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Household Formation and the Housing Stock

A Stock-Flow Perspective

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This report provides estimates of household formation and the housing stock in Canada, and also attempts to gauge the degree of balance in the housing sector, both for new housing units and for the overall housing stock.

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Executive Summary

Key points

This report provides estimates of household formation and the housing stock in Canada, and also attempts to gauge the degree of balance in the housing sector, both for new housing units and for the overall housing stock. Our assessment, however, is based on housing data and indicators at the national level, which can mask important variation across regions. An assessment of the housing sector at the regional, or Census Metropolitan Area (CMA), is beyond the scope of our report.

Households and household formation

We adopt the Census definition of a household, which is defined as a person or a group of persons (other than foreign residents) who occupy a private dwelling and do not have a usual place of residence elsewhere in Canada. Household formation is the net change in the number of households.

- Over 2012 to 2015, we estimate that the number of (net) new households formed outpaced the construction of new housing units, reversing the trend observed since 2001.
- While the reversal of this trend helped reduce the national vacancy rate from elevated levels, we estimate that there was still some excess supply in terms of the overall stock of housing units in 2015.
- PBO's October 2016 outlook incorporates a significant adjustment in the share of residential investment in the economy that is driven by a pullback in housing construction activity.
- The projected weakness in PBO's outlook for residential investment largely reflects rising borrowing rates and a deceleration in house prices.
- Based on PBO's October 2016 outlook, we project that the housing stock will return to balance over the medium term as the national vacancy rate converges to its long-term historical average.

The headship rate

The headship rate is defined as the ratio of the number of household heads or household maintainers to the population 15 years of age and older.

We would caution that our estimates of household formation over 2012 to 2021 reflect only the demographic demand for new housing. Including behavioural effects (through changes to age-group specific headship rates) could influence our estimates of household formation and the vacancy rate.

Context

The share of residential investment in the Canadian economy reached a record high of 7.7 per cent of gross domestic product (GDP) in the second quarter of 2016. In its 2016 *Economic Survey*, the Organization for Economic Co-operation and Development (OECD) noted that the share of residential investment in Canada's GDP was the highest among OECD countries and that "it appears stronger than what can be justified by underlying population increases".

Residential investment

Statistics Canada's measure of residential construction investment includes three components: investment in new housing construction; investment in renovations; and acquisition costs. Over 2010 to 2015, new housing construction accounted for 44 per cent of residential investment.

While the share of residential investment in the economy serves as a useful indicator of housing market activity, assessing imbalances—in terms of housing units as opposed to prices—in this sector requires taking a broader perspective. This report examines the housing sector from a stock-flow perspective. That is, we examine the "flow" of residential construction relative to its fundamental driver, household formation, as well as in the context of the overall "stock" of occupied and vacant housing units.

Unfortunately, there are shortcomings in terms of the availability of official housing data. As noted in IMF staff analysis, housing stock series published by Statistics Canada were discontinued in 2000. Further, estimates of households and dwellings are only available every five years with the Census. To address these shortcomings, we construct annual estimates of the number of households over 1971 to 2015 and the housing stock beyond 2000.

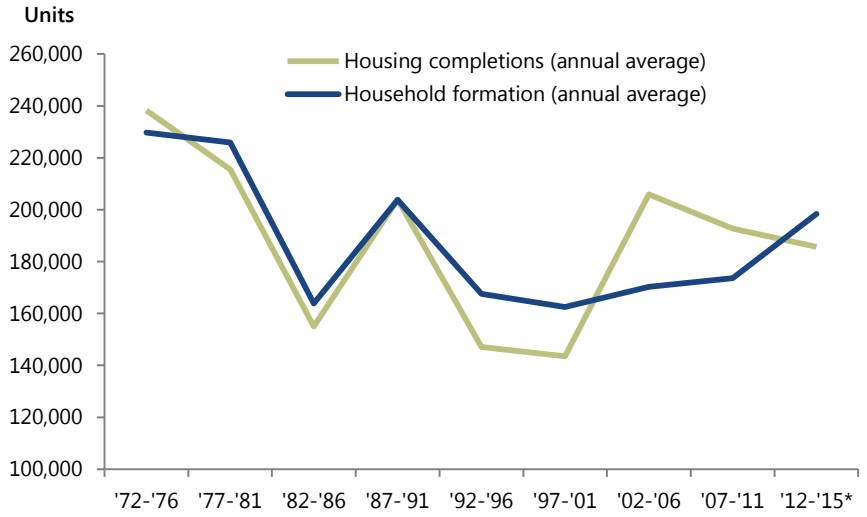
Household formation and residential construction

We adopt the Census definition of a household, which is defined as a person or a group of persons (other than foreign residents) who occupy a private dwelling and do not have a usual place of residence elsewhere in Canada. Household formation is the net change in the number of households.

Summary Figure 1 shows that average annual housing completions closely tracked household formation over 1972 to 1991. However, over 1992 to 2001, household formation exceeded housing completions. This dynamic then reversed over 2002 to 2011 as housing construction surged.

Summary Figure 1

Household formation and housing completions



Sources: Canada Mortgage and Housing Corporation; Statistics Canada; and Parliamentary Budget Officer.

Note: * Household formation over 2012 to 2015 is estimated assuming that age-group specific headship rates are unchanged from 2011 levels.

Based on our estimate of the number of households in 2015, household formation outpaced the construction of new housing units over 2012 to 2015, reversing the trend observed since 2001.

The housing stock and vacancy rate

The total vacancy rate

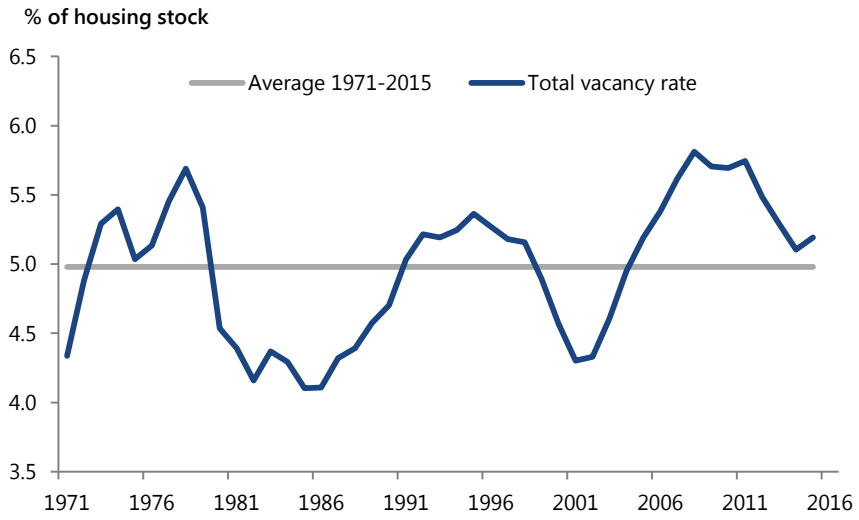
The total vacancy rate represents the number of vacant units, for sale or rent, relative to the total stock of housing units, which includes both occupied and vacant dwelling units.

Assessing housing completions relative to household formation helps to gauge "flow" imbalances, whereas taking into account the total vacancy rate (that is, the number of vacant units for sale and rent relative to the overall housing stock) provides a "stock" perspective.

Summary Figure 2 shows that, nationally, the total vacancy rate remained elevated in the aftermath of the global financial crisis as housing construction moderated and moved into line with household formation over 2009 to 2011. In 2012, the vacancy rate began to decline sharply, returning close to its long-term historical average of 5.0 per cent, as housing construction remained subdued while the pace of household formation picked up.

Summary Figure 2

The total vacancy rate, 1971-2015



Sources: Statistics Canada and Parliamentary Budget Officer.

Note: The total vacancy rate includes dwelling units for sale and for rent.

