

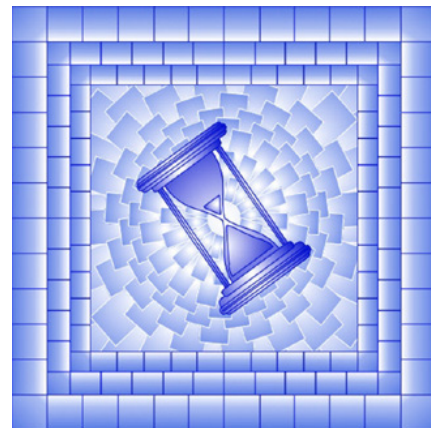
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## Prices Analytical Series

# Evaluating different approaches to measuring owned accommodation in the Consumer Price Index

by Patrick Sabourin and Faouzi Tarkhani

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# Evaluating different approaches to measuring owned accommodation in the Consumer Price Index

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## Executive Summary

### Introduction

In the context of the Consumer Price Index (CPI), owned accommodation (OA) refers to the cost of owning a home and how this cost changes over time. The measurement of OA in the CPI is an area of ongoing debate, with no current consensus on a preferred method as each has its own advantages and disadvantages. This analysis explores alternative treatments of OA in a Canadian context and demonstrates what housing inflation would have looked like in Canada over the past 20 years using alternative approaches.

### Background

The method used to calculate the CPI follows accepted [international standards](#). The CPI serves various purposes, including the indexation of payments (such as public and private pensions) and tax brackets, as a deflator of other economic aggregates, as a tool for setting monetary policy and as a gauge for the wellbeing of the economy. The approach adopted by Statistics Canada in calculating the CPI must balance these various uses of the CPI. OA is a key CPI component, representing nearly 18% of the CPI basket of goods and services, and therefore has a significant impact on the all-items CPI. Statistics Canada's current treatment of OA aligns with the conceptual basis that best satisfies the principal purpose of the CPI and reflects price change for the average Canadian. When it comes to housing inflation and affordability, the challenges Canadians encounter when entering the current housing market are illustrated in a number of Statistics Canada products, including the [Housing Statistics Portal](#), indicators of [household wealth and affordability](#), and [distributions of household economic accounts](#).

### Treatment of owned accommodation

There are four main approaches to OA: the acquisition/net acquisition approach, the payments approach, the rental equivalence approach and the user cost approach, with some countries excluding OA from the CPI entirely. The Canadian CPI uses a variant of these approaches that measures the change in the cost of owning (rather than buying) a home by tracking the ongoing costs of homeownership, including replacement cost, mortgage interest cost, property taxes, homeowners' home and mortgage insurance, homeowners' maintenance and repairs and other OA expenses, while excluding the principal mortgage payment and capital gains. Using this method, price changes in the housing market are represented in the CPI, either explicitly (replacement cost and mortgage interest cost) or implicitly (property assessment values affecting taxes, the replacement cost of houses affecting insurance premiums). In short, the Canadian CPI, like most others around the world, treats housing as a service people use and incorporates the price of that service into the index, rather than including the purchase price of an asset.

While each method has advantages and disadvantages and, globally, there is no consensus on a preferred method, there are situational factors in different countries that may impact the suitability of one or more of these approaches in a specific market. For instance, while the rental equivalence approach is the most commonly used worldwide, countries employing it typically feature less regulated and deeper rental markets. This includes many European countries, where the rental equivalence method is supported by extensive and high-quality rental data, and the United States, where changes in the financial markets and the emergence of new types of mortgage instruments in the early 1980s created additional complexities in accurately estimating the expenditure weight and monthly price movement of contracted mortgage interest costs. Australia and New Zealand employ the net acquisition approach, as both countries have robust data on building costs, which allow them to price a housing structure separately from land. No countries employ an acquisition approach and only Ireland uses a payment approach.

## Analysis

In analyzing the impact of each approach on the OA index, the acquisition approach, followed by the net acquisition approach, resulted in the largest increases to the index over the last decade. The Canadian approach was third, closely followed by the payments approach but firmly above the rental equivalence and user cost approaches. The Canadian approach to OA and the other main methods all result in analytical CPI series that trend similarly over time. The acquisition approach generates the most volatility, reaching the highest peaks during housing booms and the lowest troughs during busts. This volatility indicates that the acquisition approach is not an appropriate method for indexation purposes, to either homeowners or renters. Therefore, this approach is not used in any other countries for CPI calculation.

## Conclusion

This analysis demonstrates that the official treatment of OA used in the Canadian CPI remains the best approach for Canada. This approach is aligned with the conceptual purpose of consumer price indexation, balances the various uses of the CPI by limiting volatility, can be produced using existing data sources and serves as a middle ground between the acquisition and net acquisition approaches, which have trended higher in the past decade, and the payments, rental equivalence and user cost approaches, which have trended lower.

For these reasons, there are no plans to make changes to the treatment of OA currently used for CPI calculation. Any subsequent changes to the CPI methodology would require in-depth consultations with Statistics Canada's advisory committees and other national statistical organizations, as well as with external stakeholders, to ensure the ongoing quality, accuracy and utility of the CPI as a tool for both indexation, setting monetary policy and gauging the health of the economy. The goal remains to produce a CPI that is relatively stable, best serves its intended uses and better reflects the experiences of Canadians. Working with price experts, other national statistical organizations and partners ensures that the data and methods used in the calculation of the CPI are aligned with international standards and best practices.

## **Preface**

As part of an ongoing research program into major challenges involved in the construction of consumer price indexes, this research paper is a collaborative project between Statistics Canada and the Bank of Canada. It focuses on constructing analytical price index series for Canada, using the main owned accommodation measurement concepts proposed by the International Consumer Price Index Manual and adopted by other countries.

This paper has been reviewed and has undergone extensive consultation with various research groups, such as the Ottawa Group, United Nations Prices Sprint, Statistics Canada's Price Measurement Advisory Committee, and many other stakeholders. The views expressed in the papers are those of the authors and do not necessarily reflect the positions of the Consumer Prices Division, Statistics Canada, or the Bank of Canada.

## 1. Introduction

The Canadian Consumer Price Index (CPI) is an indicator that measures the price change of a fixed basket of consumer goods and services through time. This fixed basket contains goods and services that typical households purchase over a specified period. The prices of around 1,400 unique goods and services across the country are collected on a monthly basis.<sup>1</sup> These collected prices are used to calculate price indexes and produce the CPI according to [international standards and methods](#), which are regularly updated and reviewed by price statistics experts.

The CPI basket consists of eight primary categories: food; shelter; household operations and furnishings; clothing and footwear; transportation; health and personal care; recreation and education; and alcoholic beverages, tobacco and recreational cannabis.

Shelter, which includes rented accommodation and owned accommodation (OA), is one of the largest components, accounting for almost one-third of the CPI basket. Addressing what OA measures and how it is measured is among the most challenging aspects of developing consumer price indexes. There are several internationally recognized approaches to the treatment of OA; however, there is no international consensus on how price change for OA should be measured in the CPI. These diverse approaches are attributable to the intricate nature of homeownership, which complicates the task of identifying and measuring price changes. They also stem from the varying needs of users with respect to the CPI.<sup>2</sup>

The CPI is an important statistical indicator that is used not only for monetary policy, but also for many other uses and purposes. Governments, businesses and individuals use it to adjust specific contractual or legislated payments, such as wages, rents and social security. These adjustments are meant to maintain purchasing power. Consequently, the CPI excludes assets because they cannot be associated with the specific current consumption of any particular good or service. Conceptually, an owner-occupied dwelling can be considered as an asset or a consumption good—or both.

There are several approaches for the treatment of OA in the CPI. The rental equivalence approach gauges the cost of homeownership as if owners were renting their properties to themselves. The user cost approach considers the perceived costs of owning a home, while the payment approach assesses actual housing expenses.<sup>3</sup> The (net) acquisition approach treats an owner-occupied dwelling like any other CPI household durable good, measuring the cost paid by a household to acquire a house (including or excluding the land). Finally, one approach considers OA as a pure investment and therefore excludes from the CPI any effect of price change related to the purchase and use of an OA.

In addition, the treatment of OA is an integral part of the discussion on how to explain the gap between perceived inflation (measured by the Bank of Canada's Canadian Survey of Consumer Expectations) and measured inflation. The difference between the price of a house (or how much it costs to buy a house) and the cost of owning a house can be a source of confusion that affects consumers' perception of inflation, potentially widening the inflation perception–measurement gap. While this source of confusion should not dictate how to appropriately measure OA, it may still have an impact on the credibility of the CPI as the official measure of inflation. Therefore, it is important to communicate the reasoning behind the adoption of a specific approach. The rest of this paper will address common questions that typically emerge on this topic:

- To what extent is the perception–measurement gap stemming from the conceptual difference between the cost of a house and the cost of housing?
- What would an analytical CPI look like under various OA measurement scenarios?

The objective of this paper is to review the pros and cons of each available approach to measuring OA and determine how analytical CPI inflation would vary with each approach, especially in the current context of high inflation. The goal is thus not to narrow the gap between perceived and measured inflation by using different

1. Some goods and services are on an intermittent basis (quarterly, semi-annual, etc.).

2. See [Consumer Price Index Manual: Concepts and Methods, 2020](#).

3. Diewert and Nakamura (2009) introduced the concept of opportunity cost as the potential benefit that an individual homeowner forgoes by not making the optimal decision. This decision is based on the greater value between the cost to rent an equivalent dwelling and the owner or user costs. See Section 2 for more details.

constructions of the OA component of the CPI.<sup>4</sup> This analysis does not aim to propose a change in either the current measurement methodology or the interpretation of the CPI with respect to housing inflation and affordability, given that alternative approaches already exist. The challenges Canadians encounter when entering the current housing market are illustrated in a number of Statistics Canada products, including the [Housing Statistics Portal](#), indicators of [household wealth and affordability](#), and [distributions of household economic accounts](#).

This paper presents the construction of analytical CPI series for Canada, using the main OA measurement concepts proposed by the International Consumer Price Index Manual and adopted by other countries. This approach aims to evaluate the impact of different concepts and enable bilateral comparisons of inflation performance. Statistics Canada's analytical CPI series, based on four primary concepts of owner accommodation, are estimated for the period from January 2001 to April 2023. In the following section, the paper will present in detail the different approaches of measuring OA, along with their respective analytical CPI series. Each will be assessed in the Canadian context using several criteria, including the purpose of each approach, practical considerations and data limitations. Finally, implications for monetary policy and the inflation perception–measurement gap will also be discussed.

Annexes A and B include information on data sources and estimation methods for expenditure weights and price estimation for each OA approach.

