1993	21,307	6,629	6,720	15,637	13,729
1994	20,473	6,877	5,006	18,443	13,157
1995	14,992	5,685	3,082	16,325	7,468
1996	15,453	7,111	3,634	18,998	7,556
1997	15,950	11,215	4,962	25,574	10,508
1998	11,878	12,495	5,947	25,910	10,293
1999	8,677	10,600	6,655	34,904	12,366
2000	8,203	11,093	6,228	38,982	12,766
2001	10,862	11,349	7,855	41,017	13,300
2002	13,197	14,339	12,581	43,805	20,554
2003	15,626	13,642	12,380	45,475	24,321
2004	19,430	14,008	11,488	42,115	28,673
2005	18,914	13,667	13,294	41,596	25,317
2006	18,705	17,046	14,970	37,080	22,813
2007	20,736	13,505	14,888	33,293	23,233
2008	19,591	11,438	6,615	42,212	21,927
2009	8,339	6,318	6,317	25,949	19,251
2010	15,217	9,262	9,959	29,195	22,001
2011	17,867	9,292	9,332	39,745	22,719
2012	19,027	12,841	12,837	48,105	20,591
2013	18,696	12,584	14,689	33,547	15,632
2014	19,212	17,131	13,872	28,929	18,672
2015	20,863	13,033	17,050	42,287	18,744
2016	27,914	9,245	10,036	39,027	17,834

Source: CMHC

Figure 7: Toronto housing starts (units)

YEAR	CONDOMINIUM APARTMENTS	SINGLE-DETACHED
1990	5,901	7,067
1991	1,574	9,459
1992	608	9,027
1993	798	8,037
1994	1,332	10,811
1995	3,406	6,879
1996	2,302	10,152
1997	2,940	14,203
1998	4,463	12,696
1999	8,270	15,535
2000	9,981	17,119
2001	12,738	16,844
2002	9,081	22,115
2003	13,291	19,626
2004	12,450	19,076
2005	14,376	15,797
2006	13,338	14,120
2007	9,396	14,769
2008	22,244	11,308
2009	10,954	8,130
2010	11,586	9,936
2011	19,195	11,247
2012	27,413	10,699
2013	17,450	9,421
2014	12,862	8,830
2015	22,695	10,223
2016	18,486	11,884

Source: CMHC

Figure 8: Vancouver Housing Starts (units)

YEAR	CONDOMINIUM APARTMENTS	SINGLE-DETACHED
1990	6,694	6,316
1991	4,277	6,991
1992	6,178	7,603
1993	10,045	6,593
1994	9,586	6,345
1995	7,630	4,526
1996	7,183	5,072
1997	7,547	4,685
1998	6,146	3,373
1999	2,700	3,568
2000	2,152	3,132
2001	2,754	3,512
2002	4,182	4,980
2003	6,044	5,382
2004	8,542	5,614
2005	9,291	4,935
2006	8,845	5,614
2007	12,376	4,211
2008	11,496	3,634
2009	2,355	2,929
2010	5,793	4,533
2011	7,177	3,686
2012	9,616	3,381
2013	9,185	4,004
2014	8,666	4,374
2015	9,901	4,622
2016	12,620	5,169

Source: CMHC

Figure 9: Ratio of Multiple Starts to Single Starts

YEAR	CALGARY	EDMONTON	VANCOUVER	TORONTO	MONTRÉAL
1988	0.1	0.2	0.9	1.0	n.a.
1989	0.2	0.2	1.1	1.1	n.a.
1990	0.3	0.2	1.8	1.6	1.0
1991	0.1	0.4	1.1	1.0	1.1
1992	0.2	0.4	1.5	1.3	1.2
1993	0.3	0.6	2.2	0.9	1.3
1994	0.3	0.6	2.2	0.7	1.1
1995	0.3	0.4	2.3	1.4	1.0
1996	0.2	0.2	2.0	0.9	1.0
1997	0.3	0.3	2.4	0.8	1.0
1998	0.4	0.5	2.5	1.0	0.8
1999	0.6	0.6	1.4	1.2	0.9
2000	0.6	0.5	1.6	1.3	0.9
2001	0.5	0.6	2.1	1.4	0.9
2002	0.5	0.8	1.7	1.0	1.0
2003	0.6	0.9	1.9	1.3	1.3
2004	0.7	0.7	2.5	1.2	1.7
2005	0.6	0.7	2.8	1.6	2.0
2006	0.6	0.7	2.3	1.6	1.9
2007	0.7	0.9	3.9	1.3	1.9
2008	1.6	1.5	4.4	2.7	2.3
2009	0.3	0.6	1.8	2.2	2.5
2010	0.6	0.6	2.4	1.9	2.8
2011	0.8	0.9	3.8	2.5	3.9
2012	1.2	1.3	4.6	3.5	4.2
2013	1.0	1.5	3.7	2.6	4.1
2014	1.6	1.0	3.4	2.3	6.0
2015	2.1	2.0	3.5	3.1	6.8
2016	1.6	1.3	4.4	2.3	6.1

Source: CMHC. Calculations based on CMHC's Survey of Starts and Completions.

Figure 10: House price, population, income and mortgage rate, Canada, 1921-2016

The figure is a line chart with four yearly times series for Canada from 1921 to 2016: the Real Housing Price Index (1957=100), the Real mortgage rate (*1,000), a population index (1957=100) and a Real disposable income per capital index (1957=100). From 1957 to 2016, the Population index increased at a steady pace, reaching nearly 220 in 2016. In the early 1970s, the Real disposable income per capita index increased at a higher rate than the Population index and since this index remained at a higher level, reaching approximately 320 in 2016. From the 1970s to the early 2000s, the Real Housing Price index generally fluctuated within the bands of disposable income and population. The Real Housing Price Index has then increased markedly from the early 2000s to 2016, departing from the higher band of disposable income in 2005 and reaching approximately 442 in 2016. Prior to the early 1970s, the Real Housing Price Index, the Population index and the Real disposable income per capita index were generally evolving at similar rates. The Real mortage rate (*1,000) fluctuated approximately between 0 and 60 from the mid 1930s to the mid 1940s, between -90 and 30 from the mid 1940s to the early 1950s, between 0 and 90 from the early 1950s to the mid 1980s, remained relatively flat with a minimum of 55 between the mid 1980s and the mid 1990s and followed a downward trend since, reaching 23 in 2016.

Data sources: Statistics Canada, CMHC, and CREA. For illustrative purposes, real housing price, population, and real disposable income are rebased so that the value in 1957 is 100, and real mortgage rate is augmented a thousand fold.

Figure 11: Employment shock, values in thousands ('000s)

	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER
1992Q2	434.4	465.5	1,616.7	2,182.6	878.9
1993Q2	431.6	463.6	1,608.9	2,172.6	875.7
1994Q2	435.4	467.5	1,620.4	2,190.5	882.5
1995Q2	443.2	474.7	1,649.2	2,231.3	896.4
1996Q2	447.8	479.6	1,670.2	2,258.9	906.2
1997Q2	452.0	484.1	1,690.1	2,286.4	915.4
1998Q2	459.8	492.4	1,724.7	2,334.3	931.7
1999Q2	467.5	503.2	1,769.5	2,394.9	953.8
2000Q2	477.8	515.7	1,819.9	2,463.7	979.3
2001Q2	488.8	526.2	1,855.3	2,511.9	999.4
2002Q2	498.6	537.6	1,897.7	2,567.8	1,022.1
2003Q2	511.8	552.5	1,947.2	2,635.8	1,050.2
2004Q2	522.6	563.8	1,983.0	2,685.9	1,071.3
2005Q2	530.4	571.2	2,000.1	2,712.2	1,083.8
2006Q2	538.7	578.0	2,004.2	2,723.8	1,093.0
2007Q2	553.8	593.3	2,043.1	2,777.7	1,120.3
2008Q2	571.6	612.8	2,095.8	2,850.0	1,155.8
2009Q2	568.8	611.4	2,075.6	2,825.1	1,151.8
2010Q2	565.0	608.0	2,053.2	2,797.1	1,144.2
2011Q2	575.2	617.7	2,081.3	2,838.1	1,161.8
2012Q2	582.2	623.4	2,098.1	2,862.9	1,171.5
2013Q2	590.5	631.5	2,120.7	2,895.3	1,185.8
2014Q2	597.0	638.5	2,138.5	2,920.6	1,198.3
2015Q2	600.2	642.3	2,152.4	2,939.5	1,206.0
2016Q2	602.1	646.7	2,169.2	2,962.8	1,215.4

Source: Statistics Canada

Figure 12: Population shock, values in thousands ('000s)

	MONTREAL	TORONTO	VANCOUVER	EDMONTON	CALGARY
1992Q2	11.25	84.66	33.71	8.32	9.41
1993Q2	12.95	97.49	38.82	9.58	10.83
1994Q2	15.02	113.07	45.02	11.11	12.56
1995Q2	16.76	126.16	50.23	12.40	14.02
1996Q2	18.20	137.02	54.56	13.46	15.23
1997Q2	19.47	146.53	58.34	14.40	16.28
1998Q2	20.44	153.86	61.26	15.12	17.10
1999Q2	21.33	160.55	63.93	15.78	17.84
2000Q2	22.32	167.99	66.89	16.51	18.67
2001Q2	23.56	177.34	70.61	17.43	19.71
2002Q2	24.84	186.98	74.45	18.37	20.78
2003Q2	26.02	195.84	77.98	19.24	21.76
2004Q2	27.32	205.61	81.87	20.20	22.85
2005Q2	28.91	217.60	86.64	21.38	24.18
2006Q2	30.75	231.46	92.16	22.74	25.72
2007Q2	32.58	245.24	97.65	24.10	27.25
2008Q2	34.80	261.92	104.29	25.74	29.11
2009Q2	37.38	281.34	112.03	27.65	31.26
2010Q2	40.73	306.62	122.09	30.13	34.07
2011Q2	44.56	335.38	133.54	32.96	37.27
2012Q2	48.08	361.93	144.12	35.57	40.22
2013Q2	51.16	385.12	153.35	37.84	42.80
2014Q2	54.38	409.35	163.00	40.23	45.49
2015Q2	59.22	445.77	177.50	43.80	49.54
2016Q2	64.08	482.34	192.06	47.40	53.60