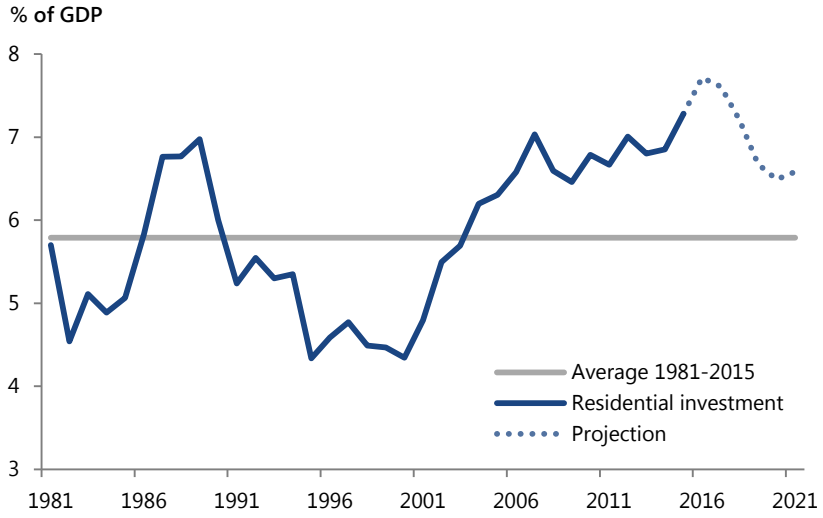
Relative to its long-term historical average, our estimate of the vacancy rate in 2015 (5.2 per cent) suggests that there was still some excess supply in the housing sector at the national level. Thus, while data and our estimates suggest that there was an imbalance between the flows of household formation and housing completions over 2012 to 2015, this helped reduce the excess supply in the overall housing stock.

Medium-term prospects

Based on PBO's October 2016 Economic and Fiscal Outlook (EFO), the share of residential investment in the Canadian economy is projected to fall from 7.7 per cent of GDP in 2016 to 6.5 per cent of GDP in 2020 (Summary Figure 3). The projected decline primarily reflects weaker residential investment volumes, owing to rising borrowing rates and a deceleration in house prices.

Summary Figure 3

Residential investment in the Canadian economy



Sources: Statistics Canada and Parliamentary Budget Officer.

Note: The projection period covers 2016 to 2021.

Based on PBO's October 2016 outlook for residential investment, we project that housing completions will increase to 198,800 units in 2017 before moderating to around 170,900 units, on average, over 2019 to 2021. Household formation is projected to increase from 173,500 (net) new households in 2015 to 188,500 in 2016 before trending lower to 172,500 by 2021, which is in line with the number of housing completions.

We project that the total vacancy rate will remain close to 5.2 per cent through 2018 as net additions to the housing stock track household formation. However, as residential construction activity weakens further in 2019 and 2020, the total vacancy rate decreases—even as household formation moderates—converging to its long-term historical average of 5.0 per cent by 2021.

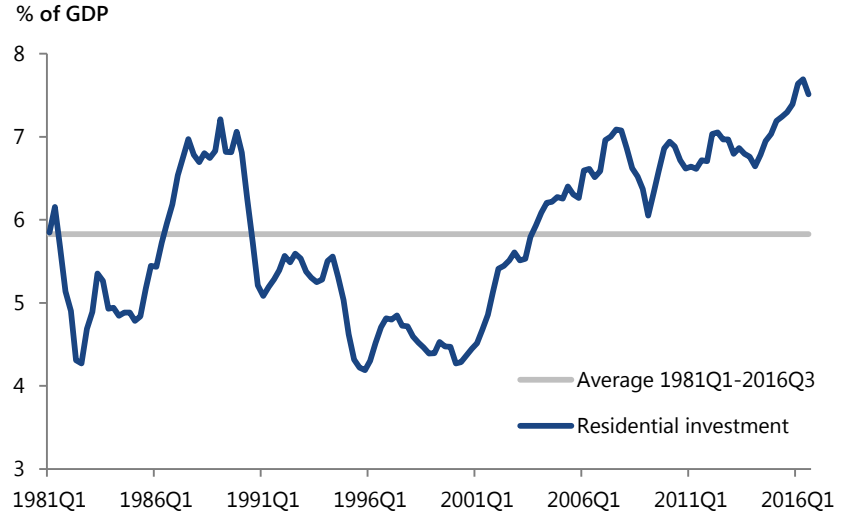
Thus, based on PBO's October 2016 outlook, we project that the housing stock will return to balance over the medium term.

1. Introduction

The share of residential investment in the Canadian economy reached a record high of 7.7 per cent of gross domestic product (GDP) in the second quarter of 2016 (Figure 1-1).[1] In its 2016 *Economic Survey*, the Organisation for Economic Co-operation and Development (OECD) noted that the share of residential investment in Canada's GDP was the highest among OECD countries and that "it appears stronger than what can be justified by underlying population increases".[2] Moreover, in 2013, International Monetary Fund (IMF) staff analysis[3] concluded that

> The last time residential investment-to-GDP ratio reached 7 percent, the Canadian housing sector went through a long period of stagnation. With current house prices and construction activity at historical highs, an adjustment is likely to take place in the coming years.

Figure 1-1 The share of residential investment in the economy



Sources: Statistics Canada and Parliamentary Budget Officer.

Since early 2000, the share of residential investment in the economy has increased by 3¼ percentage points of GDP due to rising investment prices as well as increases in the "volume" (that is, the inflation-adjusted level) of investment.[4] The share of residential investment in the economy has remained above its long-term historical average of 5.8 per cent of GDP since late 2003.

Elevated and rising levels of residential activity have prompted concerns about potential overbuilding and an excess supply of housing units. IMF staff analysis conducted in 2015, estimated that by the end of 2013, the Canadian housing market was in excess supply by about 0.5 per cent of the total housing stock.[5] Since early 2014, increases in the volume of residential investment have outpaced real GDP gains, which would seem to suggest a further buildup of imbalances in the housing sector.

Residential investment

Statistics Canada's measure of residential construction investment includes three components: investment in new housing construction; investment in renovations; and acquisition costs. Over 2010 to 2015, new housing construction accounted for 44 per cent of residential investment.

While the share of residential investment in the economy serves as a useful indicator of housing market activity, assessing imbalances—in terms of volumes as opposed to prices—in this sector requires taking a broader perspective. This report attempts to examine the housing sector from a stock-flow perspective. That is, this report examines the "flow" of residential construction relative to its fundamental driver, household formation, as well as in the context of the overall "stock" of occupied and vacant housing units.

Our assessment, however, is based on housing data and indicators at the national level, which can mask important variation across regions. An assessment of the housing sector at the regional, or Census Metropolitan Area (CMA), is beyond the scope of our report. That said, we provide a prospective view over 2016 to 2021 based on PBO's October 2016 Economic and Fiscal Outlook.

Unfortunately, there are shortcomings in terms of the availability of official housing data. As noted in the 2015 IMF staff analysis, housing stock series published by Statistics Canada were discontinued in 2000. Further, estimates of households and private dwellings are only available every five years with the Census. Consequently, to address these shortcomings, this report first constructs annual estimates of the number of households over 1971 to 2015 and the housing stock beyond 2000.

Structure of report

Section 2 of the report presents our estimates of households and household formation, highlighting the link with new housing construction. Section 3 extends Statistics Canada's estimates of the housing stock beyond 2000 and provides estimates of the total vacancy rate for housing units. In Section 4, we assess medium-term prospects for household formation and the vacancy rate based on PBO's October EFO.

2. Households and Household Formation

Households and household formation

We adopt the Census definition of a household, which is defined as a person or a group of persons (other than foreign residents) who occupy a private dwelling and do not have a usual place of residence elsewhere in Canada. Household formation is the net change in the number of households.