## 2. Alternative approaches for cost of owned accommodation

In a market economy, measuring the price of rental housing services is relatively easy, because a consumer pays rent charged by a landlord for providing accommodation. By contrast, the landlord and occupier are the same person for owner-occupied housing, and there is consumption of housing services but no measurable rent. How statistical agencies should treat OA in their CPI is a complex and difficult question given the relative importance of OA services in the CPI and the different results when each approach is used to calculate the CPI.

### Approach 1: Acquisition approach

In the acquisition approach, OA services are considered a consumer good and treated similarly to other durable goods in the CPI. That is, all expenditures on a house purchase are attributed to the period of purchase, including structure and land, even though the use of the purchased house extends beyond that period. In other words, the full purchase price of the house would be captured in the month it is purchased, even though consumers are likely to finance this purchase with a mortgage and use this house over a longer period of time.

This approach includes property taxes, home insurance premiums, maintenance and repairs, and other expenses, as well as net purchases, of the housing unit, including renovations and alterations. Each component is associated with an expenditure weight that would be used for calculating the CPI. The expenditure weights for net purchases are calculated by taking the difference between the value of house purchases and the value of house sales during the reference period.

Intuitively, one could infer that the value of the net purchases should cancel out, but this is not the case. In fact, the positive value of net home purchases can be explained by the construction of new units that have been added to the market during the year and the withdrawal of units because of demolition, natural events or other reasons. It also includes the net purchases of the household sector from other institutional sectors, such as the corporate, government or non-profit sectors, including purchases of second-hand dwellings and buildings converted to residential dwellings.

### Approach 2: Net acquisition approach

Similar to the acquisition approach, the net acquisition<sup>5</sup> approach also treats a dwelling as the purchase of a good, but it makes a distinction between the house and the land. It considers the cost of land as a capital good (asset),

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4. It is not feasible to use a consumer inflation expectations survey as a benchmark for the quality of a CPI. Therefore, relying solely on one survey and not considering other inflation expectation surveys is a significant limitation.

5. See [Report from the Commission to the European Parliament and the Council](#), 2018.



and thus out of scope for the CPI, and the cost of the structure (house) as consumption. The structure can be consumed over time (consumption of fixed capital), while the land generally appreciates in value. The separation of the cost of the land from that of the structure involves considerable practical difficulties. Therefore, accurately estimating the structure price and its expenditure weights is challenging.

For this approach, the expenditure weight for the OA component in the CPI basket corresponds to the purchases of new dwellings or dwellings purchased by households from sectors other than households (excluding land) and major repairs and maintenance. The weight would be based on the value of the structure and would not include interest payments associated with the financing. Last, it should be noted that the resale of houses from one household to another is outside the scope of the CPI. Such transactions do not constitute new additions to a household's stock of houses. Including resale housing would lead to double-counting the same housing units, because they were already accounted for in previous years when initially purchased as new units.

Dion and Sabourin (2011) emphasize the significance of a CPI that reflects the instantaneous utility derived from the purchase of goods and services, aligning with the concept of a cost of living index (COLI).<sup>6,7</sup> They provide a detailed evaluation and analysis of OA approaches and the various needs and requirements of CPI users. They find that both the acquisition and net acquisition approaches are useful for measuring price inflation for the purpose of monitoring central bank monetary policy, because they instantly encompass the effect of house price increase in the CPI. However, the acquisition approaches are not consistent with uses of the CPI as an escalator for nominal income (cost of living indexing), because they do not consider the flow of services that are generated by an OA.

### Approach 3: Rental equivalence

A third approach is to account for the shelter services that are generated by an OA as though the homeowners rented their dwellings to themselves. Since these prices are not observable and cannot be determined on the basis of a market transaction, they are imputed from another series, such as the rent series, or through the administration of a separate owner's rental equivalence survey.

In this approach, the OA expenditure weight in the CPI basket would be based on the estimated rental expenditure by homeowners in the basket reference year.

The advantage of this approach is that housing services for owner-occupied dwellings are treated similarly to shelter services in the rented accommodation market. Whether the occupant of the dwelling is a tenant or a homeowner does not prevent statisticians from comparing their aggregate accommodation expenditures across households.

The rental equivalence approach is suitable for a COLI, as it relies on estimates of the price of current consumption of accommodation services. While rental equivalence prices do not directly reflect housing price effects, they do capture indirect changes in house prices. This is because they are imputed from tenants' rental prices (or closely tied to them), which are affected, at least in the long term, by house price changes. However, it is important to mention that because of provincial and municipal regulations and interventions in the local rental markets, such as rent controls, the direct effect of house prices on the rental equivalence index is limited.<sup>8</sup> As a result, Dion and Sabourin (2011) argue that the rental equivalence index offers limited utility for monetary policy. A key reason is the need for price imputations, which are not directly observable. Further, the lack of adjustments to this index because of rent control laws further limits the usefulness of this approach as a tool for setting monetary policy.

In addition, Hill et al. (2020) find that the rental equivalence approach is prone to missing the signs of a housing overvaluation. This is because such overvaluation is driven by the expectation of future capital gains rather than rising rents. As a result, this poses challenges for setting monetary policy.

6. The COLI measures changes in the cost of maintaining a given level of well-being for a group of consumers.

7. By design, the CPI is not a COLI. Although it may serve as a close approximation for a COLI, they are not directly comparable. The CPI is based on a fixed basket of goods and services, which represents the average Canadian household's spending habits. The CPI measures the average change in retail prices encountered by all consumers in Canada. By contrast, the objective of a COLI is to measure price changes experienced by consumers in maintaining a constant standard of living. A COLI can be linked to the notion of the minimum amount of money that would be necessary in different periods to ensure a given level of well-being.

8. Rental control makes the house price-to-rent ratio not stationary, at least in the short term.

## Approach 4: Payment approach

This approach, which measures actual cash flows, assumes that OA services are equivalent to the actual payments made by homeowners (such as mortgage interest payments and other operating expenditures). Opportunity costs (such as capital gains), imputed costs (such as depreciation) and investment costs (such as down payments and mortgage principal payments) are excluded.

The payment approach encompasses five<sup>9</sup> of six components of Statistics Canada's OA approach. The sole exception is replacement cost, which pertains to the portion of owner-occupied dwellings presumed to be consumed. This is represented by the worn-out structural portion of housing (depreciation of housing) or the amount a homeowner must spend to maintain the market value of the home. Unlike other owner accommodation components, it does not constitute an out-of-pocket expense. Therefore, being imputed, it is excluded from the OA cost under the payment approach.

It is essential to highlight that the term "replacement cost" is not synonymous with "homeowners' maintenance and repairs." The latter encompass direct expenses incurred to restore the house's physical condition and operation to a specified standard; thus, these costs are paid to keep the house in good working order or maintain its appearance.

Some economists argue that the payment approach appropriately serves the CPI's primary use as an escalator for nominal income. Dion and Sabourin (2011) argue that the payment approach is not fully consistent with cost of living indexing since it ignores the replacement cost, one of the most important components of OA. It is also less desirable from a monetary policy standpoint, because it gives a prominent role to the mortgage interest cost, a component that is volatile and may send a misleading signal about the stance of monetary policy.<sup>10</sup>

## Approach 5: User cost approach

The user cost approach is derived from the capital theory that assumes the user cost is an estimation of a home's rental price based on the costs of owning a house. User costs encompass actual and imputed ongoing costs for OA. Therefore, an owner would incur interest costs and opportunity costs during the period of ownership (actual interest costs on mortgages or a forgone rate of return on owned funds that could otherwise have earned interest), a replacement cost, and other operating costs (such as fees for maintenance and repairs, property taxes, and insurance premiums). Offsetting these expenses would be an expected capital gain (the expected selling price at time of disposal less the purchase price).

A simplified user cost<sup>11,12</sup> method is defined as follows:

$$u_t = p_t(r_t - g_t + \delta_t + \omega_t)$$

$u_t$  is the user cost for owner-occupied dwellings

$p_t$  is the average housing price<sup>13</sup>

$r_t$  is the real interest rate

$g_t$  is the real rate of capital gain on housing

$\delta_t$  is the depreciation rate

$\omega_t$  is the rate of operating and average transaction costs (including taxes).

9. These items are the mortgage interest cost, property taxes, homeowners' insurance premiums, homeowners' maintenance and repairs, and other OA expenses.

10. One could argue that this also applies to the official approach. However, because of the reduced weight of the mortgage interest cost in the official approach caused by the accounting of the replacement cost, the impact of mortgage interest cost volatility is diminished.

11. Hill et al. (2020), [Owner Occupied Housing, Inflation and Monetary Policy](#).

12. The formula presents potential issues. First, the housing price used corresponds to the average housing price, which encompasses both the land and structural components. While the structure is subject to depreciation, the land is not. Furthermore, the appreciation rate of the structure typically differs from that of the land. It is more accurate to apply the user cost formula to these two components separately. In addition, some also suggest that the user cost should factor in nominal capital gains and depreciation rates rather than real rates.

13. Three types of housing prices are used: the New Housing Price Index, the Resale Housing Price Index and a hybrid housing price index (see Annex B for more information).

This analysis uses five variants<sup>14</sup> of the user cost approach:

- a simple user cost variant where real interest rate  $\bar{r}_t$  and capital gain  $\bar{g}_t$  are fixed and set equal to the average long-run natural rate of interest; a rate<sup>15</sup> that would equate saving and investment in full employment condition
- alternative variants<sup>16</sup> of the user cost where real interest rate  $\bar{r}_t$  and capital gain  $\bar{g}_t$  are variables;  $\bar{r}_t$  is the weighted average real interest rate,<sup>17</sup> and real capital gains are based on different horizon lengths of expectation formation, such as 0, 10, 25 and 30 years.

The user cost approach is consistent with COLI. However, there is a negative relationship between an expected housing appreciation and the user cost. That is, in a period of rising house prices, where  $\bar{g}_t$  (the real rate of capital gain on housing) becomes very high, there is a significant risk of obtaining a negative value for the estimate of the OA price using the user cost approach.

Rising home prices have direct effects on household wealth. However, the question becomes whether it is appropriate to capture this increase in wealth through a decline in the price index. It seems reasonable to assert that people may feel wealthier in a housing boom, not because the price of housing services has decreased, but because their comprehensive income, combined with the capital gains (from the rising value of their property), has increased. It seems unconventional to capture this increase in wealth statistically via a decline in the cost of housing services price index.

In addition, this approach may overstate the extent to which people are better off in a housing boom. The user cost approach seems to equate the increase in a house's value (a form of wealth) directly with the cost of borrowing money (such as mortgage interest). While interest charges are actual cash payments that households must make, the increase in a house's value is less concrete. It is a potential increase in wealth that may not be realized unless the homeowner sells the house at that increased value.