Source: Statistics Canada

Figure 13: Thresholds of top 1 per cent total incomes by geography (2014)

	$
Trois-Rivières, QC	169,100
Ottawa-Gatineau, QC	169,300
Sherbrooke, QC	169,700
Saguenay, QC	171,500
Non-CMA and non-CA	177,800
St. Catharines-Niagara, ON	182,400
Thunder Bay, ON	186,200
Saint John, NB	186,500
Québec, QC	190,900
Greater Sudbury, ON	191,900
Windsor, ON	199,200
All CA	203,300
Winnipeg, MB	207,300
Oshawa, ON	209,100
Halifax, NS	210,600
London, ON	211,100
Victoria, BC	219,100
Montréal, QC	223,400
Kitchener-Cambridge-Waterloo, ON	227,500
Canada	234,700
Saskatoon, SK	237,200
Regina, SK	243,000
Hamilton, ON	246,900
Ottawa-Gatineau, ON	248,100
Vancouver, BC	249,600
All CMAs	257,700
St. John's, NL	271,500
Edmonton, AB	295,900
Toronto, ON	299,600
Calgary, AB	467,800

Source: Statistics Canada (CANSIM Table 204-0002)

Figure 14: Number of patents per census division, 2013

Toronto: 688.4; Montréal: 376.8; Vancouver: 374.1; CA3506: Ottawa-Carleton - ON: 322.1; CA4806: Division 6 - AB: 255.4; CA3530: Waterloo - ON: 126.5; CA4811: Division 11 - AB: 96.8; CA2423: Communauté-Urbaine-de-Québec - QC: 78.1; CAZZZ: Not classified: 74.2; CA3539: Middlesex - ON: 67.6; CA4611: Division 11 - MB: 50.0; CA3525: Hamilton-Wentworth - ON: 43.1; CA2458: Champlain - QC: 39.0; CA4711: Division 11 - SK: 37.2; CA1209: Halifax - NS: 31.6; CA5917: Capital - BC: 31.6; CA3523: Wellington - ON: 25.5; CA3543: Simcoe - ON: 20.6; CA3510: Frontenac - ON: 19.4; CA3537: Essex - ON: 17.8; CA2443: Sherbrooke - QC: 17.5; CA2459: Lajemmerais - QC: 14.9; CA5935: Central Okanagan - BC: 14.5; CA3526: Niagara - ON: 13.4; CA2494: Le Fjord-du-Saguenay - QC: 12.3; CA2473: Thérèse-De Blainville - QC: 10.6; CA1307: Westmorland - NB: 9.9; CA1102: Queens - PE: 9.7; CA3547: Renfrew - ON: 9.5; CA3536: Kent - ON: 8.7; CA2481: Communauté-Urbaine-de-l'Outaouais - QC: 8.5; CA3529: Brant - ON: 8.1; CA3538: Lambton - ON: 7.9; CA3507: Leeds and Grenville - ON: 7.6; CA4808: Division 8 - AB: 7.2; CA4706: Division 6 - SK: 7.2; CA2447: La Haute-Yamaska - QC: 6.8; CA1001: Division 1 - NL: 6.5; CA5921: Nanaimo - BC: 6.3; CA1310: York - NB: 5.8; CA2431: L'Amiante - QC: 5.7; CA3553: Sudbury (Regional Municipality) - ON: 5.7; CA2445: Memphrémagog - QC: 5.4; CA4810: Division 10 - AB: 5.0; CA4815: Division 15 - AB: 4.7; CA2449: Drummond - QC: 4.6; CA3558: Thunder Bay - ON: 4.5; CA3515: Peterborough - ON: 4.5; CA3534: Elgin - ON: 4.0; CA2460: L'Assomption - QC: 3.9; CA2425: Les Chutes-de-la-Chaudière - QC: 3.8; CA2472: Deux-Montagnes - QC: 3.7; CA1304: Queens - NB: 3.6; CA4802: Division 2 - AB: 3.5; CA2442: Le Val-Saint-François - QC: 3.5; CA2467: Roussillon - QC: 3.4; CA3522: Dufferin - ON: 3.2; CA2437: Francheville - QC: 3.2; CA3509: Lanark - ON: 3.2; CA4819: Division 19 - AB: 3.0; CA2439: Arthabaska - QC: 2.7; CA3528: Haldimand-Norfolk - ON: 2.7; CA5907: Okanagan-Similkameen - BC: 2.6; CA5937: North Okanagan - BC: 2.6; CA3548: Nipissing - ON: 2.6; CA5933: Thompson-Nicola - BC: 2.5; CA3502: Prescott and Russell - ON: 2.4; CA5903: Central Kootenay - BC: 2.3; CA3531: Perth - ON: 2.2; CA3516: Victoria - ON: 2.2; CA3512: Hastings - ON: 2.1; CA3532: Oxford - ON: 2.1; CA3501: Stormont - Dundas and Glengarry - ON: 2.1; CA4615: Division 15 - MB: 2.1; CA5925: Comox-Strathcona - BC: 2.0; CA5923: Alberni-Clayoquot - BC: 2.0; CA1007: Division 7 - NL: 2.0; CA2429: Beauce-Sartigan - QC: 2.0; CA2489: Vallée-de-l'Or - QC: 2.0; CA3554: Timiskaming - ON: 2.0; CA5919: Cowichan Valley - BC: 2.0; CA2419: Bellechasse - QC: 1.9; CA3544: Muskoka - ON: 1.9; CA2454: Les Maskoutains - QC: 1.9; CA1315: Gloucester County - NB: 1.8; CA4603: Division 3 - MB: 1.7; CA2446: Brome-Missisquoi - QC: 1.6; CA2456: Le Haut-Richelieu - QC: 1.6; CA3541: Bruce - ON: 1.5; CA2468: Les Jardins-de-Napierville - QC: 1.5; CA4715: Division 15 - SK: 1.5; CA4812: Division 12 - AB: 1.5; CA1101: Kings - PE: 1.5; CA4613: Division 13 - MB: 1.4; CA4813: Division 13 - AB: 1.4; CA1006: Division 6 - NL: 1.3; CA4708: Division 8 - SK: 1.3; CA2424: Desjardins - QC: 1.3; CA2434: Portneuf - QC: 1.2; CA3557: Algoma - ON: 1.1; CA5905: Kootenay Boundary - BC: 1.0; CA2418: Montmagny - QC: 1.0; CA3546: Haliburton - ON: 1.0; CA1010: Division 10 - NL: 1.0; CA1103: Prince - PE: 1.0; CA2409: La Mitis - QC: 1.0; CA2450: Nicolet-Yamaska - QC: 1.0; CA2487: Abitibi-Ouest - QC: 1.0; CA2493: Lac-Saint-Jean-Est - QC: 1.0; CA4607: Division 7 - MB: 1.0; CA4701: Division 1 - SK: 1.0; CA4703: Division 3 - SK: 1.0; CA4807: Division 7 - AB: 1.0; CA4818: Division 18 - AB: 1.0; CA5955: Peace River - BC: 1.0; CA4805: Division 5 - AB: 1.0; CA2477: Les Pays-d'en-Haut - QC: 1.0; CA2482: Les Collines-de-l'Outaouais - QC: 1.0; CA2438: Bécancour - QC: 0.9; CA1208: Hants - NS: 0.9; CA2461: Joliette - QC: 0.9; CA3513: Prince Edward - ON: 0.9; CA5929: Sunshine Coast - BC: 0.8; CA1212: Pictou - NS: 0.8; CA5931: Squamish-Lillooet - BC: 0.8; CA3514: Northumberland - ON: 0.8; CA4614: Division 14 - MB: 0.7; CA2436: Le Centre-de-la-Mauricie - QC: 0.7; CA1217: Cape Breton - NS: 0.7; CA2470: Beauharnois-Salaberry - QC: 0.7; CA4803: Division 3 - AB: 0.6; CA3549: Parry Sound - ON: 0.6; CA2463: Montcalm - QC: 0.5; CA3540: Huron - ON: 0.5; CA1206: Lunenburg - NS: 0.5; CA1207: Kings - NS: 0.5; CA2415: Charlevoix-Est - QC: 0.5; CA2422: La Jacques-Cartier - QC: 0.5; CA4601: Division 1 - MB: 0.5; CA4712: Division 12 - SK: 0.5; CA5953: Fraser-Fort George - BC: 0.5; CA4602: Division 2 - MB: 0.4; CA4618: Division 18 - MB: 0.3; CA1005: Division 5 - NL: 0.3; CA2441: Le Haut-Saint-François - QC: 0.3; CA2448: Acton - QC: 0.3; CA2455: Rouville - QC: 0.3; CA2469: Le Haut-Saint-Laurent - QC: 0.3; CA3556: Cochrane - ON: 0.3; CA2435: Mékinac - QC: 0.3; CA4610: Division 10 - MB: 0.3; CA4702: Division 2 - SK: 0.3; CA2401: Les Îles-de-la-Madeleine - QC: 0.3; CA2403: La Côte-de-Gaspé - QC: 0.3; CA2440: Asbestos - QC: 0.3; CA4714: Division 14 - SK: 0.3; CA4717: Division 17 - SK: 0.3; CA4801: Division 1 - AB: 0.3; CA3542: Grey - ON: 0.2; CA1203: Digby - NS: 0.2; CA1213: Guysborough - NS: 0.2; CA2491: Le Domaine-du-Roi - QC: 0.2; CA3559: Rainy River - ON: 0.2; CA5947: Skeena-Queen Charlotte - BC: 0.2; CA2430: Le Granit - QC: 0.2; CA2444: Coaticook - QC: 0.2; CA3511: Lennox and Addington - ON: 0.2; CA2427: Robert-Cliche - QC: 0.1; CA1214: Antigonish - NS: 0.1; CA2414: Kamouraska - QC: 0.1; CA5943: Mount Waddington - BC: 0.1; CA5939: Columbia-Shuswap - BC: 0.0; CA2421: La Côte-de-Beaupré - QC: 0.0; CA2480: Papineau - QC: 0.0; CA2479: Antoine-Labelle - QC: 0.0; CA4809: Division 9 - AB: 0.0; CA4604: Division 4 - MB: 0.0; CA4705: Division 5 - SK: 0.0; CA2417: L'Islet - QC: 0.0; CA3552: Sudbury (District) - ON: 0.0; CA2483: La Vallée-de-la-Gatineau - QC: 0.0; CA2428: Les Etchemins - QC: 0.0; CA4710: Division 10 - SK: 0.0; CA1002: Division 2 - NL: 0.0; CA1003: Division 3 - NL: 0.0; CA1004: Division 4 - NL: 0.0; CA1008: Division 8 - NL: 0.0; CA1009: Division 9 - NL: 0.0; CA1201: Shelburne - NS: 0.0; CA1202: Yarmouth - NS: 0.0; CA1204: Queens - NS: 0.0; CA1205: Annapolis - NS: 0.0; CA1210: Colchester - NS: 0.0; CA1211: Cumberland - NS: 0.0; CA1215: Inverness - NS: 0.0; CA1216: Richmond - NS: 0.0; CA1218: Victoria - NS: 0.0; CA1301: Saint John - NB: 0.0; CA1302: Charlotte - NB: 0.0; CA1303: Sunbury - NB: 0.0; CA1305: Kings - NB: 0.0; CA1306: Albert - NB: 0.0; CA1308: Kent - NB: 0.0; CA1309: Northumberland - NB: 0.0; CA1311: Carleton - NB: 0.0; CA1312: Victoria - NB: 0.0; CA1313: Madawaska County - NB: 0.0; CA1314: Restigouche County - NB: 0.0; CA2402: Pabok - QC: 0.0; CA2404: Denis-Riverin - QC: 0.0; CA2405: Bonaventure - QC: 0.0; CA2406: Avignon - QC: 0.0; CA2407: La Matapédia - QC: 0.0; CA2408: Matane - QC: 0.0; CA2410: Rimouski-Neigette - QC: 0.0; CA2411: Les Basques - QC: 0.0; CA2412: Rivière-du-Loup - QC: 0.0; CA2413: Témiscouata - QC: 0.0; CA2416: Charlevoix - QC: 0.0; CA2420: L'Île-d'Orléans - QC: 0.0; CA2426: La Nouvelle-Beauce - QC: 0.0; CA2432: L'Érable - QC: 0.0; CA2433: Lotbinière - QC: 0.0; CA2451: Maskinongé - QC: 0.0; CA2462: Matawinie - QC: 0.0; CA2478: Les Laurentides - QC: 0.0; CA2484: Pontiac - QC: 0.0; CA2485: Témiscamingue - QC: 0.0; CA2486: Rouyn-Noranda - QC: 0.0; CA2488: Abitibi - QC: 0.0; CA2490: Le Haut-Saint-Maurice - QC: 0.0; CA2492: Maria-Chapdelaine - QC: 0.0; CA2495: La Haute-Côte-Nord - QC: 0.0; CA2496: Manicouagan - QC: 0.0; CA2497: Sept-Rivières-Caniapiscau - QC: 0.0; CA2498: Minganie-Basse-Côte-Nord - QC: 0.0; CA2499: Nord-du-Québec - QC: 0.0; CA3551: Manitoulin - ON: 0.0; CA3560: Kenora - ON: 0.0; CA4605: Division 5 - MB: 0.0; CA4606: Division 6 - MB: 0.0; CA4608: Division 8 - MB: 0.0; CA4609: Division 9 - MB: 0.0; CA4612: Division 12 - MB: 0.0; CA4616: Division 16 - MB: 0.0; CA4617: Division 17 - MB: 0.0; CA4619: Division 19 - MB: 0.0; CA4620: Division 20 - MB: 0.0; CA4621: Division 21 - MB: 0.0; CA4622: Division 22 - MB: 0.0; CA4623: Division 23 - MB: 0.0; CA4704: Division 4 - SK: 0.0; CA4707: Division 7 - SK: 0.0; CA4709: Division 9 - SK: 0.0; CA4713: Division 13 - SK: 0.0; CA4716: Division 16 - SK: 0.0; CA4718: Division 18 - SK: 0.0; CA4804: Division 4 - AB: 0.0; CA4814: Division 14 - AB: 0.0; CA4816: Division 16 - AB: 0.0; CA4817: Division 17 - AB: 0.0; CA5901: East Kootenay - BC: 0.0; CA5927: Powell River - BC: 0.0; CA5941: Cariboo - BC: 0.0; CA5945: Central Coast - BC: 0.0; CA5949: Kitimat-Stikine - BC: 0.0; CA5951: Bulkley-Nechako - BC: 0.0; CA5957: Stikine - BC: 0.0; CA5959: Fort Nelson-Liard - BC: 0.0; CA6001: Yukon - YT: 0.0; CA6106: Fort Smith - NT: 0.0; CA6107: Inuvik - NT: 0.0