Headship rate

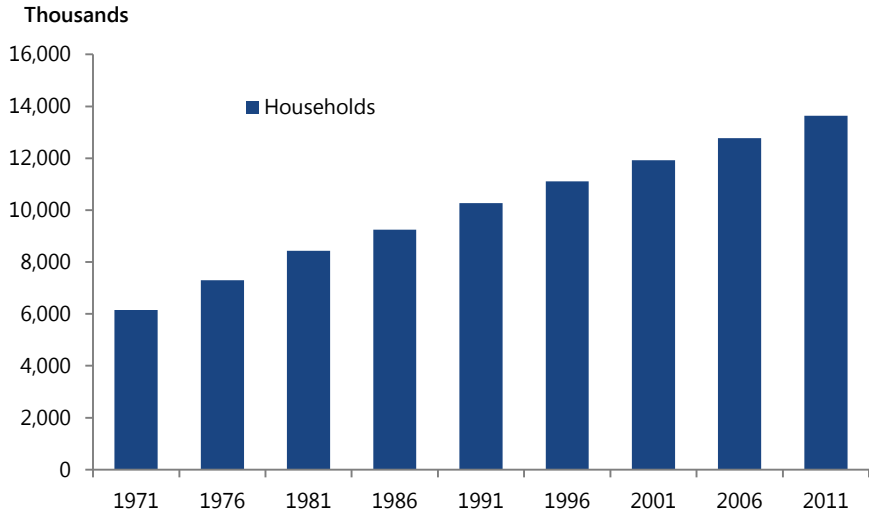
The headship rate is defined as the ratio of the number of household heads or household maintainers to the population 15 years of age and older.

In this report, we adopt the Census definition of a household, which is defined as a person or a group of persons (other than foreign residents) who occupy a private dwelling and do not have a usual place of residence elsewhere in Canada. Household formation is the net change in the number of households. It is a key driver of the demand for new housing units and is closely linked to residential construction.

In constructing historical estimates of the number of households, we follow other studies and make adjustments for Census undercounts by multiplying Census-based headship rates (that is, the ratio of the number of household heads or maintainers to the population 15 years of age and older) by population estimates that have been adjusted for undercounts. Headship rates were calculated for individual provinces and the (combined) territories for six age groups (15-24, 25-34, 35-44, 45-54, 55-64, 65+). At the national level, estimates of the number of households represent the aggregation across provinces, the territories and age groups.

Figure 2-1 presents our estimates of the number of households for Census years from 1971 to 2011. We estimate that the number of households in Canada has more than doubled over the 40-year period 1971 to 2011 from 6.2 million to 13.6 million.[6]

Figure 2-1 Number of households in Canada

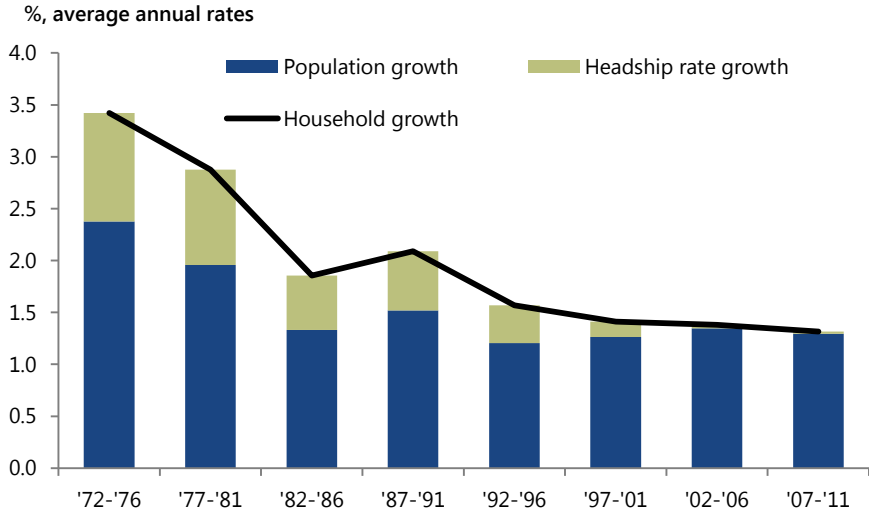


Sources: Statistics Canada and Parliamentary Budget Officer.

2.1. Decomposing household formation

Following Paciorek (2013), growth in the number of households can be decomposed into population (aged 15 years and older) growth and growth in the headship rate. Figure 2-2 shows that growth in the number of households decreased from 3.4 per cent (230,000) annually, on average, over 1972-1976 to 1.3 per cent (174,000) annually, on average, over 2007-2011. The decrease in household growth over this period was driven by similar declines, of approximately 1 percentage point, in population and headship rate growth.

Figure 2-2 Household growth decomposition

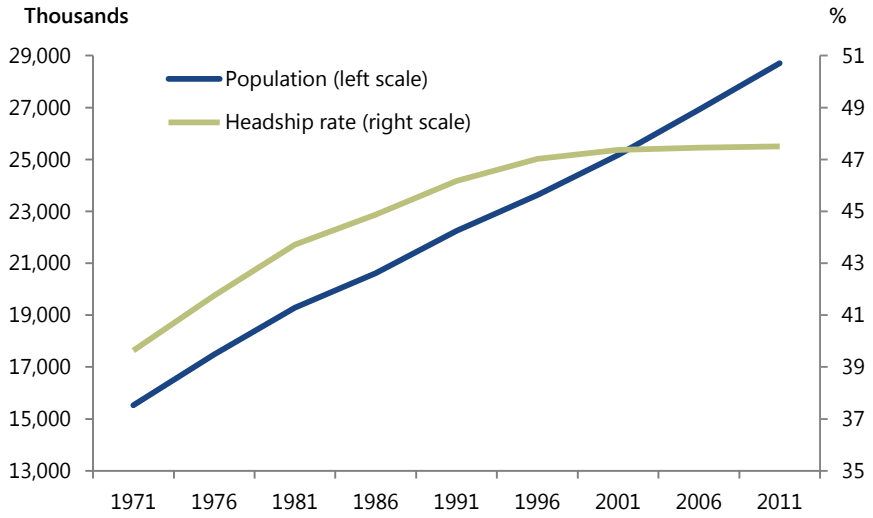


Sources: Statistics Canada and Parliamentary Budget Officer.

Note: A logarithmic decomposition of growth in households is used. Growth rates are calculated as the change in natural logarithms.

Moreover, since 2001, the growth in households was due almost exclusively to population growth, as the national, or aggregate, headship rate stabilized over this period (Figure 2-3).

Figure 2-3 **Population and headship rate**



Sources: Statistics Canada and Parliamentary Budget Officer.

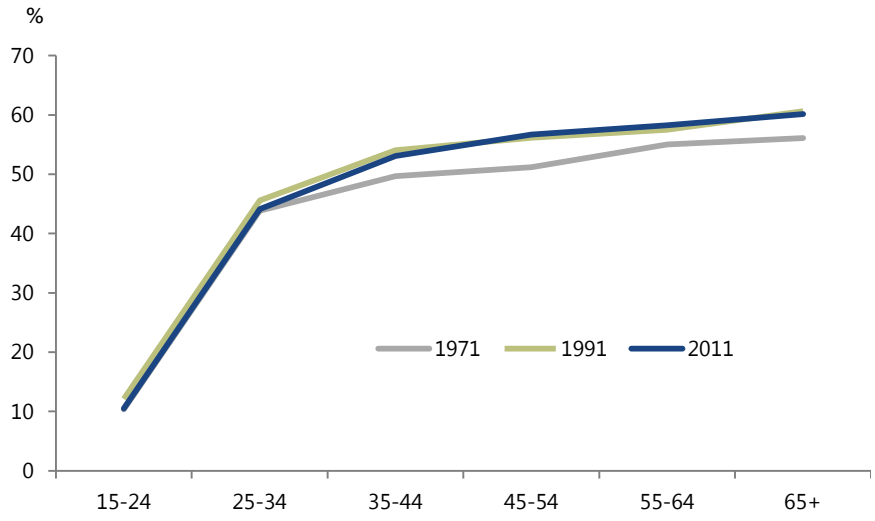
The decrease in the contribution from population growth in the 1980s reflects the sharp decline in the total fertility rate following the baby-boom period (1946-1966). However, the diminishing and ultimately negligible contribution from growth in the headship rate reflects offsetting factors. Again following Paciorek (2013), to examine these factors, it first helpful to represent the aggregate headship rate as a weighted sum of headship rates by age, where the weights are the shares of the population for a given age group.

$$HSR_t = \sum_{i=i}^{n} \left(\frac{Pop_{i,t}}{Pop_t}\right) \cdot HSR_{i,t}$$

Where HSR_t represents the aggregate headship rate at time t; $HSR_{i,t}$ represents the headship rate for the population age group i at time t; Pop_t represents the population aged 15 years and older at time t; and $Pop_{i,t}$ represents the population in age group i at time t.