## Approach 6: Diewert and Nakamura's opportunity cost approach

Given the constraints of the user cost approach and its underlying assumption, which views the user cost as an estimate of the market rental price, its validity as a measure for OA services has been challenged (Verbrugge, 2008). To address this issue, Diewert and Nakamura (2009) introduced an alternative methodology known as the opportunity cost approach.

This concept is the potential benefit an individual homeowner misses out on by not making the best decision:

- At the individual homeowner level, Diewert and Nakamura (2009) define the owned accommodation opportunity cost (OAO) as the greater value between the cost to rent an equivalent dwelling (the rental equivalent  $t$ ) and the owner or user costs.
- At the national level, Diewert and Nakamura (2009) define the OAO index as a weighted expenditure share of the rental equivalence index and user cost index. The expenditure share weight of the rental equivalence index represents the estimated segment of owned properties where the cost to rent an equivalent dwelling surpasses the owner or user costs.

14. For all variants, the official estimations of  $\delta_t$  and  $\omega_t$  were used (depreciation/replacement cost and other transaction costs). For more details on these components, see the [Canadian CPI reference paper](#).

15. It is set equal to 2.5%. It is based on the Kichian (2015) study, which estimates that, in equilibrium, the real interest rate is between the values of 2.4% and 2.7%, from 1999 to 2005 in Canada.

16. User cost (0) variant, user cost (10) variant, user cost (25) variant and user cost (30) variant, where  $\bar{r}_t$  and  $\bar{g}_t$  are variables, and the real rates of capital gain are respectively null and the geometric mean of the 10-year, 25-year and 30-year real rates of capital gain.

17. It is calculated as (30% of Government of Canada marketable bonds 10 years, average yields plus 70% of mortgage interest rate) minus expected inflation rate 1.9% (average annual inflation rate over the 2001 to 2021 period).

Diewert and Nakamura's (2009) opportunity cost addresses the limitation found in the user cost approach, especially when there are elevated expectations for housing prices. In such cases, there is a pronounced risk of the user cost estimates returning a negative value. By taking the greater value between rental equivalence and user cost, the Diewert and Nakamura (2009) opportunity cost ensures values are never zero or negative. This approach is pertinent to homeowners with either positive or no home equity.

However, this approach presents issues associated with micro-aggregation stemming from differences between low-end and high-end dwellings. While the user cost and imputed rents are similar for low-end dwellings, the imputed rent is roughly half the user cost for high-end dwellings. This discrepancy arises because renters may not be able to afford the complete cost of ownership for premium properties.

In terms of CPI use, this characteristic of a combination of rental equivalence and user cost approaches makes it consistent with the cost of living indexing; however, Dion and Sabourin (2011) find it challenging in terms of monetary policy use. This method does not address the limitation of including an interest rate component of the user cost.

No statistical agency has adopted this approach because the necessary data for its implementation are unavailable. However, Bettina Aten<sup>18</sup> (2018) and Bettina and Heston<sup>19</sup> (2020) successfully estimated the OA price index using the opportunity cost approach applied on American Community Survey data.

### Approach 7: Statistics Canada's owned accommodation approach<sup>20</sup>

In the Canadian CPI, the OA index measures the impact of price changes on the cost of using a fixed stock of dwellings. By accounting for homeowners' specific costs, this approach is consistent with COLI concept.

Homeowners' specific [shelter costs in the Canadian CPI](#) include the following components:

- replacement cost (or depreciation cost)<sup>21</sup>
- mortgage interest cost
- property taxes
- homeowners' home and mortgage insurance
- homeowners' maintenance and repairs
- other OA expenses.

Changes in house prices affect all components of homeowners' specific costs to some degree, either explicitly or implicitly. They directly affect the mortgage interest cost<sup>22</sup> and replacement cost,<sup>23,24</sup> as the house price is part of the calculation of price indexes for both components. House prices indirectly affect property taxes through property assessment values and homeowners' insurance through the value of the replacement cost of houses. Dion and Sabourin (2011) find this approach to be an acceptable compromise between the monetary policy purpose and the escalation purpose of the CPI.

Table 1 presents a detailed breakdown of various housing-related components and how they are considered across different OA approaches. Each component is marked with a check mark (✓) if it is applicable to the respective approach. It is notable that no approach considers principal mortgage payments or down payments as part of its calculation.

18. See [Valuing Owner-Occupied Housing: an empirical exercise using the American Community Survey \(ACS\) Housing files](#), 2018.

19. See [The Owner-Premium Adjustment in Housing Imputations](#), 2020.

20. Considered as a variant of the user cost approach.

21. This is the amount of OA that is assumed to be used up.

22. The mortgage interest cost index is calculated as the product of two sub-indexes: (1) the interest sub-index, which measures the effect of changes in the interest rate on mortgage interest payments, holding the principal outstanding constant, and (2) the house sub-index, which measures the effect of changes in house prices on the initial amount of mortgage debt and thus the principal outstanding in subsequent periods, holding interest rates constant.

23. Dion and Sabourin (2011) find the mortgage interest cost and replacement cost statistically significantly sensitive at medium term to housing price movements.

24. For the replacement cost, the price index is derived by taking the total value of homes owned in Canada at the end of the basket reference year and adjusting the total each month by changes in house prices as reflected by the New Housing Price Index, excluding land.

**Table 1**  
**Components for each owned accommodation approach**

Components	Canada – user cost variant	User cost	Payments	Acquisition/ net acquisition (excludes land value)	Rental equivalence
Home purchase (structure and land or structure only)				✓	
Investment on renovations				✓	
Property taxes	✓	✓	✓	✓	
Insurance premiums	✓	✓	✓	✓	✓
Maintenance and repairs	✓	✓	✓	✓	✓
Other expenses (commission fees and legal fees)	✓	✓	✓	✓	
Mortgage interest cost	✓	✓	✓		
Replacement cost	✓	✓			
Opportunity cost		✓			
Capital gain		✓			
Equivalent rent					✓
Principal mortgage payment	No approach considers principal mortgage payments or down payments				

Source: [Consumer Price Index Manual: Concepts and Methods, 2020](#). International Monetary Fund.

### 3. International practice on the treatment of owned accommodation in the Consumer Price Index

The treatment of OA in the CPI varies across countries as there is no consensus about the best approach. The CPI manual, notably, does not prescribe a singular, universal approach for the treatment of OA in the CPI. It demands that statistical agencies make well-informed decisions that align with their CPI intended use and data availability.

The CPI manual states:

“Ideally, the approach chosen should align with the conceptual basis that best satisfies the main use of the CPI. However, the data requirements may be such that it is not feasible to adopt the preferred treatment. Also, the dual use of CPIs as both macroeconomic indicators and for indexation purposes can lead to clear tensions in designing an appropriate treatment for owner-occupied housing services costs that suits all needs.”<sup>25</sup>

In selecting the most appropriate approach to measuring OA, statistical agencies use several criteria in their decision-making process:

- The chosen approach must align with the main purpose of the CPI, ensuring that the measure remains true to its intended purpose.
- It should adequately meet the needs of the CPI’s diverse users, from policy makers to the general public.
- The practicality of implementation is critical. Statistical agencies must consider the operational realities and constraints that come with data collection and processing.
- Finally, statistical agencies must acknowledge the data needs of each approach and confront any limitations that may arise.

25. Paragraph 11.83, [Consumer Price Index Manual: Concepts and Methods, 2020](#).

Table 2 provides an assessment of various approaches to measuring OA in the CPI against two criteria in the Canadian context:

- their alignment with the purpose of the CPI and user needs, along with the assessment of analytical OA and CPI series against the six Statistics' Canada quality dimension (relevance, accuracy, timeliness, accessibility, interpretability, and coherence).
- their practicality and data limitations.

**Table 2**  
**Evaluation of analytical owned accommodation approaches in the Canadian context**

Approach	Alignment with the purpose of the Consumer Price Index and user needs	Practicality and data limitations
Acquisition/net acquisition	<ul style="list-style-type: none"> <li>• Does not fit the Canadian users' purpose, as relevance and timeliness quality dimensions are not fully met: <ul style="list-style-type: none"> <li>▶ It is not consistent with the COLI</li> <li>▶ It is not suitable for escalation of income and payments</li> <li>▶ Production of construction cost indexes does not meet the timely release requirements of the CPI</li> </ul> </li> <li>• Could guide monetary policy and help assess wealth</li> </ul>	<ul style="list-style-type: none"> <li>• Based on transaction prices and consistent with other durable goods in the CPI (e.g., passenger vehicles)</li> <li>• For net acquisition, it is difficult to split the value of the structure and the land, with the land being considered an investment and out of scope for the CPI</li> </ul>
Payment	<ul style="list-style-type: none"> <li>• Does not fit the Canadian users' purpose, as relevance quality dimension is not fully met: <ul style="list-style-type: none"> <li>▶ It is not fully consistent with the COLI, as it ignores the replacement cost</li> <li>▶ Could be used for escalation of income and payments (contracts and social transfers)</li> </ul> </li> <li>• Affected by changes in mortgage interest rates (circularity)</li> </ul>	<ul style="list-style-type: none"> <li>• Based on transaction data</li> </ul>
User cost	<ul style="list-style-type: none"> <li>• It does not fit the Canadian users' purpose, as relevance quality dimension is not fully met: <ul style="list-style-type: none"> <li>▶ Because of its high volatility it is not suitable for escalation of income and payments</li> <li>▶ Consistent with the COLI</li> </ul> </li> <li>• Affected by changes in mortgage interest rates (circularity)</li> </ul>	<ul style="list-style-type: none"> <li>• Sensitive to assumptions on some inputs (forgone return on home equity, expected capital gains)</li> <li>• Determining specific terms like the real interest rate, real rate of capital gain on housing and depreciation rate objectively and consistently poses a challenge</li> <li>• Risk of having negative costs of housing in a period of increasing house prices</li> </ul>
Canada's approach	<ul style="list-style-type: none"> <li>• It fits the Canadian users' purpose, as all Statistics Canada's quality dimension criteria are fully met: <ul style="list-style-type: none"> <li>▶ It is consistent with the COLI</li> <li>▶ It is suitable for escalation of income and payments</li> </ul> </li> <li>• Error and bias properties of the Canadian CPI and their potential sources are well explained<sup>1</sup></li> <li>• Periodical consultation with users to identify areas for improvement to increase the fit for use of CPI products and effectiveness of communication strategies</li> <li>• Affected by changes in mortgage interest rates (circularity)</li> </ul>	<ul style="list-style-type: none"> <li>• Based on transaction data</li> <li>• Replacement cost is a notional cost, which is based on a hypothetical depreciation rate</li> </ul>
Rental equivalence	<ul style="list-style-type: none"> <li>• It does not fit the Canadian users' purpose, as the accuracy, and coherence of rental equivalence price series are questionable</li> <li>• Consistent with the COLI</li> <li>• Suitable for escalation of income and payments</li> <li>• The lack of adjustments of the rental equivalence price index due to rent control laws poses challenges for monetary policy</li> </ul>	<ul style="list-style-type: none"> <li>• Totally relies on imputed prices (the concept assumes an owner occupier renting the dwelling to themselves; there is no actual transaction occurring, so an imputed price is needed to measure price change)</li> <li>• Rent regulations and small rental markets in certain geographies make imputed prices less representative</li> <li>• Many owned dwelling units may not have observable rental prices; there is a lack of coverage for higher-end dwellings</li> <li>• A separate survey for homeowners' rental equivalence may be costly</li> </ul>

1. See [Chapter 9 – Reliability and Uncertainty](#) in The Canadian Consumer Price Index Reference Paper, 2023.

Source: Statistics Canada, Consumer Prices program.