Source: OECD

Figure 15: Average annual growth in populations, CMAs and Canada

	2010-16	2001-16
Calgary, AB	2.87%	2.75%
Edmonton, AB	2.76%	2.49%
Saskatoon, SK	3.07%	2.09%
Barrie, ON	1.20%	1.87%
Kelowna, BC	1.50%	1.69%
Toronto, ON	1.58%	1.65%
Oshawa, ON	1.41%	1.64%
Regina, SK	2.48%	1.52%
St. John's, NL	1.54%	1.40%
Vancouver, BC	1.40%	1.38%
Moncton, NB	1.41%	1.36%
Ottawa-Gatineau, ON/QC	1.30%	1.32%
Abbotsford-Mission, BC	1.31%	1.30%
Guelph, ON	1.32%	1.27%
Kitchener-Cambridge-Waterloo, ON	1.01%	1.22%
Sherbrooke, QC	1.12%	1.06%
Canada	1.08%	1.05%

	2010-16	2001-16
Winnipeg, Manitoba	1.64%	1.03%
Montréal, QC	1.06%	0.99%
Halifax, Nova Scotia	1.12%	0.96%
Québec, QC	0.86%	0.92%
Victoria, BC	0.91%	0.87%
Brantford, ON	0.82%	0.83%
London, ON	0.88%	0.82%
Hamilton, ON	0.94%	0.82%
Kingston, ON	0.85%	0.77%
Trois-Rivières, QC	0.63%	0.64%
Peterborough, ON	0.30%	0.49%
Windsor, ON	0.61%	0.39%
St. Catharines-Niagara, ON	0.40%	0.33%
Greater Sudbury, ON	0.03%	0.16%
Saint John, NB	-0.06%	0.08%
Saguenay, QC	0.11%	-0.11%
Thunder Bay, ON	-0.12%	-0.13%

Source: Statistics Canada (CANSIM Tables 051-0056 and 051-0001)

Figure 16: Interest rates and mortgage rates in Canada, 1990-2016

YEAR	BANK RATE	CHARTERED BANK - CONVENTIONAL MORTGAGE: 5 YEAR
1990	11.8	12.5
1991	7.7	9.9
1992	7.4	9.5
1993	4.1	7.8
1994	7.4	10.5
1995	5.8	8.4
1996	3.3	7.0
1997	4.5	7.1
1998	5.3	6.6
1999	5.0	8.3
2000	6.0	8.0
2001	2.5	6.9
2002	3.0	6.7
2003	3.0	6.5

YEAR	BANK RATE	CHARTERED BANK - CONVENTIONAL MORTGAGE: 5 YEAR
2004	2.8	6.1
2005	3.5	6.3
2006	4.5	6.5
2007	4.5	7.5
2008	1.8	6.8
2009	0.5	5.5
2010	1.3	5.2
2011	1.3	5.3
2012	1.3	5.2
2013	1.3	5.3
2014	1.3	4.8
2015	0.8	4.6
2016	0.8	4.6

Source: Statistics Canada (CANSIM Table 176-0043)