Examining headship rates across age groups helps to illustrate their life cycle pattern (Figure 2-4). Lewis (2008) notes that younger age groups are more likely to share accommodation and therefore less likely to form households compared to older age groups. According to Lewis (2008), relatively more individuals in older age groups have "reached an age where independence, financial and otherwise, is the norm".

Figure 2-4 Headship rates by age groups

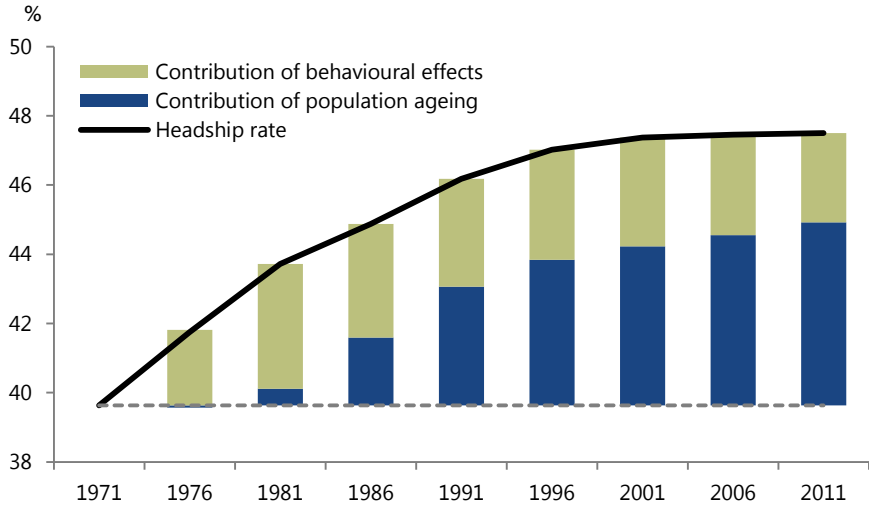


Sources: Statistics Canada and Parliamentary Budget Officer.

Given this life cycle pattern, an ageing population would, all else equal, result in an increase in the aggregate headship rate as the share of the population in older age groups rises. In terms of assessing fluctuations in the aggregate headship rate, we refer to this as the "demographic effect". However, age-group specific headship rates can also fluctuate and influence the aggregate headship rate. Paciorek (2013) refers to this as the "behavioural effect". As Lewis (2013) notes, behavioural effects can encompass a variety of economic factors such as unemployment, interest rates and income growth, and social factors such as attitude towards marriage and divorce.[7]

Figure 2-5 provides our estimates of the contributions from demographic and behavioural effects to the change in the aggregate headship rate from 1971 to 2011.[8] Our estimates indicate that since 1976, population ageing has put increasing upward pressure on the aggregate headship rate, accounting for approximately two-thirds of the increase in the aggregate headship rate observed over 1971 to 2011.

Figure 2-5 **Contributions to the change in the aggregate headship rate since 1971**



Sources: Statistics Canada and Parliamentary Budget Officer.

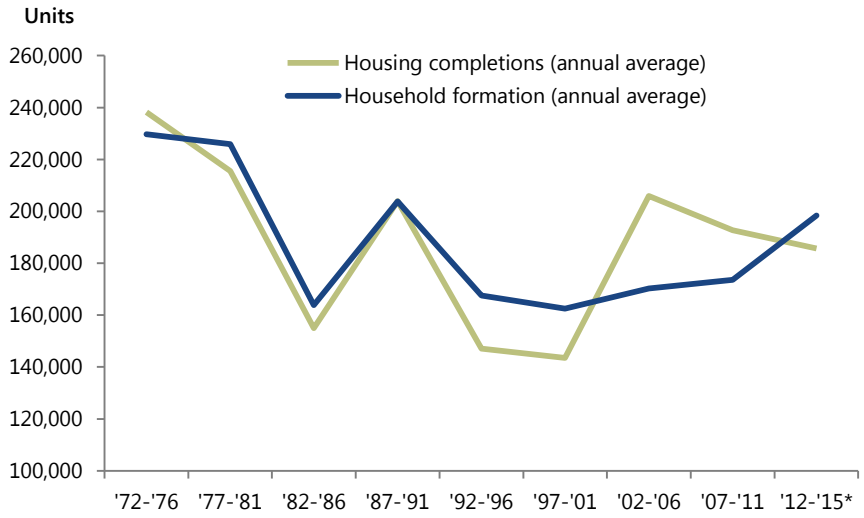
However, over the period 2001 to 2011, behavioural effects acted to offset the upward pressure from population ageing, stabilizing the aggregate headship around 47.5 per cent. Lewis (2013) also finds that over 2001 to 2011 individual age segments of the population were, on balance, less likely to form households. He notes that young people were somewhat more likely to be living with their parents in 2011 than people of comparable age in 2001.

2.2. Household formation and housing construction

As Lin (2016) and others have noted, the trend in household formation is linked to that for new housing construction given that the "housing stock must grow in order to accommodate increasing numbers of households". Thus, household formation serves as a useful benchmark to gauge housing construction activity.

Figure 2-6 shows that average annual housing completions closely tracked household formation over 1972 to 1991. However, over 1992 to 2001, household formation exceeded housing construction and then this dynamic reversed over 2002 to 2011 as housing construction surged. Lewis (2013) notes that definitive explanations for the imbalance between housing construction and household formation over 2002 to 2011 are elusive. That said, he does indicate that from 2002 to 2011, the number of dwelling units in Canada not occupied by usual residents (that is, vacant and secondary homes) increased by roughly the amount of the excess of housing completions over household formation.

Figure 2-6 Household formation and housing completions



Sources: Canada Mortgage and Housing Corporation; Statistics Canada; and Parliamentary Budget Officer.

Note: * Household formation over 2012 to 2015 is estimated assuming that age-group specific headship rates are unchanged from 2011 levels.

To examine potential developments since 2011, and in the absence of 2016 Census data, we construct an estimate of household formation based on the assumption that age-group specific headship rates in 2015 remain fixed at their 2011 levels. Consequently, over the period 2012 to 2015, household formation reflects only demographic factors (that is, population growth and population ageing).

Based on our demographic estimate, the excess of housing completions relative to household formation is eliminated over 2012 to 2015, as housing completions moderated to 185,700 units and household formation accelerated to 198,400 (net) new households. While there still remains an imbalance between household formation and housing construction over 2012 to 2015, the gap over this period is smaller (in absolute terms) compared to the periods since 1991.

Just as (net) household formation represents the "flow" into the "stock" of households, housing completions are the main flow into the housing stock. In the section that follows, we turn to the housing stock. Using our estimates of households and the housing stock, we will then be able to assess imbalances in the housing sector from a stock perspective.