The various approaches can result in fairly different weights in the CPI basket and contributions to CPI inflation. International practices (see Annex C) indicate that rental equivalence is the most prevalent approach to estimating OA in the CPI. Countries employing this approach often cater to a diverse range of user needs and typically feature less regulated and deeper rental markets (i.e., a more liquid market for the rental of single dwellings). For example, many European countries use rental equivalence, as the decision is supported by extensive and high-quality rental data. In U.S. the Bureau of Labor Statistics (BLS) has converted the CPI for All Urban Consumers (CPI-U) and the CPI for Urban Wage Earners and Clerical Workers (CPI-W) to a rental equivalence measure for homeowner costs, effective with data for January 1983 and the January 1985 data, respectively. These changes were influenced by professional judgments that shifted from a mixture of acquisition and payment approaches to a rental equivalence approach. Additionally, changes in the financial markets, characterized by the emergence of new types of mortgage instruments, which introduced additional complexities in accurately estimating the expenditure weight and monthly price movement of contracted mortgage interest costs<sup>26</sup>.

The second most common approach is to exclude OA from the CPI entirely. This method is used by Argentina, Brazil, China, India, Indonesia, Korea, the Russian Federation, Saudi Arabia and Turkey. It is also used by the European Union's Harmonised Indices of Consumer Prices. Yet Australia and New Zealand employ the net acquisition approach, as they both have robust data on building costs, which allow them to price a housing structure separately from land. Meanwhile, Sweden, Iceland and Canada employ variants of the user cost approach.

#### 4. Comparison of analytical consumer price indexes for owned accommodation

Table 3<sup>27</sup> shows the different expenditure shares for homeowners' specific cost components across different analytical OA approaches, based on the 2021 CPI basket.<sup>28</sup>

Over time, the expenditure share for the OA component of the CPI based on the rental equivalence approach is the least volatile between basket updates. The expenditure share based on the acquisition approach is the most volatile. Meanwhile, the expenditure shares based on Statistics Canada's official approach, as well as the payment, user cost and net acquisition approaches, vary within the same range (Table 4).

**Table 3**  
**Distribution of owned accommodation expenditures among its components according to different approaches, 2021**

	Official approach	Payments approach	User cost approach	Rental equivalence approach	Net acquisition approach	Acquisition approach
<b>Owned accommodation components</b>						
				percent		
Interest rate of return <sup>1</sup>	...	...	3.20	...	...	...
Mortgage interest cost	16.10	23.80	...	...	...	...
Replacement and depreciation cost <sup>2</sup>	32.30	...	38.50	...	...	...
Property taxes	13.40	19.80	16.00	...	11.00	7.80
Insurance premiums	7.00	10.40	8.40	1.80	5.10	3.60
Maintenance and repairs	9.60	14.20	11.50	3.60	7.90	5.60
Other owned accommodation expenses	21.50	31.80	25.70	...	17.70	12.50
Equivalent rent <sup>3</sup>	...	...	...	94.60	...	...
Self-built dwellings and purchases of new dwellings (excluding land) or home purchase cost <sup>4</sup>	...	...	...	...	33.40	52.80
Renovations <sup>4</sup>	...	...	...	...	24.80	17.60
Capital gain <sup>5</sup>	...	...	-3.20	...	...	...

... not applicable

1. The expenditure weight of interest rate of return is the product of estimated interest rate and estimated housing value during the reference years.

2. The replacement cost is based on 2021 Survey of Household spending. See [Canadian Consumer Price Index Reference Paper](#) for more information.

3. The rental equivalent expenditure value is based on national account rental equivalent estimates during the reference years.

4. These are based on the national accounts series on residential investments on new construction and renovations.

5. This is based on the 30 years real capital gains and estimated as the product of estimated real capital gain rate by the estimated housing value during the reference years.

**Notes:** This table presents the distribution of weights at basket reference period prices.

All weights are based on the 2021 basket reference year, except for the replacement cost, new construction and renovations, equivalent rent, interest rate of return and capital gain.

**Source:** Statistics Canada, Consumer Prices program.

26. Prior to January 1983, the BLS's OA components encompassed: (1) Purchase of a home; (2) Interest contracted in mortgages; (3) Expenses related to purchasing and selling homes, or refinancing mortgages, and ground rent; (4) Taxes and special assessments; (5) Insurance; and (6) Repairs and improvements. The expenditure weights for house prices and contracted mortgage interest costs were based on a small group of families, approximately 6 percent of the total, who actually purchased a home during the base period. The prices used for the house and mortgage interest components of the index were current prices, which led them to be important contributors to OA monthly price changes.

27. The distributions of the OA expenditures among its components according to different approaches for the other reference years are available upon request.

28. This study covers the CPI baskets with expenditure reference years 2001, 2005, 2009, 2011, 2013, 2015, 2017, 2020 and 2021.

**Table 4**  
**Proportional expenditure weights of owned accommodation according to different approaches and basket reference years**

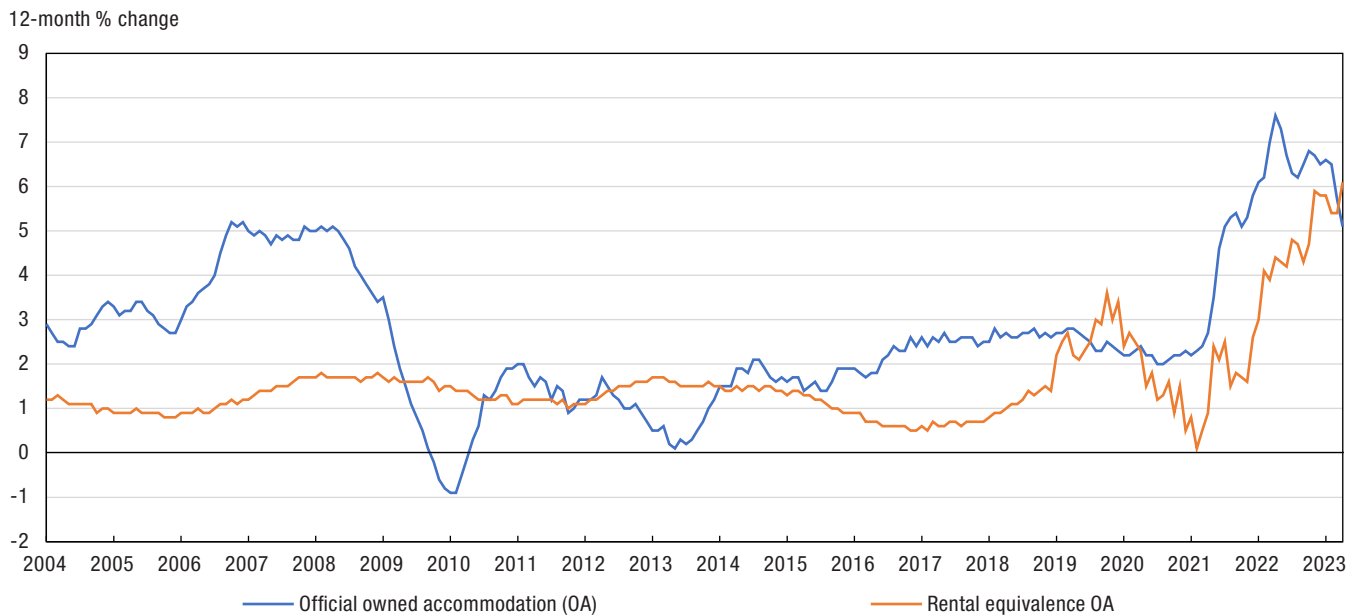
Owned accommodation approach	2015	2017	2020	2021
	percent			
Official OA	16.12	16.48	19.46	19.31
Payments	11.90	11.90	15.00	13.90
User cost	13.10	14.30	16.40	16.70
Rental equivalence	20.20	20.00	20.10	19.20
Net acquisition approach	19.40	20.00	21.70	22.60
Acquisition	22.30	22.10	27.00	31.30

**Note:** This table presents weights at basket reference period prices.

**Source:** Statistics Canada, Consumer Prices program.

Chart 1 presents a comparison between the official OA price index and the estimated OA using the **rental equivalence approach**. From January 2003 to April 2023, using rent prices as a proxy for rental equivalent prices (which contribute to more than 95%<sup>29</sup> of the OA rental equivalence price index) resulted in lower inflation compared with the official approach. However, since January 2019, OA measured using the rental equivalence approach has been more volatile.<sup>30</sup> The gap has closed since the start of 2023, suggesting similar inflationary pressures from OA if a rental equivalence approach is used to calculate a CPI. As such, even if the rental equivalence approach excludes the direct impact from a recent spike in the mortgage interest cost, it does not result in a lower OA price index.