Figure 17: Share of total credit, by type of credit

YEAR	RESIDENTIAL MORTGAGE CREDIT	CONSUMER CREDIT	BUSINESS CREDIT
1969	20%	13%	67%
1970	21%	13%	66%
1971	22%	13%	65%
1972	23%	14%	63%
1973	25%	14%	61%
1974	26%	15%	59%
1975	27%	15%	58%
1976	28%	15%	57%
1977	30%	15%	55%
1978	31%	15%	54%
1979	31%	15%	55%
1980	30%	14%	56%
1981	27%	13%	59%
1982	25%	12%	63%
1983	25%	12%	63%
1984	26%	12%	63%
1985	25%	12%	63%
1986	26%	12%	62%
1987	27%	12%	60%
1988	29%	13%	59%
1989	29%	12%	58%
1990	30%	12%	58%
1991	31%	12%	57%
1992	33%	12%	56%
1993	34%	12%	54%
1994	34%	12%	54%
1995	34%	12%	54%
1996	34%	12%	54%
1997	33%	13%	55%
1998	32%	13%	56%
1999	31%	13%	56%
2000	30%	14%	56%
2001	30%	14%	56%
2002	31%	14%	55%
2003	32%	15%	54%
2004	32%	15%	52%
2005	33%	16%	51%
2006	33%	16%	50%
2007	34%	16%	50%
2008	35%	17%	48%
2009	36%	17%	47%
2010	37%	18%	45%
2011	37%	17%	45%
2012	38%	17%	46%
2013	37%	16%	46%
2014	37%	16%	47%
2015	37%	15%	48%
2016	37%	15%	48%

Source: Statistics Canada (CANSIM Table 176-0032)

Figure 18: House Prices and Long-Term Trends

Six line charts present the evolution of the real MLS® average price from 1980 to 2016 in Canada, Vancouver, Toronto, Montréal, Calgary and Edmonton. Each graph is composed of two lines: the real MLS® average price and the trend, obtained by applying the Hodrick-Prescott Filter to the real average price times series. Focusing on the 2010-16 period, the charts illustrate that real average prices increased markedly in Vancouver and Toronto. The upward trend is much lower in Montréal and relatively flat in Calgary and Edmonton.

Sources: CMHC calculations based on Canadian Real Estate Association, Québec Federation of Real Estate Boards.
Notes: Hodrick-Prescott Filter applied to obtain trends.

Figure 19: Accounting for price changes by CMA, 2010-2016

	VANCOUVER	TORONTO	MONTRÉAL	CALGARY	EDMONTON
Real personal disposable income	16.36%	5.04%	12.63%	3.13%	11.96%
Young adult population	10.85%	8.09%	1.13%	2.01%	4.77%
Real mortgage rate	8.52%	3.22%	4.97%	1.83%	5.45%
Unexplained price change	12.15%	23.84%	-7.80%	-6.61%	-22.08%
Actual price change	48%	40%	11%	0.4%	0.1%

Source: CMHC calculations

Figure 20: Actual average price for Vancouver, 1988 to 2016; predicted price from 2010 to 2016

A line chart illustrates the evolution of real home prices in Vancouver. The chart is composed of two quarterly times series: the actual prices from 1988 to 2016 and the predicted prices from 2010 to 2016, which are obtained from the Workhorse model. The gap between actual and predicted prices between 2010 and 2016 illustrates the forecasting errors of the model. The model does a reasonable job in predicting prices in Vancouver.

Source: Actual prices from CREA, MLS®

Figure 21: Actual average price for Toronto, 1988 to 2016; predicted price from 2010 to 2016

A line chart illustrates the evolution of real home prices in Toronto. The chart is composed of two quarterly times series: the actual prices from 1988 to 2016 and the predicted prices from 2010 to 2016, which are obtained from the Workhorse model. The gap between actual and predicted prices between 2010 and 2016 illustrates the forecasting errors of the model. The actual prices during this period are consistently higher than the predicted prices. The part of the price growth explained by the fundamental factors included in the model is lower in Toronto than in Vancouver.

Source: Actual prices from CREA, MLS®

Figure 22: Gini coefficient, income including capital gains

YEAR	CANADA	TORONTO	VANCOUVER	MONTRÉAL	CALGARY	EDMONTON
1995	0.578	0.596	0.575	0.586	0.572	0.557
1996	0.582	0.604	0.580	0.586	0.587	0.564
1997	0.587	0.612	0.585	0.591	0.593	0.570
1998	0.588	0.614	0.585	0.589	0.591	0.576
1999	0.584	0.611	0.586	0.585	0.589	0.572
2000	0.592	0.627	0.601	0.590	0.610	0.567
2001	0.585	0.620	0.588	0.583	0.617	0.566
2002	0.587	0.624	0.599	0.582	0.608	0.570
2003	0.587	0.626	0.605	0.585	0.608	0.562
2004	0.590	0.630	0.613	0.592	0.620	0.573
2005	0.593	0.634	0.615	0.590	0.643	0.574
2006	0.597	0.641	0.617	0.594	0.648	0.576
2007	0.596	0.641	0.615	0.593	0.637	0.578
2008	0.590	0.633	0.600	0.588	0.625	0.570
2009	0.591	0.636	0.604	0.589	0.611	0.564
2010	0.595	0.642	0.620	0.594	0.622	0.560
2011	0.593	0.641	0.618	0.593	0.619	0.556
2012	0.590	0.636	0.608	0.593	0.612	0.553
2013	0.591	0.637	0.611	0.590	0.612	0.555

Source: Statistics Canada

Figure 23: Shapley value decomposition for demand model with income inequality

	VANCOUVER	TORONTO
Real personal disposable income	36.42%	19.22%
Young adult population	27.03%	33.63%
Real Mortgage rate	17.32%	13.26%
Gini coefficient	19.24%	33.89%

Source: CMHC calculations

Figure 24: Total new households and new housing starts, 1987 to 2020, Vancouver, values in thousands ('000s)

YEAR	NEW HOUSING STARTS	TOTAL NEW HOUSEHOLDS
1987	17.9	8.3
1988	17.9	13.0
1989	21.8	13.9
1990	18.0	12.1
1991	14.8	10.8
1992	18.7	19.5
1993	21.3	16.3
1994	20.5	20.2
1995	15.0	19.8
1996	15.5	20.5
1997	16.0	18.6
1998	11.9	16.0
1999	8.7	15.9
2000	8.2	13.4
2001	10.9	11.0
2002	13.2	8.1
2003	15.6	7.7
2004	19.4	7.2
2005	18.9	9.3
2006	18.7	13.1
2007	20.7	14.6
2008	19.6	12.0
2009	8.3	17.0
2010	15.2	18.9
2011	17.9	9.4
2012	19.0	19.2
2013	18.7	17.7
2014	19.2	18.7
2015	20.9	18.2
2016	27.9	20.5
2017F	23.8	15.4
2018F	21.1	15.4
2019F	19.2	15.2

Source: CMHC

Notes: Data for 2016-forward reflect high scenario forecasts of new households. New households include migrant flows. This data does not reflect demolitions and conversions.

Figure 25: Employment patterns in construction, by province

	EMPLOYMENT IN CONSTRUCTION AS A SHARE OF TOTAL EMPLOYMENT		WAGE DIFFERENTIAL OF CONSTRUCTION RELATIVE TO INDUSTRIAL AGGREGATE	
	2016	2010	2016	2010
British Columbia	6.9%	6.2%	$208	$176
Alberta	9.6%	9.0%	$329	$299
Ontario	5.4%	4.9%	$216	$161
Quebec	5.3%	5.1%	$263	$229

Sources: CMHC calculations based on Statistics Canada data (SEPH and CANSIM 281-0063)

Figure 26: Increases in Apartment Building Construction Costs

	Q1, 2010 TO Q4, 2016	Q1, 2003 TO Q4, 2009
Vancouver	2.5%	4.0%
Edmonton	1.7%	5.2%
Calgary	1.2%	6.3%
Toronto	1.9%	4.0%
Montréal	1.5%	3.9%

Source: CMHC calculations based on Statistics Canada data (CANSIM Table 327-0044)

Figure 27: Apartment Construction Costs and Prices for Select Cities, 2005Q1=100

The figure is composed of four line charts, one for each of four cities: Calgary, Vancouver, Toronto and Montréal. Each line chart is composed of two quarterly time series from 2005 to 2016: the apartment construction building index and the MLS® Home Price Index (HPI) for apartment. The base period is the first quarter of 2005 for both indexes (2005Q1=100). The charts show that overall, apartment prices have risen relatively more rapidly than the cost of building apartments (during the 2010-16 period, the apartment MLS® HPI is consistently higher than the apartment construction building index for all four cities).

Sources: Statistics Canada (CANSIM Table 327-0044) and MLS® HPI apartment index

Notes: There is no HPI index for Edmonton. The Apartment Building Construction Price Index measures changes in contractors' selling prices of a representative apartment building. The index relates to both general and trade contractors' work and excludes the cost of land, land assembly, design, development and real estate fees.

Figure 28: Fraser Institute's Regulatory Index, select cities, 2016

	LAND-USE REGULATION INDEX	AVERAGE APPROVAL TIMELINES (MONTHS)	COSTS AND FEES, PER UNIT	PERCENTAGE OF PROJECTS REQUIRING REZONING	DEGREE OF OPPOSITION FROM COUNCIL AND COMMUNITY GROUPS	DEGREE OF UNCERTAINTY ON APPROVAL TIMELINES
Vancouver	2.25	15.08	$37,283	64.58%	3.17	3.44
Toronto	2.50	15.94	$46,957	63.39%	3.26	3.06
Calgary	1.07	13.07	$24,429	57.89%	3.54	3.56
Montréal	-3.61	12.27	$8,917	56.25%	2.75	2.73
Edmonton	-3.51	13.13	$22,813	62.50%	2.00	2.56

Source: CMHC calculations based on Green *et al.* (2016)

Figure 29: Zoning for the City of Vancouver

A zoning map of the City of Vancouver (2017) shows that the Vancouver downtown area is surrounded by land zoned for low density residential.