3. Housing Stock and Vacancy Rate

As Reynaud (2015) notes, one of the shortcomings of publicly-available housing indicators is the lack of (annual) housing stock data beyond 2000. This stems from the termination of Statistics Canada's data in Table 030-0001 ("housing stock, dwelling units by type of dwelling and tenure, annual (units)").[9]

3.1. Estimating the housing stock, 2001-2015

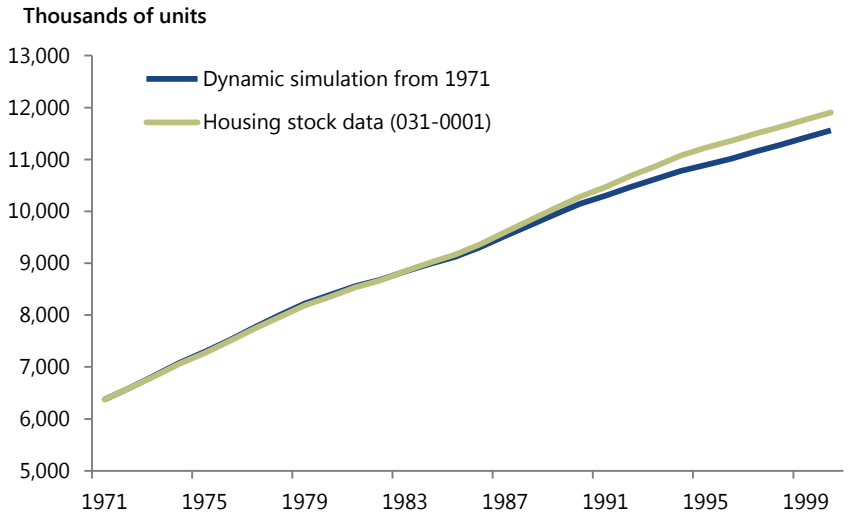
Following the approach used by Reynaud (2015), we construct annual estimates of the housing stock beyond 2000 by extrapolating the stock of units using the annual flows of housing completions, conversions[10] (that is, "additional housing units created from non-residential buildings or other types of residential units"[11]) and demolitions. The following equation describes the evolution of the housing stock:

$$\textbf{Housing stock}_t = \textbf{Housing stock}_{t-1} + \textbf{Completions}_t + \textbf{Conversions}_t - \textbf{Demolitions}_t$$

However, before constructing estimates for the period 2001 to 2015, it is a useful check to see how this approach performs by simulating the evolution of the housing stock over 1971 to 2000 using this equation and comparing the simulation results to the observed data over the same period.

Figure 3-1 compares the simulated housing stock results to the data from Statistics Canada. The simulated housing stock series, which includes singles and multiples, closely tracks the observed data up to about 1987, after which the simulated series diverges somewhat until 1994. Although the simulated series is lower than the observed data over the period 1994 to 2000, the discrepancy is relatively stable, averaging close to 3 per cent. Assuming that this relationship remains stable going forward, extrapolating the housing stock from the observed 2000 level would adjust for this discrepancy.

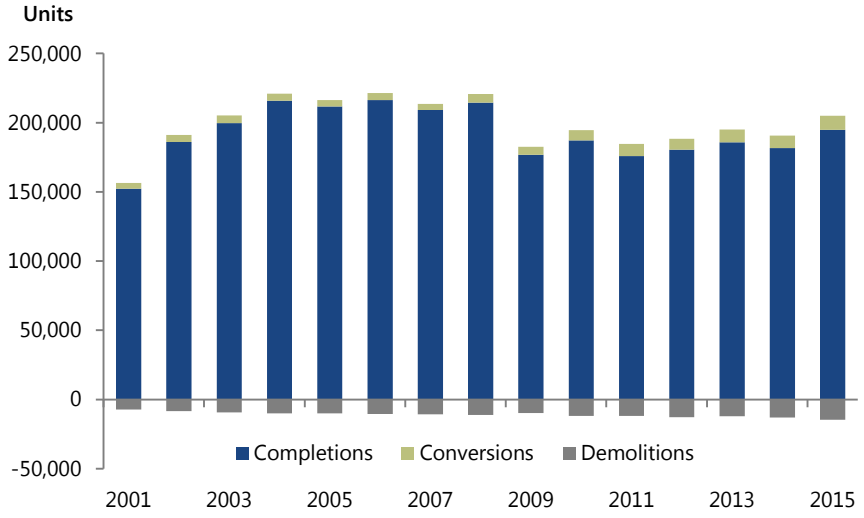
Figure 3-1 Simulated housing stock versus observed data



Sources: Statistics Canada and Parliamentary Budget Officer.

Based on our extrapolation, we estimate that the housing stock increased by approximately 2.8 million units from 11.9 million units in 2000 to 14.7 million units in 2015.[12] Figure 3-2 shows the contributions to the housing stock from the annual flows related to completions, conversions and demolitions. Not surprisingly, housing completions are the ultimate source of additions to the housing stock, with demolitions more than offsetting the contribution from conversions.

Figure 3-2 Contributions to the housing stock



Sources: Canada Mortgage and Housing Corporation; Statistics Canada; and Parliamentary Budget Officer.

3.2. The total vacancy rate

The total vacancy rate

The total vacancy rate represents the number of vacant units, for sale or rent, relative to the total stock of housing units, which includes both occupied and vacant dwelling units.

Statistics Canada's terminated series for the housing stock also included the breakdown by tenure, that is, by occupied and vacant dwelling units. Vacant units include units available for sale or rent. Expressing the number of vacant units relative to the housing stock provides a measure of the total vacancy rate. As CBO (2008) notes, the vacancy rate

> "is a key measure of the balance between supply and demand in the housing market. A low vacancy rate indicates excess demand, which stimulates construction. A high vacancy rate reflects excess supply, which dampens construction."

Thus, while assessing housing construction relative to household formation helps to gauge "flow" imbalances, taking into account the overall vacancy rate provides a "stock" perspective. For example, housing construction could be outpacing household formation, which all else equal, would suggest potential overbuilding. However, if this occurs in the context of a relatively low vacancy rate, then the potential for overbuilding would be diminished.

To assess the possibility of overbuilding conditions in the housing market, the Canada Mortgage and Housing Corporation (CMHC) uses the rental vacancy rate and the inventory of completed and unsold ownership and condominium housing units per 10,000 population.[13] While these indicators can also reflect imbalances in the housing market, they are not as encompassing as the total vacancy rate. For instance, the rental vacancy rate excludes units for sale and the inventory of completed-unsold units represents only recently constructed units and therefore is largely a flow-based measure.

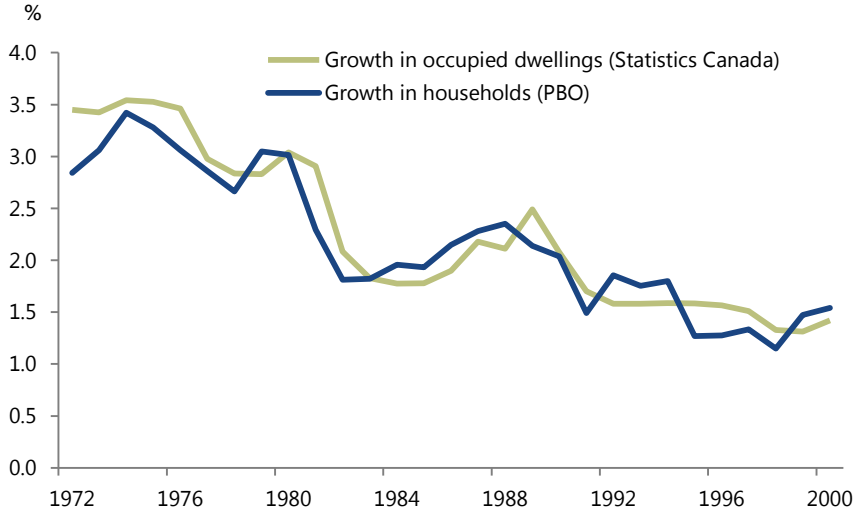
Given the lack of annual data beyond 2000, it is also necessary to construct estimates of vacant dwelling units to produce a measure of the total (that is, units for sale or rent) vacancy rate. Given our estimates of the housing stock over 2001 to 2015, we calculate the number of vacancies residually by subtracting estimates of occupied dwelling units from the housing stock.