**Chart 1**  
**12-month change in the official owned accommodation and rental equivalence owned accommodation price indexes**



**Source:** Statistics Canada, Consumer Prices program.

29. See Annex D for more information on the weight of each OA component.

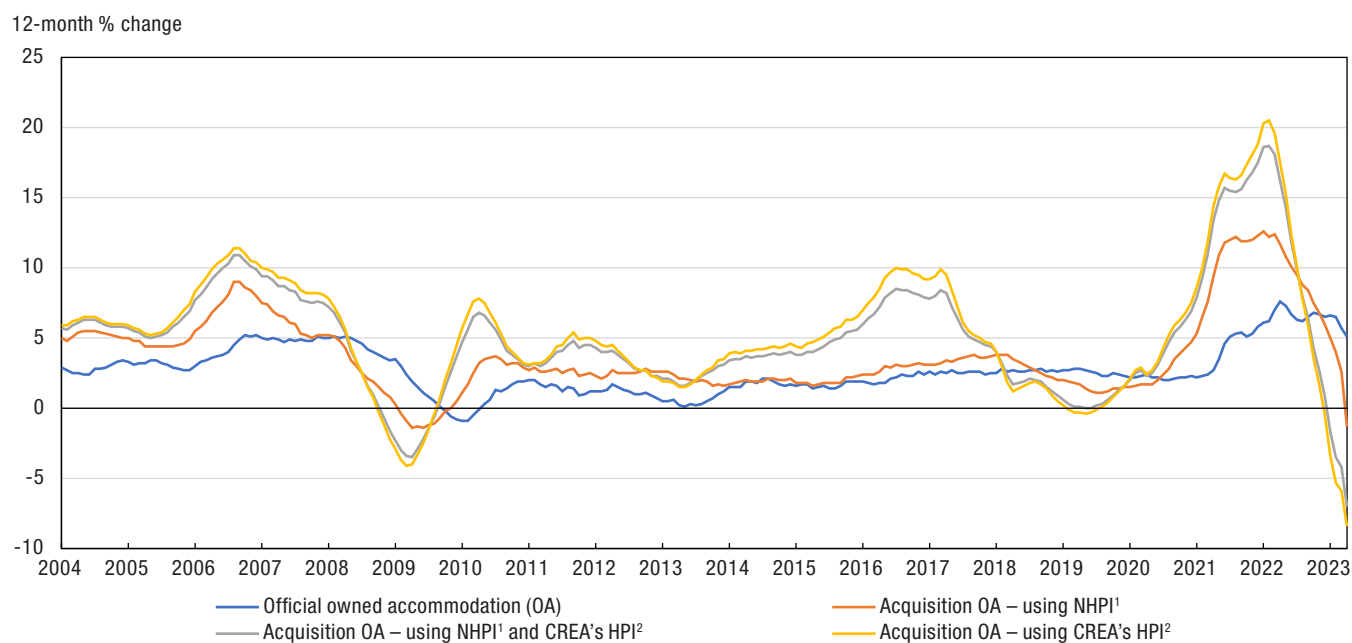
30. Users should note that, with the release of the January 2019 CPI, Statistics Canada updated its rent methodology to improve its coverage and methodological approach. Before 2019, a matched-model approach was used for index calculation, where the same unit had to remain part of the sample for at least two months to be included. This resulted in relatively fewer units being included for index calculation. With the release of the January 2019 CPI, a hedonic model was introduced, replacing the matched model. This enhancement improved coverage over the matched-model approach, as the hedonic model allows more observations to be used in calculating the index on a monthly basis and more effectively uses information about dwelling characteristics (e.g., the number of bedrooms) to account for changes in the quality of dwellings. Using this approach, the rent index is better able to capture changes in the rental market, but it is more sensitive to sample variance common in smaller regions. Users should exercise caution when making comparisons between the current trend in the rent index and the trend before 2019. The rent index accurately reflects the change in rent prices faced by all Canadian renters as a group, including those under a current lease, those covered by rent control regulations and those paying current market rents. Regardless of the changes in index methodology, recent rent inflation remains historically high. For more technical information about the hedonic model used to estimate the rent index of the CPI, please consult the following link: [New approach for estimating the rent component of the Consumer Price Index](#).



Chart 2 compares the official OA price index with the estimated OA using the **acquisition approach**. The construction price index<sup>31</sup> contributes to more than 22.6% of the OA price, and the home purchase price index<sup>32</sup> accounts for almost 42.7% of OA using the acquisition approach. Over the same period, the increased influence of housing and construction prices in the OA price index has led to higher inflationary pressures, especially from mid-2020 to mid-2022, primarily because of factors such as higher demand and limited supply of building materials, COVID-19-pandemic-related supply chain issues, and worker shortages. However, from late 2022 to early 2023, the 12-month price change using the acquisition approach began to dip into negative territory because of a related slowdown in the housing market and easing of supply-chain constraints.

Since there are several price measures of housing available from both Statistics Canada and external sources, three types of home purchase price indexes were used. These resulted in different OA acquisition approach indexes. The highest acquisition OA index (yellow line) uses the CREA HPI, which measures resale housing prices. By contrast, the lowest acquisition OA index (orange line) uses the New Housing Price Index, which measures the prices of newly constructed houses. The middle acquisition OA index (gray line) incorporates new and resale housing prices.

**Chart 2**  
**12-month change in the official owned accommodation and acquisition owned accommodation price indexes**



1. NHPI represents the New Housing Price Index.

2. CREA's HPI represents the Canadian Real Estate Association's Home Price Index.

Source: Statistics Canada, Consumer Prices program.

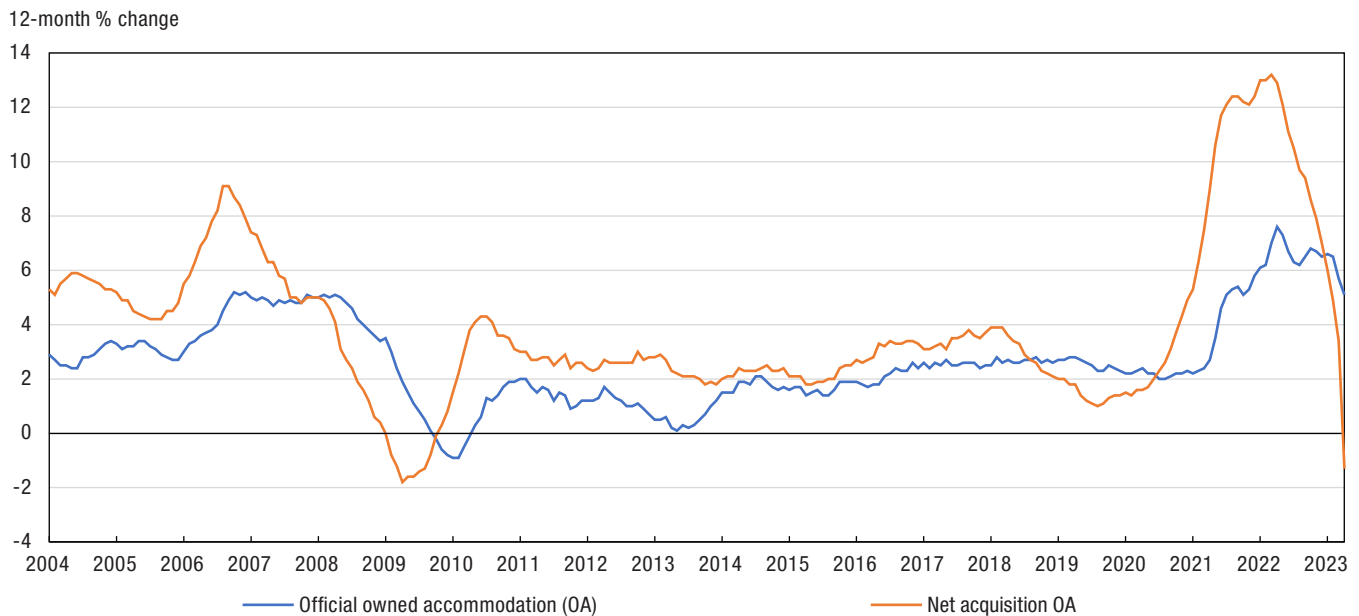
31. [Building Construction Price Index \(BCPI\), table 18-10-0135-01](#), Statistics Canada.

32. The home purchase price index includes the New Housing Price Index, which measures the prices of newly constructed houses, and the Canadian Real Estate Association's Home Price Index (CREA HPI), which measures resale housing prices.

Chart 3 compares the official OA price index with the estimated OA using the **net acquisition approach**. The construction price index contributes to more than 26.0% of the OA price, and the home purchase price index (structure only) accounts for almost 33.9% of OA using this approach. The increased influence of house structure and construction prices in the OA price index has led to heightened inflationary pressures, on average. The official OA and the net acquisition approach tracked closely together from 2011 to early 2020, when house prices were relatively stable.

### Chart 3

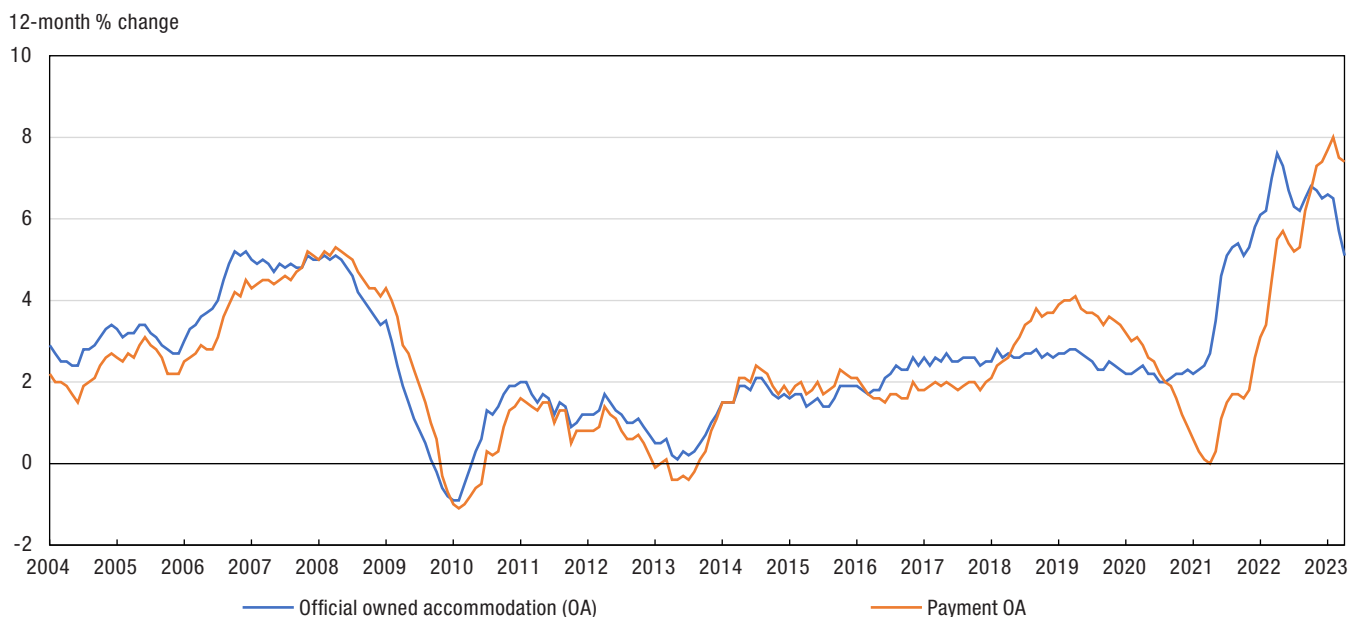
#### 12-month change in the official owned accommodation and net acquisition owned accommodation price indexes



Source: Statistics Canada, Consumer Prices program.