Source: City of Vancouver (2017)

Figure 30: Zoning rules for the City of Toronto

A zoning map of the City of Toronto (2014) shows that the Toronto downtown area is surrounded by land zoned for low density residential.

Source: Toronto City Planning (2014)

Figure 31: Land Prices per square feet, by city

YEAR	VANCOUVER	MONTRÉAL	TORONTO
2006	$141	$28	$93
2007	$162	$28	$112
2008	$162	$28	$99
2009	$161	$28	$113
2010	$187	$28	$107
2011	$229	$37	$154
2012	$227	$37	$125
2013	$228	$37	$141
2014	$256	$50	$155
2015	$318	$50	$158
2016	$434	$50	$228

Sources: JLR, Landcor, MPAC calculations by CMHC

Figure 32: Land Prices as percentage of total house prices, by city

YEAR	VANCOUVER	MONTRÉAL	TORONTO
2006	75.0%	32.9%	81.2%
2007	72.0%	29.8%	94.8%
2008	71.8%	29.8%	79.0%
2009	71.0%	29.8%	89.4%
2010	72.7%	29.8%	75.6%
2011	74.8%	29.9%	99.8%
2012	74.1%	29.9%	75.9%
2013	73.6%	29.9%	79.6%
2014	74.6%	32.3%	79.3%
2015	76.7%	32.3%	73.6%
2016	80.3%	32.3%	87.3%

Source: JLR, Landcor, MPAC calculations by CMHC. Data are for respective cities, not CMAs.

Figure 33: Shares of components of residential investment and their totals in GDP

	SHARE OF NEW RESIDENTIAL CONSTRUCTION IN GDP	SHARE OF TOTAL RESIDENTIAL STRUCTURES IN GDP	SHARE OF OWNERSHIP TRANSFER COSTS IN GDP	SHARE OF RENOVATIONS IN GDP
1981Q4	2.6%	5.1%	0.8%	1.7%
1982Q4	1.9%	4.7%	0.9%	1.8%
1983Q4	2.2%	4.9%	0.8%	1.9%
1984Q4	2.1%	4.9%	0.8%	2.0%
1985Q4	2.6%	5.4%	0.9%	1.9%
1986Q4	3.2%	6.2%	1.1%	1.9%
1987Q4	3.7%	6.8%	1.1%	2.0%
1988Q4	3.5%	6.8%	1.3%	2.0%
1989Q4	3.6%	7.1%	1.4%	2.0%
1990Q4	2.6%	5.2%	0.8%	1.8%
1991Q4	2.8%	5.4%	0.9%	1.7%
1992Q4	2.8%	5.5%	1.0%	1.8%
1993Q4	2.6%	5.3%	0.9%	1.8%
1994Q4	2.5%	5.0%	0.8%	1.7%
1995Q4	2.0%	4.2%	0.7%	1.5%
1996Q4	2.1%	4.8%	1.0%	1.7%
1997Q4	2.3%	4.7%	0.8%	1.7%
1998Q4	2.1%	4.4%	0.7%	1.6%
1999Q4	2.2%	4.5%	0.7%	1.5%
2000Q4	2.1%	4.4%	0.7%	1.7%
2001Q4	2.4%	5.1%	0.9%	1.9%
2002Q4	2.9%	5.6%	0.9%	1.8%
2003Q4	3.0%	5.9%	1.0%	2.0%
2004Q4	3.2%	6.3%	1.0%	2.1%
2005Q4	3.0%	6.3%	1.1%	2.2%
2006Q4	3.1%	6.6%	1.2%	2.3%
2007Q4	3.4%	7.1%	1.3%	2.4%
2008Q4	3.1%	6.4%	0.8%	2.4%
2009Q4	2.7%	6.9%	1.4%	2.7%
2010Q4	2.9%	6.6%	1.2%	2.5%
2011Q4	2.9%	6.7%	1.3%	2.5%
2012Q4	3.3%	7.0%	1.1%	2.5%
2013Q4	3.0%	6.8%	1.3%	2.5%
2014Q4	3.0%	7.0%	1.4%	2.6%
2015Q4	3.1%	7.4%	1.6%	2.6%
2016Q4	3.2%	7.6%	1.7%	2.6%

Source: Statistics Canada (CANSIM Table 380-0068)

Figure 34: Employment patterns in real estate industries, by province

	EMPLOYMENT IN REAL ESTATE AS SHARE OF TOTAL EMPLOYMENT		WAGE DIFFERENTIAL OF REAL ESTATE RELATIVE TO INDUSTRIAL AGGREGATE	
	2016	2010	2016	2010
British Columbia	2.1%	2.0%	$81	-$25
Alberta	2.2%	2.0%	-$2	-$38
Ontario	2.0%	1.8%	$24	-$8
Quebec	1.6%	1.5%	-$109	-$112

Sources: CMHC calculations based on Statistics Canada data (CANSIM Table 281-0063)

Note: real estate includes firms primarily engaged in renting and leasing of real estate, managing real estate for others, acting as intermediaries in the sale and/or rental of real estate, and appraising real estate.

Figure 35: Estimated Long-Run Supply Elasticity of Housing Starts from Different Models

	CALGARY	EDMONTON	MONTRÉAL	TORONTO	VANCOUVER	GROUP MEAN
OLS Panel	0.88	1.97	1.37	0.44	0.31	1.06
SUR Panel	0.82	1.95	1.46	0.53	0.35	1.09
SUR Time Series	0.94	2.15	2.10	0.35	0.22	1.15
2SLS Time Series	0.93	2.22	2.11	0.52	0.28	1.21
Model Average	0.89	2.07	1.76	0.46	0.29	1.13

Source: CMHC based on data from Statistics Canada, Conference Board of Canada, Canadian Real Estate Association, and CMHC. OLS panel refers to separately estimating a stock-flow model with a demand equation and a supply equation in a panel; SUR panel simultaneously estimating the model in a panel; SUR time series simultaneously estimating the model by CMA; and 2SLS time series simultaneously estimating the model using instrument variables by CMA.

Figure 36: Estimates of the long-run price-elasticity of new housing supply

	LONG-RUN PRICE-ELASTICITY OF NEW HOUSING SUPPLY
Toronto	0.35
Vancouver	0.22
Calgary	0.94
Edmonton	2.15
Montréal	2.10

Source: CMHC calculations

Figure 37: Estimates of the speed of new housing supply response to the long-run disequilibrium

	SPEED OF NEW HOUSING SUPPLY RESPONSE
Toronto	0.22
Vancouver	0.31
Calgary	0.52
Edmonton	0.38
Montréal	0.08

Source: CMHC calculations

Figure 38: Housing starts and household formation

	BRITISH COLUMBIA		ALBERTA		ONTARIO		QUEBEC	
	HOUSEHOLD FORMATION	HOUSING STARTS	HOUSEHOLD FORMATION	HOUSING STARTS	HOUSEHOLD FORMATION	HOUSING STARTS	HOUSEHOLD FORMATION	HOUSING STARTS
1972Q1	30.57	36.09	17.60	21.53	80.06	103.18	53.72	70.08
1973Q1	32.68	31.18	18.72	19.51	78.86	129.94	54.34	69.98
1974Q1	36.40	43.46	18.41	21.39	83.85	135.61	58.61	79.95
1975Q1	32.37	29.06	26.17	14.39	79.97	61.64	59.86	46.42
1976Q1	27.45	41.08	29.32	33.97	79.95	108.76	62.58	79.37
1977Q1	26.25	36.80	33.15	21.80	67.63	76.92	57.12	82.33
1978Q1	29.47	38.92	33.09	58.57	69.28	92.07	49.32	75.08
1979Q1	31.66	24.42	33.74	47.90	67.24	55.80	55.11	45.94
1980Q1	41.16	41.48	39.80	27.81	70.02	56.78	59.02	31.37
1981Q1	41.48	49.99	42.99	32.80	63.21	38.41	58.76	31.86
1982Q1	24.29	40.89	30.79	32.76	47.33	64.11	35.56	29.88
1983Q1	18.98	19.47	14.58	21.12	49.78	68.06	32.33	34.43
1984Q1	21.28	19.53	6.73	8.12	53.38	52.71	34.33	58.00
1985Q1	18.50	19.02	10.19	4.69	54.07	42.11	36.90	61.58
1986Q1	19.24	24.63	15.56	9.99	61.14	69.22	40.36	55.89
1987Q1	20.16	25.10	8.20	7.54	85.26	121.44	59.84	86.64
1988Q1	26.81	27.47	10.78	9.94	83.07	95.24	53.73	83.37
1989Q1	31.44	41.64	17.95	11.85	102.75	122.12	63.11	61.49
1990Q1	34.22	56.87	19.68	23.23	74.82	100.16	54.95	64.19
1991Q1	30.36	22.13	18.20	8.55	53.17	38.53	48.53	36.98
1992Q1	32.12	39.56	13.38	16.01	56.17	59.22	38.81	42.61
1993Q1	34.75	42.64	13.02	16.85	54.19	45.30	40.56	34.13
1994Q1	39.70	44.79	13.11	17.75	56.76	43.16	37.44	34.74
1995Q1	39.09	33.68	13.69	13.76	59.95	37.56	36.22	25.42
1996Q1	35.68	25.99	15.66	13.51	61.02	33.80	35.87	21.25
1997Q1	32.04	26.51	23.73	23.70	55.26	54.03	28.20	25.66
1998Q1	20.43	25.13	28.01	26.49	50.96	57.41	25.32	20.85
1999Q1	17.81	16.91	24.24	22.78	51.45	61.61	30.00	22.64
2000Q1	17.92	13.86	24.40	23.46	63.59	70.86	34.59	21.53
2001Q1	20.81	17.09	25.29	24.20	73.83	72.15	37.20	24.99
2002Q1	17.94	19.31	29.74	37.28	80.18	91.33	40.24	39.97
2003Q1	17.99	23.10	24.42	35.81	65.81	85.77	40.04	45.86
2004Q1	20.90	31.82	24.53	34.33	64.71	78.25	42.52	56.84
2005Q1	24.75	30.90	33.90	35.47	62.26	69.92	43.60	52.01
2006Q1	27.07	41.46	39.20	49.77	62.05	75.26	45.79	48.46
2007Q1	18.76	39.30	33.90	52.67	53.86	60.04	40.96	48.14
2008Q1	21.80	38.76	30.24	42.01	58.85	72.62	42.15	48.32
2009Q1	21.90	13.58	31.22	13.59	55.82	46.03	45.61	39.79
2010Q1	19.33	27.28	20.10	28.98	62.94	60.30	48.38	53.75
2011Q1	12.02	25.28	20.31	20.57	57.54	61.67	43.67	47.86
2012Q1	25.01	27.91	42.21	30.71	79.64	79.82	41.77	42.32
2013Q1	24.70	24.24	49.49	32.91	79.04	58.53	37.28	37.18
2014Q1	27.23	27.75	47.49	37.47	73.78	54.74	36.50	41.41
2015Q1	27.99	30.29	45.93	45.29	74.03	55.55	36.91	29.16
2016Q1	28.56	45.93	36.06	22.79	78.20	78.61	40.04	38.15