Since, by definition, a household requires occupying a private dwelling, we extrapolate the number of occupied units beyond 2000 using annual estimates of the growth in the number of households.[14] To produce annual estimates of the number of households, we first interpolated headship rates between Census years and then multiplied these rates by Statistics Canada's annual population estimates.

Figure 3-3 shows the close relationship between our estimates of the annual growth in households with the growth in occupied dwelling units calculated from Statistics Canada's terminated series over 1972 to 2000. While not perfect, the correlation between the two series is very high. Further, on an annual basis, both series grew at approximately the same rate over 1972 to

2000. Over more recent horizons, their average annual growth rates are the same; for example, over 1986 to 2000, both series grew at 1.7 per cent on average.

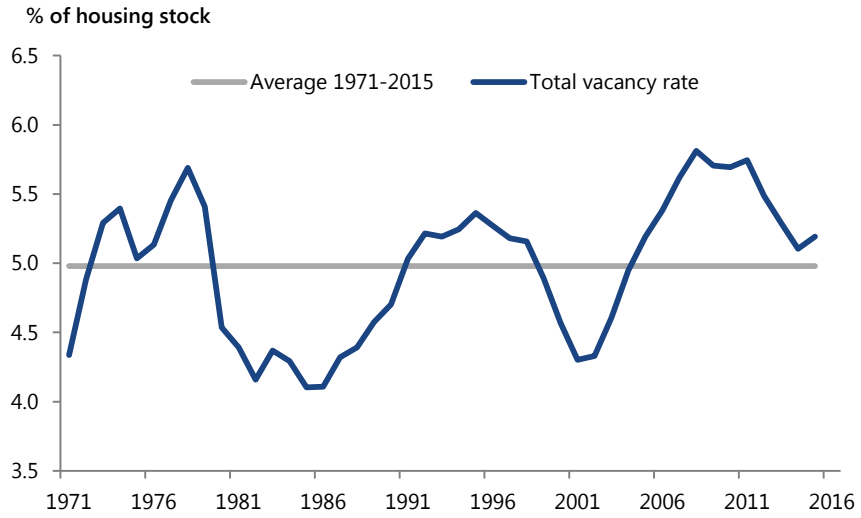
Figure 3-3 Annual growth in occupied dwelling units and households



Sources: Statistics Canada and Parliamentary Budget Officer.

Using our estimates of the housing stock and occupied dwelling units, we are able to extend Statistics Canada's total vacancy rate beyond 2000. Figure 3-4 shows that the total vacancy rate fell from 4.6 per cent in 2000 to a near-record low of 4.3 per cent in 2001 before rising to a record high of 5.8 per cent in 2008 as housing construction outpaced household formation over this period. The vacancy rate remain elevated in the aftermath of the global financial crisis as housing construction moderated and moved into line with household formation over 2009 to 2011. In 2012, the vacancy rate began to decline sharply, returning close to its long-term (1971-2015) historical average of 5.0 per cent, as housing construction remained subdued while the pace of household formation picked up.

Figure 3-4 Total vacancy rate, 1971-2015



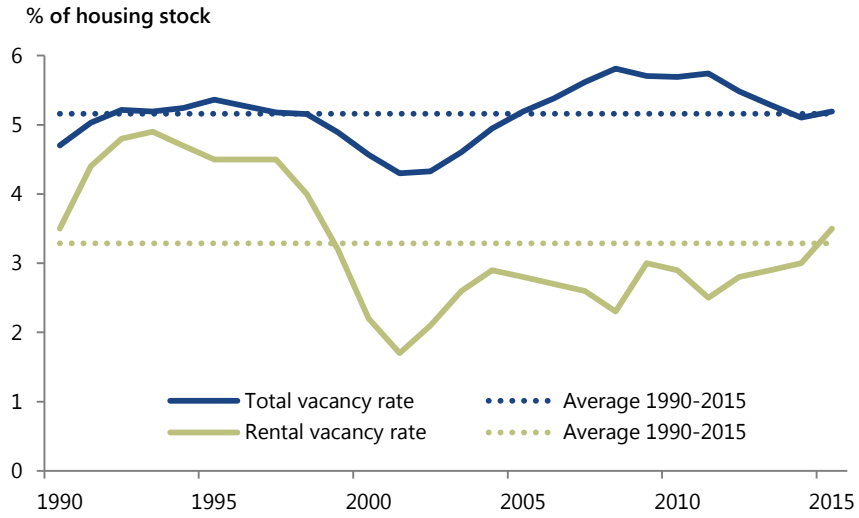
Sources: Statistics Canada and Parliamentary Budget Officer.

As Reynaud (2015) notes, "the difference between the vacancy ratio and its historical average is a measure of the disequilibrium in the housing stock".[15] Relative to its long-term historical average (5.0 per cent), our estimate of the vacancy rate in 2015 of 5.2 per cent suggests that there was still some excess supply in terms of the overall stock of housing units. Thus, while data and our estimates suggest that there was an imbalance between the flows of household formation and housing completions over 2012 to 2015, this helped to reduce the excess supply in the housing stock.

However, we would caution that our estimates of household formation over 2012 to 2015 reflect only the demographic demand for new housing. Including behavioural effects (that is, changes to age-group specific headship rates) would influence our estimates of household formation and the total vacancy rate over this period.

It is also interesting to compare our estimate of the total vacancy rate to CMHC's rental vacancy rate series, which begins in 1990. Figure 3-5 shows that the gap between the total rate and the rental rate widened after 1998. Over 1990 to 1998, the total vacancy rate exceeded the rental vacancy rate by 0.7 percentage points, on average. However, after 1998 the total vacancy rate exceeded the rental vacancy rate by 2.5 percentage points, on average.

Figure 3-5 Total and rental vacancy rates



Sources: Canada Mortgage and Housing Corporation; Statistics Canada; and Parliamentary Budget Officer.

Since 2005, on balance, the total vacancy rate has exceeded its historical (1990-2015) average while the rental vacancy rate has remained below its historical average. This would suggest that, over most of this period, while there was some excess supply of dwelling units for sale, there was excess demand for rental dwelling units. However, in 2015, both vacancy rates returned close to their longer-term averages, which would suggest that both the stock of units for sale and the stock of units for rent were close to being balanced.

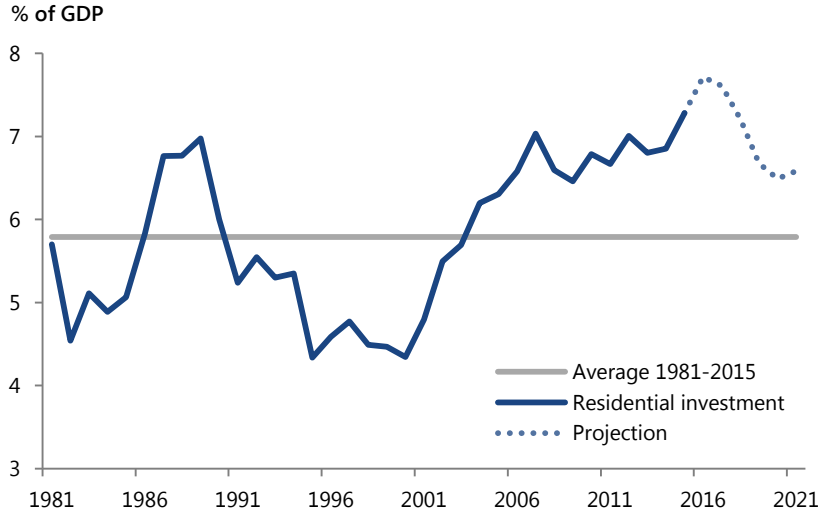
4. Medium-Term Prospects

The most recent data and our estimates suggest there was still some excess supply in terms of the overall stock of housing units in 2015. Given the recent concerns expressed about the elevated level of residential investment in the Canadian economy, it is useful to assess medium-term prospects for residential investment and the housing stock.