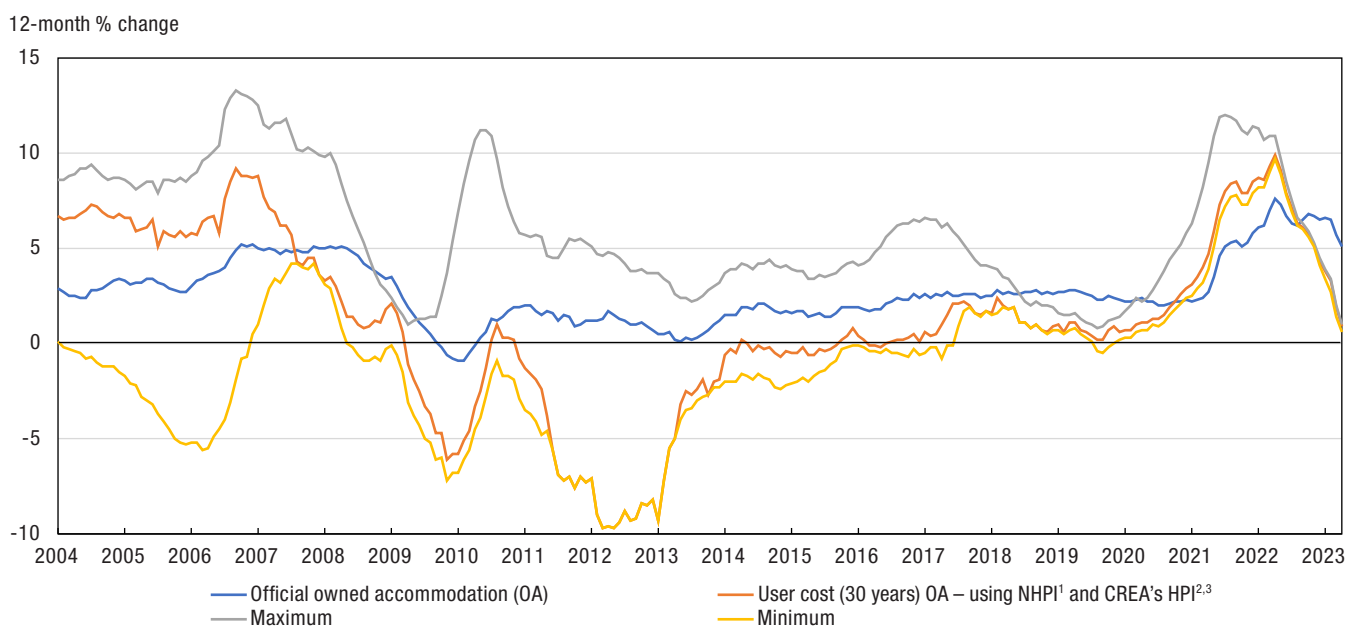
Chart 4 compares the official OA price index with the estimated OA using the **payment approach**. The only difference between the payment approach and the official OA series is the replacement cost, considered accrual cost, which is not included in the payment approach. As a result, the actual payments by homeowners, as estimated by this approach, show price pressures similar to the official OA. However, since the second quarter of 2018, the payment approach has shown greater volatility compared with the official OA. The difference between the two series is primarily caused by the growing influence of the mortgage interest cost,<sup>33</sup> which can first be attributed to the rise in housing prices up until the first quarter of 2022, and subsequently to the increase in interest rates starting from the second quarter of 2022.

33. The mortgage interest cost weight has increased from 20.4% (on average) in the official approach to 28.9% (on average) in the payment approach. See Annex D for more information.

**Chart 4****12-month change in the official owned accommodation and payment owned accommodation price indexes**

Source: Statistics Canada, Consumer Prices program.

Chart 5 compares the official OA price index with the estimated OA using the **user cost approach**. This approach, which uses the capital gain based on 30 years of horizon length of expectation and a weighted average rate of return, results in a more volatile OA index than the official approach. The monthly OA changes can vary between the minimum yellow line and the maximum gray line. These fluctuations are attributed to the different monthly changes in the components of the user cost, by applying different variants of the user cost calculation.

**Chart 5****12-month change in the official owned accommodation and user cost owned accommodation price indexes**

1. NHPI represents the New Housing Price Index.

2. CREA's HPI represents the Canadian Real Estate Association's Home Price Index.

3. User cost estimates are estimates of expected capital gain based on 30 years of horizon length of expectation formation, applying the CREA's HPI and the NHPI.

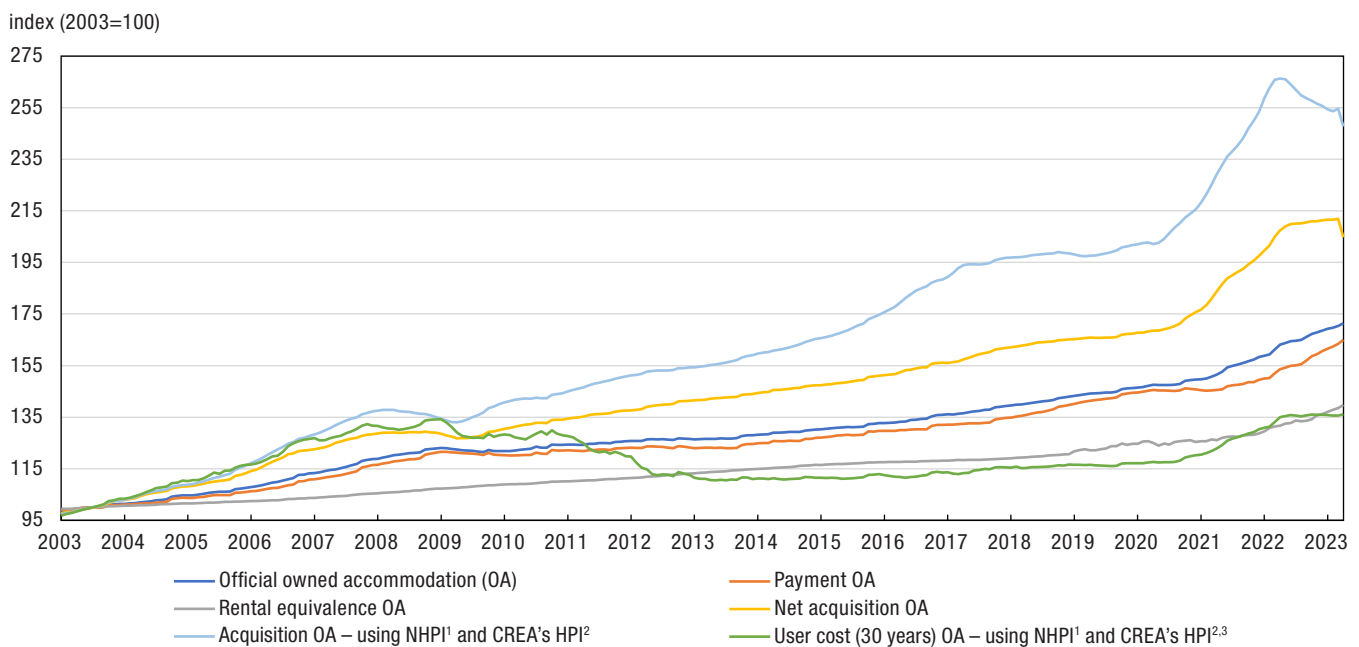
Note: The range indicates the spectrum of monthly price fluctuations based on different user cost variants.

Source: Statistics Canada, Consumer Prices program.

While different approaches result in a wide range of estimates for analytical OA price indexes (Chart 6), in terms of their impact on total inflation, the 12-month growth rates of analytical CPI series based on the different approaches from January 2003 to April 2023 are plotted in charts 7 and 8. The analytical CPI using the payment approach tracks the official CPI fairly closely, while the user cost CPI generates more volatile inflation rates. This result reflects the inconsistent impact of expected capital gain price changes across time on the OA price index. The acquisition approach and net acquisition approach generate the highest inflation and are much quicker to reflect the inflation of house prices, new house prices (housing only) and construction prices, as opposed to the rental equivalence approach, which generates the lowest inflation index.

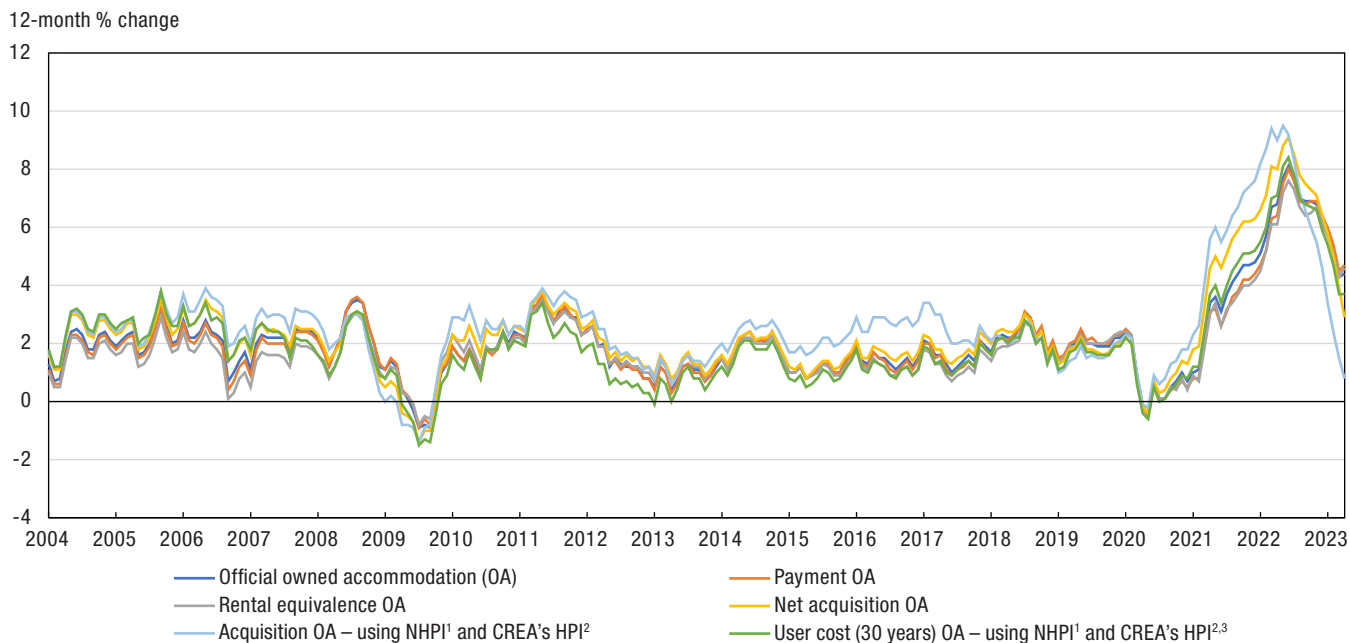
More recently, in the context of rising interest rates, most OA approaches suggest that analytical inflation pressures would be elevated relative to pre-pandemic periods. The acquisition approach, which puts more weight on house prices, is the exception and indicates that inflationary pressures are nearly at the same level they were before the pandemic.