Sources: Statistics Canada, CMHC

Figure 39: The stock of privately owned rental apartments

	VANCOUVER	TORONTO	MONTRÉAL	CALGARY	EDMONTON
2007Q4	135,697	347,141	483,913	44,597	68,712
2008Q4	136,057	349,612	457,629	42,797	66,989
2009Q4	142,464	357,444	460,327	45,599	67,455
2010Q4	146,201	356,686	460,098	46,680	69,869
2011Q4	149,485	367,173	460,570	45,920	69,674
2012Q4	153,595	371,433	467,856	48,525	70,509
2013Q4	156,771	384,361	519,606	48,758	72,173
2014Q4	157,709	398,917	555,110	50,598	74,906
2015Q4	163,518	412,075	574,696	52,037	77,405

Source: CMHC

Figure 40: Price acceleration metric

During the period from 1988Q1 to 2016Q4, the HMA indicator of price acceleration equaled 1 for Vancouver during 2003Q4-2007Q2 and 2016Q1-2016Q4; for Toronto during 1988Q1-1989Q4, 2005Q1-2010Q3, and 2015Q2-2016Q4; for Montréal during 1988Q1-1990Q1 and 2000Q4-2006Q3; for Calgary during 1998Q1-2000Q4 and 2006Q1-2009Q2; and, for Edmonton during 2001Q4-2005Q1 and 2006Q2-2009Q4. Otherwise, it was equal to 0.

Sources: CMHC analysis using data from CREA and the Québec Federation of Real Estate Boards

Note: The indicator equals "1" when price acceleration is detected, "0" when it is not.

Figure 41: Shapley value decomposition of the model to explain forecasting errors with regulation constraint

	%
Fixed Effects	35.59
Year Dummy	1.62
Regulation Constraint	29.55
Speculation	3.72
Investment Demand	1.55

Source: CMHC calculations

Figure 42: Shapley value decomposition of the model to explain forecasting errors with geographic constraint

	%
Fixed Effects	42.61
Year Dummy	1.75
Geographic Constraint	16.99
Speculation	4.71
Investment Demand	2.01

Source: CMHC calculations

Figure 43: Shapley value decomposition of the long-run equation, 1988-2016

	%
Fixed Effects	34.56
Year Dummy	13.78
Income	27.62
Young-Adult Population	16.24
Mortgage Rates	3.98

Source: CMHC calculations

Figure 44: Shapley value decomposition of the Error-Correction model

	%
Error Correction Term	3.05
Fundamental Variables	4.36
Regulatory Constraints	19.15
Investment Demand	3.68
Speculation	2.97

Source: CMHC calculations

Figure 45: Taxfiler data in Canada, by CMA, 2014

	TAXFILERS BY CMA	WHERE TAXFILERS REPORT RENT
Rest of Canada	58%	51%
Vancouver	7%	9%
Calgary	4%	4%
Edmonton	4%	3%
Toronto	16%	19%
Montréal	11%	14%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 46: Share of Taxfilers Reporting Rent Relative to All Taxfilers, by CMA

	2006	2010	2014
Montréal	5.8%	6.3%	6.7%
Toronto	4.6%	5.3%	6.3%
Edmonton	2.9%	4.4%	5.1%
Calgary	3.7%	5.4%	6.3%
Vancouver	4.9%	6.2%	7.4%
Canada	4.1%	4.8%	5.5%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 47: Growth in the number of taxfilers, and in the number of taxfilers reporting rental income, by CMA

	2006 TO 2010		2010 TO 2014	
	TOTAL TAXFILERS	RENTAL TAXFILERS	TOTAL TAXFILERS	RENTAL TAXFILERS
Montreal	5.2%	13.9%	4.6%	10.1%
Toronto	7.6%	25.5%	7.0%	26.5%
Edmonton	6.7%	59.9%	14.3%	31.8%
Calgary	7.7%	57.8%	16.6%	36.4%
Vancouver	8.1%	38.3%	6.6%	25.5%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 48: Change in Gross Rental Income of Taxfilers

	2008	2009	2010	2011	2012	2013	2014
Montreal	10%	31%	9%	-13%	9%	1%	1%
Toronto	11%	52%	1%	-18%	19%	8%	7%
Vancouver	16%	56%	2%	-13%	1%	2%	10%
Canada	13%	40%	2%	-13%	12%	4%	5%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 49: Change in the number of rental taxfilers

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Vancouver	80,565	84,240	91,805	104,050	111,415	112,465	126,320	133,190	139,835
Calgary	30,365	34,120	38,715	44,040	47,925	50,840	58,045	62,400	65,370
Edmonton	23,490	26,830	30,450	34,315	37,570	39,220	43,295	46,705	49,505
Toronto	178,315	180,105	193,320	208,365	223,795	225,835	253,195	267,330	282,995
Montreal	163,815	162,845	171,005	179,400	186,520	184,770	196,365	200,715	205,325

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 50: Average Gross Rental Income Reported by Taxfilers

	2007	2008	2009	2010	2011	2012	2013	2014
Canada	$13,066	$13,915	$18,165	$17,543	$14,991	$15,456	$15,375	$15,543
Vancouver	$16,069	$17,170	$23,620	$22,402	$19,375	$17,442	$16,833	$17,666
Toronto	$12,846	$13,270	$18,691	$17,632	$14,387	$15,242	$15,521	$15,721

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 51: Rental Taxfilers by gender, 2014

		NUMBER		AVERAGE RENTAL INCOME	
		FEMALE	MALE	FEMALE	MALE
Canada	2014			$14,221	$16,726
Vancouver	2010	55,135	56,275		
	2014	70,565	69,275	$16,922	$18,293
Calgary	2010	22,730	25,195		
	2014	31,520	33,850	$14,919	$16,634
Edmonton	2010	17,955	19,620		
	2014	23,535	25,970	$14,082	$17,076
Toronto	2010	108,045	115,750		
	2014	140,790	142,205	$15,124	$16,460
Montréal	2010	85,135	101,390		
	2014	94,285	111,040	$16,425	$21,224

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 52: Total Taxfiler Population

		2010	2014
Vancouver	Immigrant	494,995	698,810
	Non-immigrant	1,287,775	1,201,410
Calgary	Immigrant	163,400	277,310
	Non-immigrant	723,415	757,045
Edmonton	Immigrant	110,215	198,385
	Non-immigrant	744,575	778,285
Toronto	Immigrant	1,386,480	1,861,015
	Non-immigrant	2,811,415	2,632,785
Montréal	Immigrant	421,695	612,080
	Non-immigrant	2,529,085	2,474,020

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 53: Rental Taxfiler Population

		2010	2014
Vancouver	Immigrant	34,855	58,910
	Non-Immigrant	76,560	80,925
Calgary	Immigrant	9,765	18,680
	Non-Immigrant	38,155	46,690
Edmonton	Immigrant	5,030	9,295
	Non-Immigrant	32,540	40,210
Toronto	Immigrant	98,455	151,370
	Non-Immigrant	125,340	131,625
Montréal	Immigrant	28,045	39,850
	Non-Immigrant	158,475	165,475

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 54: Average Gross Rental Income, 2014

	IMMIGRANT	NON-IMMIGRANT
Vancouver	15,421	17,815
Calgary	14,548	16,052
Edmonton	14,087	16,065
Toronto	12,294	19,402
Montréal	16,896	19,436

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 55: Taxfiler Population Shares, Canada, 2014

	TAXFILER POPULATION SHARES
Under 25	12%
25-34	16%
35-44	16%
45-54	18%
55-64	17%
65 & older	21%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 56: Rental Taxfiler Growth, 2010-2014