4.1. The outlook for residential investment

Based on PBO's October 2016 Economic and Fiscal Outlook (EFO),[16] the share of residential investment in the Canadian economy is projected to fall from 7.7 per cent of GDP in 2016 to 6.5 per cent of GDP in 2020 (Figure 4-1). The projected decline primarily reflects weaker residential investment volumes relative to real GDP, as opposed to weaker residential investment prices.

Figure 4-1 **Medium-term outlook for residential investment**



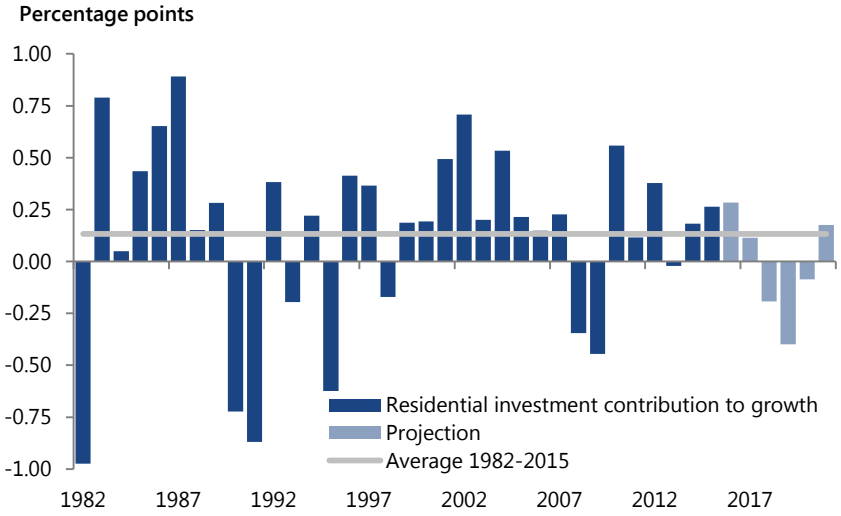
Sources: Statistics Canada and Parliamentary Budget Officer.

Note: The projection period covers 2016 to 2021.

Indeed, in PBO's October EFO, by the end of 2019, the level of residential investment (in volume terms) was projected to be almost 8 per cent below its level in the second quarter of 2016. To put this adjustment into context, it is helpful to examine the contribution of residential investment to real GDP growth over history and projection (Figure 4-2). The projected weakness in residential investment over 2018 to 2020 in PBO's EFO is broadly comparable to the collapse in residential investment observed in 2008 and 2009, which occurred during the global financial crisis. In contrast to the rebound in

residential investment observed in 2010, we are not projecting a similar bounce-back in 2021.

Figure 4-2 Contribution of residential investment to real GDP growth

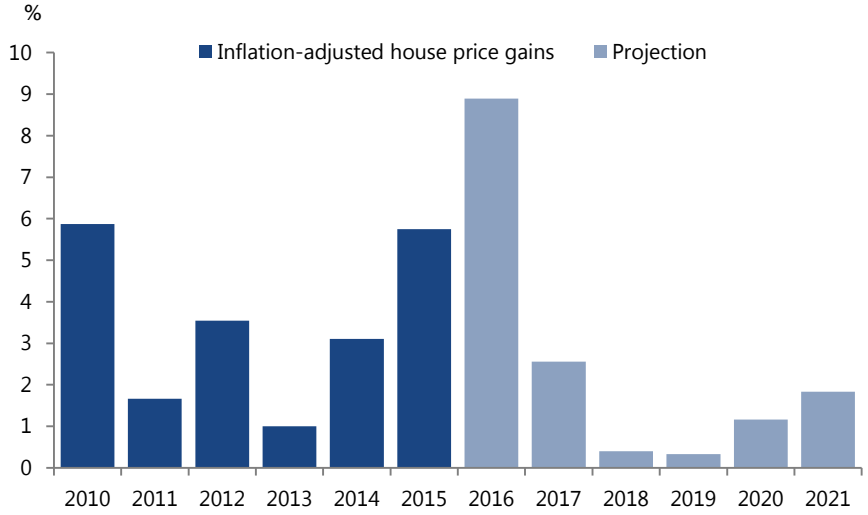


Sources: Statistics Canada and Parliamentary Budget Officer.

Note: The projection period covers 2016 to 2021.

The projected weakness in our outlook for residential investment largely reflects rising borrowing rates and a deceleration in house prices (Figure 4-3). In PBO's October EFO, we projected that inflation-adjusted house price gains would decrease from just under 9 per cent in 2016 to 0.3 per cent in 2019.

Figure 4-3 Inflation-adjusted increases in house prices



Sources: Teranet/National Bank of Canada; Statistics Canada; and Parliamentary Budget Officer.

Note: PBO's measure of house prices is based on the Teranet/National Bank of Canada Composite 11 index. The GDP implicit price index is used for the inflation adjustment. The projection period covers 2016 to 2021.

PBO's October outlook for residential investment incorporated Budget 2016 housing investment measures.[17] However, this outlook did not incorporate the impact of the Government's changes to housing insurance rules and income tax proposals that were announced on 3 October 2016.[18]

Although we have not undertaken an in-depth analysis of these new measures, our current judgement is that while they may alter the timing of our projected adjustment in residential investment over the near term, they are unlikely to meaningfully alter our medium-term outlook. That said, the Bank of Canada indicated that the effect of the new measures was "very uncertain" and incorporated a shock of -0.3 per cent on real GDP by the end of 2018 in its October 2016 outlook.[19]

Table 4-1 provides a comparison of PBO's outlook for residential investment to the Bank of Canada's October 2016 outlook, which incorporated the impact of Government's housing measures.[20] On balance, over the near term (2016 to 2018), PBO and the Bank of Canada's outlooks for the contribution of residential investment to real GDP growth are similar.

Table 4-1 PBO and Bank of Canada outlooks for residential investment (contributions to real GDP growth)

Percentage points				Projection			
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
PBO October 2016	0.3	0.3	0.1	-0.2	-0.4	-0.1	0.2
Bank of Canada October 2016	0.3	0.2	-0.2	0.1	-	-	-

Sources: Bank of Canada and Parliamentary Budget Officer.

4.2. Detailed outlook for the housing sector

In preparing its Economic and Fiscal Outlook, PBO does not produce a detailed projection of the housing sector (that is, the outlook for housing completions, conversions, demolitions and housing stock). However, to assess the evolution of the housing sector over the medium term, we use our outlook for residential investment to construct a projection of housing completions and conversions.[21] As well, we assume that demolitions will remain at their recent levels.

Our medium-term outlook for household formation is based on the same approach we used to extend estimates of the number of households beyond 2011. That is, using population estimates combined with the assumption that age-group specific headship rates remained unchanged at 2011 levels.[22] Table 4-2 summarizes our projection of the housing sector based on PBO's October 2016 outlook.

Table 4-2 Detailed housing sector outlook

Units, thousands				Projection			
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Housing completions	194.7	191.1	198.8	189.7	172.4	167.5	172.8
Conversions	10.3	10.1	10.5	10.0	9.1	8.8	9.1
Demolitions	14.7	14.7	14.7	14.7	14.7	14.7	14.7
Household formation	173.5	188.5	183.8	181.1	179.1	177.2	172.5

Sources: Canada Mortgage and Housing Corporation; Statistics Canada; and Parliamentary Budget Officer.

Based on PBO's October 2016 outlook for residential investment, we project that housing completions will increase to 198,800 units in 2017 before moderating to around 170,900 units, on average, over 2019 to 2021.