**Chart 6**  
**Analytical owned accommodation price index levels based on different owned accommodation approaches**



1. NHPI represents the New Housing Price Index.  
 2. CREA's HPI represents the Canadian Real Estate Association's Home Price Index.  
 3. User cost estimates are estimates of expected capital gain based on 30 years of horizon length of expectation formation, applying the CREA's HPI and the NHPI.  
**Source:** Statistics Canada, Consumer Prices program.

**Chart 7**  
**12-month change of the analytical Consumer Price Index based on different owned accommodation approaches**



1. NHPI represents the New Housing Price Index.

2. CREA's HPI represents the Canadian Real Estate Association's Home Price Index.

3. User cost estimates are estimates of expected capital gain based on 30 years of horizon length of expectation formation, applying the CREA's HPI and the NHPI.

Source: Statistics Canada, Consumer Prices program.

## 5. Discussion

Shelter price inflation for homeowners can differ substantially depending on how it is measured. At the same time, there are many uses of the CPI that all contribute to its design. It is used by central banks to monitor monetary policy and keep inflation within a target range. It is also used in official indexation arrangements (e.g., for the escalation of pensions and tax allowances) and as the basis for most wage negotiations in the private and public sectors. Finally, it is used as a price deflator in national accounting and many economic analyses, as well as research conducted by business analysts and economists.

Ideally, the approach chosen to measure OA should align with the conceptual basis that best satisfies the principal purposes of the CPI. The methodology of the OA shelter services in the Canadian CPI therefore considers housing as a service that people use, as opposed to the purchase of an asset, and only incorporates the price of that service into the index. Its purpose is to measure the price-induced changes in the cost of using, rather than buying, a fixed stock of dwellings. Consequently, the Canadian CPI is not a direct measure of housing affordability. Alternative approaches for measuring housing inflation and affordability already exist. Various Statistics Canada products, such as the [Housing Statistics Portal](#), indicators of [household wealth and affordability](#), and a release on [the distributions of household economic accounts](#), provide insights into the current state of housing affordability for Canadian households.

Thus, the CPI should not depart drastically from a desired COLI, which is a logical choice for income escalation and monetary policy purposes. The main advantage of applying a COLI is the fact that it is a welfare-oriented measure and is well suited to the Bank of Canada's mandate to promote economic and financial welfare for Canadians. However, achieving such a target may not be that obvious in practice because of data limitations.

Further, it is essential to examine the impact on monetary policy from the user's perspective, considering various factors. These factors include the perception–measurement inflation gap, the CPI's sensitivity to house prices,

the volatility resulting from each approach and the effectiveness of communication regarding these aspects. A discrepancy between the CPI and public perceptions thereof, excessive volatility or any potential misleading signals about the economy emanating from the CPI, such as a sharp increase in the mortgage interest cost, detract from the usefulness of a given approach. Such factors must be considered and addressed, because they can undermine trust in the CPI and its usefulness as an economic indicator. In fact, from the perspective of any statistical agency, the perception gap can be considered as a gauge of the credibility that the general public attributes to the CPI. It may also reflect the misconceptions of the public, highlight the need for educational support from these agencies and emphasize the importance of making CPI communication even more relatable. Thus, the perception gap reinforces the need for better communication—not a change in measurement.

**Table 5**  
**Volatility<sup>1</sup> of 12-month change in the analytical owned accommodation and the analytical CPI series from January 2004 to April 2023**

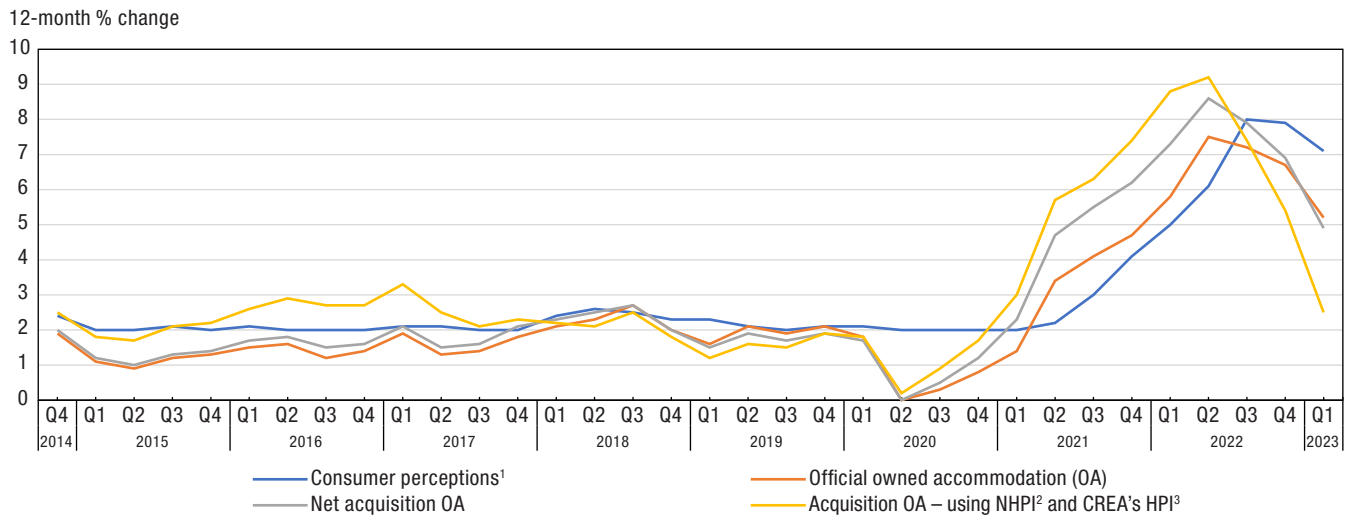
	Official approach	Payments	User cost	Rental equivalence	Net acquisition	Acquisition
				percent		
Analytical owned accommodation indexes	1.71	1.75	4.62	1.04	3.01	4.21
Analytical CPI	1.49	1.46	1.61	1.40	1.70	1.76

1. Volatility is defined as the standard deviation of the 12-month growth rates in the analytical owned accommodation indexes and the associated analytical CPI over the 2004 to 2021 period.

Source: Statistics Canada, Consumer Prices program.

The **acquisition approach**, which includes principal homes, secondary homes, other property (house and land) and investment on renovations, generates very high inflation rates that have significantly increased the gap with households’ perceptions of inflation (Chart 8). However, this approach does not reflect the cost of housing and tends to generate more volatility (Table 5).

The **net acquisition approach**, while narrowing the perception gap (Chart 8) before 2023, has high data requirements. For example, the data needed for some components, such as separate land and structure values and administrative data on housing transactions in the form of construction cost price indexes, are often available only on a quarterly basis. This issue makes it challenging to meet the monthly frequency and timely release requirements of the CPI. As a result, from a timeliness perspective (a measure of data quality), this approach significantly compromises the quality of the CPI. In addition, this approach does not reflect the cost of housing and tends to generate more volatility than the official approach (Table 5).

**Chart 8****Comparison between the 12-month change of the analytical Consumer Price Index applying (net) acquisition approaches and consumer perceptions, quarterly**

1. Consumer perceptions measured by the Bank of Canada's Canadian Survey of Consumer Expectations.

2. NHPI represents the New Housing Price Index.

3. CREA's HPI represents the Canadian Real Estate Association's Home Price Index.

**Note:** Quarterly inflation rates are calculated as the moving average of monthly inflation rates.

**Source:** Statistics Canada, Consumer Prices program.

The **rental equivalence approach** is an acceptable method for measuring the cost of housing. But it can be fairly impractical as there is an unavailability of data,<sup>34</sup> especially when the rental market<sup>35</sup> is not well established or thin and market distortions such as rent controls<sup>36</sup> are significant. In addition, the rental equivalence approach may overlook indications of housing exuberance, as they are more driven by anticipated future property value increases than by actual rent hikes (Hill et al., 2020). In addition, this approach does not reduce the gap with households' perceptions of inflation (Chart 9).

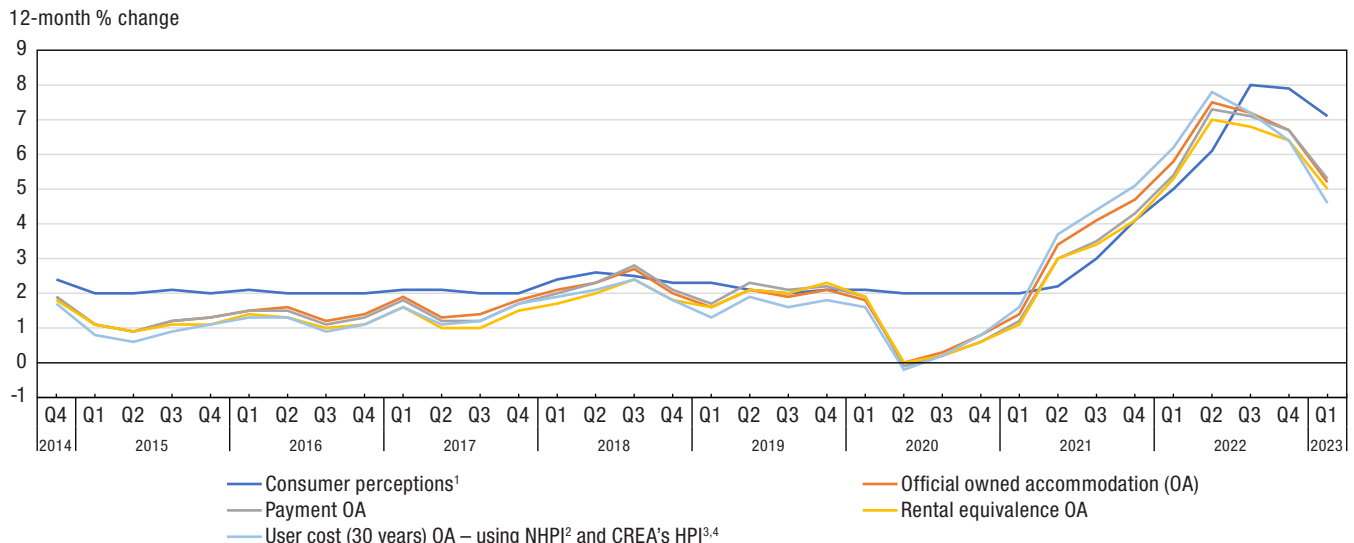
**Statistics Canada's variant of the user cost approach** is relatively consistent with measuring the cost of housing services. Data availability for the components of this approach is not a major concern, although there are some difficulties with data related to replacement costs and the mortgage interest cost index.<sup>37</sup> Also, this approach does not narrow the gap with households' perceptions of inflation (Chart 9), because it is primarily the cost of operating a home and not the cost of purchasing one, which is what consumers have in mind when forming their views about inflation. Finally, it is worth noting that the recent rapid increase in interest rates appears to be driving higher inflation. While the objective of monetary policy intervention is to control and curb inflation, this development poses a communication challenge for those overseeing monetary policy.