	VANCOUVER	CALGARY	EDMONTON	TORONTO	MONTRÉAL
25-34	23%	37%	37%	22%	0%
35-44	22%	40%	40%	20%	8%
45-54	24%	25%	23%	26%	7%
55-64	26%	40%	30%	30%	16%
65 & older	38%	50%	36%	38%	15%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 57: 2010-2014 Growth of Taxfilers 65 and older

	TAXFILERS GROWTH	RENTAL TAXFILERS GROWTH
Montréal	13.3%	14.9%
Toronto	19.1%	37.8%
Edmonton	18.3%	35.5%
Calgary	26.1%	49.5%
Vancouver	19.4%	37.7%
Canada	16.5%	28.4%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 58: Taxfiler Shares of the Rental Market, 2014

	VANCOUVER	CALGARY	EDMONTON	TORONTO	MONTRÉAL
25-34	10%	15%	16%	12%	10%
35-44	22%	25%	22%	23%	20%
45-54	28%	25%	23%	29%	25%
55-64	23%	22%	23%	21%	21%
65 & older	17%	13%	16%	15%	24%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 59: Investment income by type, 2006-2014, Vancouver

YEAR	FIXED INCOME PRODUCTS - VANCOUVER	GROSS RENT - VANCOUVER
2006	$1,154,923,000	$1,814,879,000
2007	$1,353,620,000	$2,368,835,000
2008	$1,576,292,900	$2,425,066,000
2009	$2,457,609,000	$1,930,978,500
2010	$2,495,878,000	$1,515,354,500
2011	$2,178,960,000	$1,543,430,000
2012	$2,203,260,000	$1,579,003,000
2013	$2,241,984,000	$1,681,488,000
2014	$2,470,286,000	$1,786,206,800

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 60: Investment income by type, 2006-14, Toronto

YEAR	FIXED INCOME PRODUCTS - TORONTO	GROSS RENT - TORONTO
2006	$3,902,300,000	$2,341,380,000
2007	$4,786,734,000	$2,313,588,100
2008	$4,886,436,000	$2,565,378,900
2009	$3,894,452,900	$3,894,452,900
2010	$3,190,400,200	$3,946,021,300
2011	$3,163,692,400	$3,249,197,600
2012	$3,165,411,400	$3,859,200,200
2013	$3,266,500,600	$4,149,338,600
2014	$3,460,226,000	$4,448,862,000

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 61: Average rental income by decile

	DECILE	2010	2014
Vancouver	0	$17,158	$11,915
	9	$34,685	$25,045
Calgary	0	$11,031	$11,283
	9	$19,416	$18,244
Edmonton	0	$13,305	$10,131
	9	$21,707	$19,153
Toronto	0	$10,855	$10,223
	9	$35,901	$25,196
Montréal	0	$16,447	$13,668
	9	$48,755	$36,724

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 62: Total Gross Rental Income Shares by Decile, 2014

	0	1	2	3	4	5	6	7	8	9
Canada	3%	4%	5%	6%	7%	8%	10%	12%	15%	31%
Vancouver	3%	5%	6%	6%	7%	8%	8%	11%	15%	31%
Calgary	3%	3%	3%	3%	4%	5%	7%	9%	15%	47%
Edmonton	2%	3%	3%	3%	4%	6%	7%	10%	16%	47%
Toronto	4%	5%	6%	6%	8%	8%	9%	10%	14%	30%
Montréal	2%	3%	4%	6%	8%	9%	10%	12%	15%	31%

Source: Longitudinal Administrative Databank (LAD), Statistics Canada, CMHC Calculations

Figure 63: Sold price-to-list price ratio, Vancouver CMA Average

The average sold price-to-list price ratio in Vancouver increased in 2015 and 2016, exceeding one.

Source: Real Estate Board of Greater Vancouver MLS®

Figure 64: Population and population density, select Canadian cities

	POPULATION			POPULATION DENSITY PER SQUARE KILOMETRE		
	2006	2011	2016	2006	2011	2016
Edmonton	1,034,945	1,159,869	1,321,426	110	123	140
Calgary	1,079,310	1,214,839	1,392,609	198	197	273
Vancouver	2,116,581	2,313,328	2,463,431	736	803	855
Montréal	3,635,556	3,934,078	4,098,927	854	898	890
Toronto	5,113,149	5,583,064	5,928,040	866	945	1,004

Source: Statistics Canada (2017)

Figure 69: Changes in population-density relationships, large Canadian cities

	YEAR	POPULATION DENSITY IN CENTRAL BUSINESS DISTRICT (S_0)	RATE OF DECLINE IN POPULATION DENSITY (b)	GOODNESS OF FIT (R^2)
Montréal	1991	12,545.37	0.081	0.33
	1996	12,537.31	0.082	0.34
	2001	12,723.64	0.083	0.37
	2006	12,720.66	0.083	0.38
	2011	12,800.57	0.083	0.39
	2016	13,249.94	0.084	0.42
Toronto	1991	10,008.79	0.057	0.28
	1996	10,228.37	0.054	0.26
	2001	10,912.63	0.050	0.22
	2006	10,671.86	0.048	0.23
	2011	11,357.76	0.046	0.20
	2016	13,317.12	0.055	0.21
Calgary	1991	3,408.87	0.051	0.10
	1996	3,351.66	0.049	0.10
	2001	3,348.28	0.036	0.07
	2006	3,507.48	0.045	0.11
	2011	3,380.66	0.034	0.07
	2016	3,507.64	0.029	0.06
Edmonton	1991	3,081.59	0.050	0.17
	1996	2,866.19	0.045	0.16
	2001	3,087.60	0.048	0.18
	2006	3,195.45	0.052	0.18
	2011	3,301.66	0.052	0.19
	2016	3,344.84	0.047	0.20
Vancouver	1991	8,330.04	0.105	0.29
	1996	8,667.81	0.095	0.28
	2001	8,786.74	0.071	0.28
	2006	9,287.96	0.070	0.27
	2011	9,682.21	0.061	0.24
	2016	10,585.69	0.067	0.24

Sources: CMHC calculations based on Statistics Canada Census data

Figure 70: Population density of 281 metropolitan areas in OECD, Canadian cities in red

Seoul Incheon: 5339; Busan: 4737; Changwon: 4385; Tokyo: 4181; Mexico City: 4000; The Hague: 3055; Barcelona: 2824; Naha: 2806; Anjo: 2750; Osaka: 2476; Daegu: 2453; Gwangju: 2396; Naples: 2292; Fukuoka: 2253; Essen: 2151; Athens: 2135; Kitakyushu: 2047; Guadalajara: 1979; Bochum: 1946; London: 1792; Puebla: 1744; Liverpool: 1714; New York: 1691; Daejeon: 1684; Nagoya: 1648; Milan: 1577; Ulsan: 1490; Dortmund: 1469; Santiago: 1466; Jeonju: 1460; Tijuana: 1432; Portsmouth: 1387; Porto: 1381; Cheongju: 1378; Manchester: 1349; Birmingham (UK): 1346; Yokkaichi: 1343; Nagasaki: 1332; Bradford: 1302; Düsseldorf: 1260; Wakayama: 1235; Kumamoto: 1214; Utrecht: 1212; Hiroshima: 1189; Duisburg: 1182; Valencia: 1131; Glasgow: 1130; Palermo: 1125; Kurashiki: 1124; Numazu: 1098; Takamatsu: 1072; Zurich: 1060; Bristol: 1036; Catania: 1035; Sapporo: 1023; Rotterdam: 1020; León: 1018; Cuernavaca: 1001; Turin: 996; Paris: 996; Toluca: 989; Stuttgart: 989; Cologne: 977; Sendai: 964; Philadelphia: 940; Lille: 938; Antwerp: 925; Kagoshima: 923; Mito: 922; Cardiff: 902; Bilbao: 889; Amsterdam: 870; Las Palmas: 865; Maebashi: 831; Sheffield: 829; Utsunomiya: 821; Cleveland: 820; Okayama: 813; Matsuyama: 810; Himeji: 809; Toyohashi: 803; Veracruz: 800; Brussels: 793; Fukuyama: 787; Nottingham: 778; Bari: 773; Boston: 763; Valparaíso: 760; Aachen: 743; Rome: 730; Detroit: 725; Lisbon: 724; Berlin: 712; Tokushima: 704; Bonn: 703; Thessalonica: 697; Leeds: 694; Hamamatsu: 682; Irapuato: 679; Niigata: 673; Richmond: 671; Katowice: 660; Frankfurt: 652; Kofu: 651; Pohang: 644; Genova: 635; Mannheim: 631; Leicester: 630; Shizuoka: 625; Pittsburgh: 623; Madrid: 614; Ostrava: 602; Xalapa: 601; Oita: 600; Edinburgh: 597; Kanazawa: 586; Eindhoven: 584; Ghent: 582; Celaya: 564; Lódz: 555; Málaga: 553; Saarbrücken: 548; Basel: 546; Lyon: 538; Toulon: 536; Baltimore: 535; Geneva: 531; Karlsruhe: 525; Liege: 523; Hamburg: 522; Querétaro: 519; Chicago: 511; Providence: 507; Clearwater/Saint Petersburg: 504; Venice: 501; Akron: 498; Copenhagen: 496; Kochi: 495; Dresden: 494; Vancouver: 490; Concepción: 490; Prague: 486; Atlanta: 486; Toronto: 482; Toledo (US): 480; Acapulco de Juárez: 478; Morelia: 478; Budapest: 475; Tampa: 474; Munich: 474; Oaxaca de Juárez: 473; Aguascalientes: 457; Fort Worth: 450; Melbourne: 439; Monterrey: 439; Nagano: 429; Gdansk: 423; Florence: 422; Marseille: 419; Miami: 409; San Francisco: 409; Milwaukee: 409; Pachuca de Soto: 406; Adelaide: 403; Montreal: 401; Juárez: 396; Sydney: 396; Hanover: 394; Tampico: 393; Leipzig: 391; Dublin: 385; Strasbourg: 382; Benito Juárez: 382; Tuxtla Gutiérrez: 381; Newcastle: 377; Dallas: 377; Bologna: 375; Nuremberg: 374; Charlotte: 367; Kraków: 363; Norfolk-Portsmouth-Chesapeake-Virginia beach: 363; Washington: 363; Seville: 360; Freiburg im Breisgau: 354; Warsaw: 353; Toyama: 348; Augsburg: 336; Münster: 328; Bremen: 323; Perth: 320; Wroclaw: 318; Gold Coast-Tweed Heads: 309; Poznan: 309; Vienna: 307; Dayton: 304; Montpellier: 301; Centro: 299; Saint-Étienne: 292; San Diego: 292; Houston: 290; Nantes: 290; Stockholm: 284; Bratislava: 280; Nice: 279; Brno: 274; Buffalo: 273; Grand Rapids: 272; Indianapolis: 255; Toulouse: 250; Seattle: 248; Rouen: 248; Grenoble: 246; San Luis Potosí: 246; Hamilton: 241; Helsinki: 236; Raleigh: 234; Gothenburg: 233; Orlando: 229; Bordeaux: 214; Mcallen: 214; Los Angeles: 212; Lublin: 208; Graz: 206; Cincinnati: 201; Saint Louis (US): 201; Malmö: 195; Rennes: 187; Ljubljana: 186; Oslo: 183; Reynosa: 178; Austin: 177; Columbia: 176; Linz: 175; Phoenix: 174; Columbus: 172; Sacramento/Roseville: 168; Minneapolis: 166; Jacksonville: 164; Brisbane: 147; Nashville: 146; Culiacán: 146; Saltillo: 143; Quebec: 141; Birmingham (US): 140; Louisville: 136; Portland: 134; Denver: 125; San Antonio: 123; Tallinn: 123; Albany: 119; Torreón: 117; Mérida: 114; Calgary: 114; Harrisburg: 111; Kansas City: 110; Madison: 109; Baton Rouge: 105; Memphis: 104; Chihuahua: 102; Colorado Springs: 100; Charleston: 98; New Orleans: 92; Oklahoma city: 92; Little Rock: 92; Ottawa-Gatineau: 86; Omaha: 80; Zaragoza: 74; Des Moines: 72; Durango: 68; Mexicali: 66; Edmonton: 65; Wichita: 65; El Paso: 59; Fresno: 54; Tulsa: 54; Hermosillo: 51; Tucson: 44; Salt Lake City: 43; Albuquerque: 40; Winnipeg: 39; Las Vegas: 34.