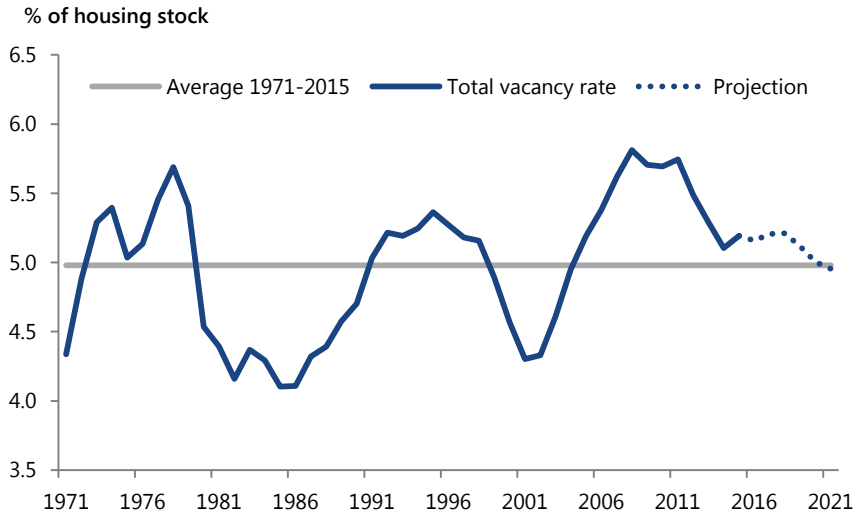
Household formation is projected to increase from 173,500 (net) new households in 2015 to 188,500 in 2016 before trending lower to 172,500 by 2021, which is in line with the number of housing completions. We would again caution that our projection of household formation over this period reflects only the demographic demand for new housing and does not incorporate behavioural effects (that is, changes to age-group specific headship rates).

The evolution of the housing stock is determined by the flows of housing completions, conversions and demolitions (see Section 3.1). Assuming that occupied dwellings grow in line with household formation, we can calculate residually the number of vacant units and the total vacancy rate over the projection period.

Figure 4-4 presents our projection of the total vacancy rate based on PBO's October 2016 EFO. We project that the total vacancy rate will remain close to 5.2 per cent through 2018 as net additions to the housing stock (that is, completions plus conversions less demolitions) track household formation. However, as residential construction activity weakens further in 2019 and 2020, the total vacancy rate decreases—even as household formation moderates—converging to its long-term historical average of 5.0 per cent.

Thus, based on PBO's October 2016 outlook, we project that the housing stock will return to balance over the medium term.

Figure 4-4 Outlook for the total vacancy rate



Sources: Statistics Canada and Parliamentary Budget Officer.

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Notes

1. Statistics Canada's measure of residential construction investment includes three components: investment in new housing construction; investment in renovations; and acquisition costs, which include "sales tax, land development and service charges, as well as record-processing fees for mortgage insurance and the associated premiums." See: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5016&lang=en&db=imdb&adm=8&dis=2.
2. An overview of the OECD Economic Survey of Canada is available at: http://www.oecd.org/eco/surveys/Canada-overview-OECD-economic-survey-2016.pdf.
3. See the February 2013 Selected Issues Paper prepared for Canada's 2012 Article IV Consultation available at: http://www.imf.org/external/pubs/ft/scr/2013/cr1341.pdf.
4. A logarithmic decomposition of the increase in the nominal share of residential investment in the economy from 2000Q1 to 2016Q3 shows similar-sized contributions from the relative price of residential investment (that is, the price of residential investment relative to the GDP price index) and the volume of residential investment relative to real GDP.
5. See IMF Working Paper WP/15/128, *Gauging Housing Supply in Canada: A Stock Approach*, by Julien Reynaud. Available at: https://www.imf.org/external/pubs/ft/wp/2015/wp15128.pdf.
6. Our estimates of the number of households in Census years 1971 to 2011 are very close to CMHC estimates presented in Lin (2016). Differences likely reflect the number of age groups used in the adjustment for Census undercounts.
7. See 2011 Census/National Household Survey Housing Conditions Series: Issue 1 Demographics and Housing Construction, 1971-2011. Available at: https://www.cmhc-schl.gc.ca/odpub/pdf/67972.pdf?fr=1475084056630.
8. Our decompostion of the demographic and behavioural effects differs from Paciorek (2013). To calculate the demographic effect, we project the aggregate headship rate forward from 1971 under the assumption that the age-group population shares (weights) remain at their 1971 levels. The difference between the observed aggregate headship rate and this projected rate is the (unadjusted) contribution from the demographic effect. The contribution from the behavioural effect is calculated similarly (age-group specific headship rates are maintained at their 1971 levels). To ensure that the combined contributions equal the observed increase in the headship rate, the unadjusted contributions are scaled such that their relative (percentage) contributions are maintained.

9. As Gabay (2015) notes, Statistics Canada does publish the census count of all private dwellings, which provides an estimate of the private housing stock. However, this data provides only a snapshot of the housing stock every 5 years. Further, Gabay (2015) cites concerns made by Statistics Canada about the quality of the data on "unoccupied dwellings and those occupied exclusively by foreign residents or temporarily present persons".

10. Following Reynaud (2015), we assume that all conversions occur within one year.

11. This definition is taken from Statistics Canada's description of residential investment. Available at: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5016&lang=en&db=imdb&adm=8&dis=2.

12. Although we appear to be using the same data and methodology as Reynaud (2015) to construct estimates of the housing stock and vacancy rate beyond 2000, we obtain different results. Unfortunately, we are unable to reconcile the differences given that the author is unable to provide us with his underlying data and calculations.

13. CMHC publishes a quarterly *Housing Market Assessment* that evaluates "the evidence of problematic housing market conditions at the national level, and in 15 Census Metropolitan Areas (CMAs)". The most recent assessment (Fourth Quarter 2016) is available at: https://www.cmhc-schl.gc.ca/odpub/esub/68456/68456_2016_Q04.pdf?fr=1479474499061.

14. We use annual *growth* in households, rather than the *level*, to extrapolate occupied dwelling units beyond 2000 because there are significant (level) differences between the number of households and the number of occupied dwelling units over the historical period 1971 to 2000 that we cannot reconcile.

15. While Reynaud (2015) constructs an estimate of excess supply of housing based on the historical average of the vacancy rate, he also undertakes a model-based analysis to incorporate other determinants of construction activity and construct an econometric estimate of housing stock disequilibrium. Reynaud (2015) argues that the measure of housing stock disequilibrium based on the long-term historical average of the vacancy rate reflects only demographic drivers and does not capture the influence of other determinants of construction activity.

16. Available at: http://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2016/EFO%20October%202016/EFO_OCT2016_EN.pdf.

17. These measures amounted to $1.359 billion in 2016-17 and $0.966 billion in 2017-18. See Table A2.2 in Budget 2016: http://www.budget.gc.ca/2016/docs/plan/budget2016-en.pdf.

18. Finance Canada's Technical Backgrounder is available at: http://www.fin.gc.ca/n16/data/16-117_2-eng.asp.

19. See the Governor of the Bank of Canada's opening statement following the release of the October 2016 *Monetary Policy Report*: http://www.bankofcanada.ca/wp-content/uploads/2016/10/opening-statement-191016.pdf.

20. See Table 2 in the Bank of Canada's October 2016 *Monetary Policy Report*: http://www.bankofcanada.ca/wp-content/uploads/2016/10/mpr-2016-10-19.pdf.

21. This is done using a regression model that relates growth in completions and conversions (combined) to growth in residential investment volumes (excluding ownership transfer costs). Given our October 2016 outlook for residential investment volumes (excluding ownership transfer costs), we then project the growth in completions and conversions over 2016 to 2021 using this model. For illustrative purposes, to distinguish between completions and conversions, we assume that the share of conversions in the combined total remains at its 2015 level of 5.0 per cent. In our stock-flow framework, in terms of additions to the housing stock, the distinction between completions and conversions is irrelevant.

22. The population projection is based on Statistics Canada's *Population Projections for Canada (2013 to 2063), Provinces and Territories (2013 to 2038)*: http://www.statcan.gc.ca/pub/91-520-x/91-520-x2014001-eng.pdf. The projection was updated to include the current population estimates for 2015. Beyond 2015, single-year age and sex groups (by province and territory) are extrapolated using the Statistics Canada projection.