The rank of the 9 canadian cities listed is : 140 for Vancouver, 144 for Toronto, 165 for Montréal, 214 for Hamilton, 243 for Québec, 253 for Calgary, 265 for Ottawa-Gatineau, 271 for Edmonton and 280 for Winnipeg.

Source: OECD

Notes: Canadian cities, ranked by population density, are Vancouver, Toronto, Montréal, Hamilton, Québec, Calgary, Ottawa-Gatineau, Edmonton and Winnipeg.

Figure 71: Annual Completions-to-Demolitions Ratio

YEAR	MONTRÉAL	TORONTO	VANCOUVER
2007	77.8	47.4	7.1
2008	40.0	57.0	9.2
2009	26.8	63.6	9.0
2010	30.8	59.2	6.4
2011	29.6	69.5	4.9
2012	25.3	54.0	5.7
2013	26.4	25.9	8.1
2014	28.4	29.6	6.3
2015	18.7	21.7	5.0
2016	32.1	21.7	6.1

Sources: Statistics Canada, CMHC, calculations by CMHC

Figure 72: Average House Prices per Bedroom, City of Vancouver, 2016, all dwelling types

A bar chart presents the prices of dwellings in the City of Vancouver in 2017 divided by the number of bedrooms (dwellings include all types of housing including single-detached and apartments). The average house price per bedroom is a little over $500,000 for 1 and 2-bedroom dwellings, over $600,000 for 3 and 4-bedroom dwellings and roughly between $400,000 and $500,000 for 5 to 7-bedroom dwellings.

Source: BC Assessment

Figure 73: Shares of first-time buyers using family assistance

YEAR	TORONTO	MONTRÉAL	VANCOUVER
2000	16.8%	18.0%	22.9%
2001	15.3%	18.8%	21.8%
2002	14.7%	20.2%	22.4%
2003	14.8%	21.3%	21.3%
2004	15.1%	21.5%	21.3%
2005	17.0%	21.0%	21.7%
2006	17.9%	21.7%	24.5%
2007	15.6%	18.5%	24.4%
2008	15.8%	17.8%	23.5%
2009	19.0%	21.9%	28.1%
2010	18.8%	22.2%	27.6%
2011	20.2%	22.9%	28.3%
2012	21.8%	22.8%	29.8%
2013	23.3%	24.5%	31.1%
2014	25.9%	24.2%	33.6%
2015	27.0%	24.3%	34.3%
2016	30.8%	26.1%	38.1%

Source: CMHC

Notes: Parental assistance includes both gifting of down payments and acting as co-signees.

Figure 74: Vancouver housing starts, shares by intended market (%)

YEAR	CONDOMINIUM	PURPOSE-BUILT RENTAL	OTHER
1990	51.6	10.5	37.9
1991	38.8	11.8	49.5
1992	47.2	10.2	42.6
1993	60.7	6.7	32.6
1994	61.9	5.8	32.4
1995	64.6	4.5	30.9
1996	61.5	4.6	33.9
1997	60.8	7.8	31.4
1998	64.6	4.2	31.2
1999	43.4	11.4	45.3
2000	41.7	14.0	44.3
2001	36.5	25.1	38.5
2002	47.5	9.9	42.6
2003	57.1	6.0	36.9
2004	65.1	3.8	31.1
2005	69.2	3.1	27.7
2006	64.6	2.7	32.7
2007	73.5	3.0	23.5
2008	72.3	3.8	23.9
2009	49.9	5.4	44.8
2010	54.5	6.9	38.5
2011	57.5	9.8	32.7
2012	63.6	6.7	29.7
2013	62.6	16.8	20.5
2014	60.1	17.1	22.8
2015	60.4	18.3	21.3
2016	58.1	24.5	17.4
2017	65.1	17.5	17.4

Source: CMHC Starts and Completions Survey. Data for 2017 is for the first half of the year.

Figure 75: Summary of Land Sales Points for Single-Family New Home Projects Opened in the GTA

	RATIO OF NUMBER OF LAND DEALS IN EACH TIMEFRAME TO NUMBER OF PROJECTS LAUNCHED DURING 2015 TO MID 2017
No transaction in previous 15 years prior to launch	60%
11-15 years prior to launch	4%
6-10 years prior to launch	7%
0-5 years prior to launch	32%

Source: Altus Group

Figure 76: Low- and Medium-Density Residential Land Sales Transactions in the GTA

YEAR	LOW DENSITY (ACRES)	MEDIUM DENSITY (ACRES)	TOTAL AREA (ACRES)
2000	6,567	346	6,914
2001	2,851	157	3,008
2002	8,168	279	8,447
2003	11,264	200	11,464
2004	7,914	373	8,287
2005	5,230	178	5,408
2006	3,500	201	3,701
2007	5,676	260	5,937
2008	3,466	793	4,259
2009	1,315	107	1,422
2010	3,036	277	3,312
2011	4,946	164	5,110
2012	4,421	284	4,705
2013	2,186	364	2,549
2014	1,837	308	2,145
2015	3,072	427	3,499
2016	4,721	433	5,154
2016 1st half	2,180	218	2,398
2017 1st half	2,871	274	3,145

Source: Altus Group

Figure 77: Low- and Medium-Density Residential Land Sales Transactions in Vancouver

YEAR	LOW DENSITY (ACRES)	MEDIUM DENSITY (ACRES)	TOTAL AREA (ACRES)
2000	523	84	608
2001	476	193	670
2002	1,059	219	1,278
2003	927	377	1,304
2004	1,529	438	1,966
2005	1,429	413	1,842
2006	1,777	452	2,229
2007	830	446	1,275
2008	386	202	588
2009	150	121	271
2010	346	289	636
2011	841	316	1,157
2012	610	325	935
2013	647	233	880
2014	572	454	1,026
2015	738	354	1,092
2016	1,261	863	2,124
2016 1st half	708	411	1,118
2017 1st half	440	229	669

Source: Altus Group

Figure 78: Summary of Land Sales Points for Single-Family New Home Projects Opened in Vancouver CMA

	RATIO OF NUMBER OF LAND DEALS IN EACH TIMEFRAME TO NUMBER OF PROJECTS LAUNCHED DURING 2015 TO MID 2017	% OF PROJECTS LAUNCHED IN 2015 TO MID 2017 THAT HAD AT LEAST 1 ASSOCIATED LAND DEAL DURING THE TIMEFRAME
No transaction in previous 15 years prior to launch	29%	29%
11-15 years prior to launch	6%	5%
6-10 years prior to launch	17%	12%
0-5 years prior to launch	109%	60%

Source: Altus Group