34. The most accurate way to calculate the rental equivalence price index is through a survey targeting homeowners' rental equivalence, although this method is expensive.

35. Rent in Canada's major cities is cyclical. Over the past two decades, primary (apartment) and secondary (condominium) rental markets in Canada's major cities have tightened as demand outpaced supply. This is partly attributable to the steady population growth, mostly driven by international and interprovincial migration.

36. Rent regulation in Canada is set by provincial legislation. With the exception of Montréal, which has strong tenant protections, Canada's major cities have weak rent control.

37. For the estimation of the replacement cost, there are difficulties related to the estimation of the house price index (housing only, including both new and existing houses). In addition, data on the monthly mortgage outstanding and interest payments are required to estimate the mortgage interest cost index.

**Chart 9****The perception-measurement gap varies across analytical Consumer Price Index based on different owned accommodation approaches and time, quarterly**

1. Consumer perceptions measured by the Bank of Canada's Canadian Survey of Consumer Expectations.

2. NHPI represents the New Housing Price Index.

3. CREA's HPI represents the Canadian Real Estate Association's Home Price Index.

4. User cost estimates are estimates of expected capital gain based on 30 years of horizon length of expectation formation, applying the CREA's HPI and the NHPI.

**Note:** Quarterly inflation rates are calculated as the moving average of monthly inflation rates.

**Source:** Statistics Canada, Consumer Prices program.

The **payment approach** has the advantage of reflecting only actual transaction costs and not imputed costs. However, a drawback is the non-inclusion of replacement costs; it could be argued that this diverges from adequately measuring the cost of housing services. This approach also does not do much to narrow the gap with households' perceptions of inflation (Chart 9).

Last, the **user cost approach** is consistent with the cost of operating a house; however, the imputation of opportunity costs and, more specifically, the assumptions on rates of interest and capital gains, can be arbitrary and challenging, resulting in a potentially excessively volatile price index series.

In summary, different approaches were analyzed based on varying criteria, and no single method satisfies all desired objectives for measuring housing costs and affordability, narrowing the perception gap, eliminating data availability challenges, and providing insights for monetary policy purposes.

## 6. Conclusion

The treatment of OA is one of the most difficult and controversial issues faced by CPI compilers. Statistical agencies<sup>38</sup> usually implement a variant of the approaches listed in the [Consumer Price Index Manual](#), but there is no consensus on a preferred method; each has its own advantages and disadvantages. The purpose of this analysis is not to propose a change in the measurement methodology used in the Canadian CPI or the interpretation of the CPI as a measure of housing inflation and affordability, but rather to illustrate for users the impacts of alternate measurement approaches and articulate the various advantages and disadvantages of each approach. This research serves as a complement to the CPI in assessing OA inflation by examining recent trends through the lens of various OA treatments and provides additional analytical value for policymakers.

The CPI serves various purposes, including the indexation of payments (such as public and private pensions) and tax brackets, as a deflator of other economic aggregates (e.g., gross domestic product) to obtain estimates at constant prices, and as a tool for setting and monitoring monetary policy. As with all other index components,

38. See Annex C - International practices: Treatment of owned accommodation in consumer price indexes.



the approach adopted by Statistics Canada in measuring OA prices seeks to find a balance between the various purposes the CPI serves. Ideally, the selected approach should align with the conceptual basis that best satisfies the principal purpose of the CPI and reflects price change for the average Canadian.

The Canadian CPI treats housing as a service that people use and incorporates the price of that service into the index, rather than including the purchase price of an asset. The purchase of a home is implicitly captured by a number of OA components. The CPI aims to consider the expenditures associated with owning a home, which are incurred by a significantly higher number of Canadians in a given month, rather than the expenditures associated with buying a home.

While the rental equivalence and user cost approaches are more aligned with measuring the cost of owning a house, the analytical CPI generated with a pure user cost approach (and its variants) was highly volatile because of the inconsistent impact of expected capital gain changes on the OA estimates.

The acquisition approach would have generated higher inflation, on average, before 2023. More recently, this approach would suggest that inflationary pressures are close to where they were before the pandemic. The acquisition approach could provide a signal of housing affordability for the purposes of policy. However, this approach is not well aligned with the cost of housing concept; its high volatility indicates that it is not an appropriate method for indexation purposes, to either homeowners or renters. Therefore, this approach is not used in any other countries for CPI calculations.

The official treatment of OA in the Canadian CPI, which is designed to measure the impact of price changes on homeowners' ongoing costs, remains fit for purpose and aligned with the conceptual purpose of the CPI. This approach best balances the various uses of the CPI, provides a clear signal of trends in housing inflation while minimizing volatility in the all-items CPI, can be produced using existing data sources and serves as a middle ground between the acquisition and net acquisition approaches, which have trended higher in the past decade, and the payments, rental equivalence, and user cost approaches, which have trended lower. The Canadian approach satisfies Statistics Canada's six quality dimensions (relevance, accuracy, timeliness, accessibility, interpretability, and coherence), meeting the needs of Canadian data users.

This analysis demonstrates that the official treatment of OA used in the Canadian CPI remains the best approach for Canada. Ultimately, Canada's official treatment of OA prevails not due to a lack of alternatives, but because, after exploring these alternative approaches, it is deemed to be the best indicator for OA inflation in Canada. For these reasons, there are no plans to change the treatment of OA in the Canadian CPI. Further, recent trends in the housing market, and consumer inflation more generally, indicate that it is not the right time to consider significant changes to the calculation of the CPI. Any future changes will require in-depth consultations with the Price Measurement Advisory Committee, the Ottawa Group, and other national statistical organizations, as well as external stakeholders, to maintain the quality, accuracy, and utility of the CPI as a tool for both indexation, monetary policy and gauging the health of the economy.

Statistics Canada remains committed to prioritizing data quality, emphasizing accuracy and timeliness when measuring price change. The goal remains to produce a CPI that is relatively stable, best serves its intended uses and better reflects the experiences of Canadians. Working with price experts, other national statistical organizations and partners ensures that the data and methods used in the calculation of the CPI are aligned with international standards and best practices. The agency will continue to explore new potential sources of expenditure and price information for future research and to adopt the most appropriate methods to keep the CPI relevant for Canadians.

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## Annex A - Weights estimation

In this section, the Consumer Price Index (CPI) basket weights for all analytical owned accommodation (OA) approaches are estimated using Canadian data. Information on expenditure weights is essentially derived from the [Survey of Household Spending \(SHS\)](#) and Canadian System of National Accounts (CSNA) for the CPI baskets during the 2001 to 2021 period.

This section does not describe the official estimation of OA in the Canadian CPI (see the [Consumer Price Index Reference Paper](#) and the [Shelter in the Canadian CPI: An overview, 2023 update](#)). However, it will cover the calculation of components not included in the Canadian CPI, as well as the required adjustments to existing OA components to derive basket weights for all approaches.

OA under the payment approach includes all official components from the Canadian CPI except the replacement cost.

### Acquisition approach

The acquisition approach includes six components:

- net home purchase
- investment on renovations
- property taxes
- home insurance premiums
- maintenance and repairs
- other OA expenses.

### Net home purchase

The SHS includes information on the purchase price of homes (new or resale) bought in the survey year and the selling price of homes sold in the survey year. Expenditure weights of the net home purchase, including land, are estimated by calculating the difference between the purchase price of the home bought and the selling price of the home sold in the same year (see the formula below), including transactions on homeowners' principal dwelling, secondary residences and other properties.

$$\text{Net home purchase} = \left[ \begin{array}{l} \text{value of purchase price of home bought in survey year} \\ - \text{value of selling price of home sold in survey year} \end{array} \right]$$

The estimation of the net home purchase by urban centre encompasses a risk of having an unreliable (and in some cases negative) expenditure weight on the net home purchase in some urban centres, because the proportion of sampled households that buy or sell a home may be small. As a result, it is important to apply regional expenditure weights for these urban centres and adjust for the difference in homeownership ratios between and across urban centres.

In addition, there is an important issue associated with the volatility of expenditure weights through baskets. This problem is attributable mainly to the cyclical nature of the housing market, so the expenditure weights can vary significantly from one basket to another, especially in a reference year considered to be a recession year. Thus, it would be important in these reference years to calculate the net home purchase as an average of expenditure weights across multiple years.<sup>39</sup>

39. In this paper, the expenditure weights used for 2015 are based on the average net purchases from 2014 and 2015. There was a significant decrease in net purchases in 2015, largely caused by high demand from wealthy foreign purchasers. This group of purchasers was not adequately represented in the household survey sample.

## Investment on renovations

Two data sources<sup>40</sup> are available for measuring household investment on home renovations. The first data source, the Survey of Household Spending, reports the amounts of homeowners' improvement and renovation spending. In addition, these amounts can be estimated using data on flows and stocks<sup>41</sup> of fixed residential capital by type of asset, including residential investment on renovations at the national level. These residential investments cover all institutional sectors: households, non-profit institutions serving households, corporations and general governments. Therefore, the residential investments on renovations are multiplied by the ratio of households' dwellings to total institutional sector residential dwellings.<sup>42</sup>

$$\text{Household residential investment on renovations} = \text{residential investments on renovations} \times \left( \frac{\text{households' residential dwellings}}{\text{total institutional sector residential dwellings}} \right)$$

For the other components of OA under acquisition approach, official expenditure weights for property taxes, homeowners' insurance premiums, homeowners' maintenance and repairs, and other OA expenses were used.

## Net acquisition approach

The net acquisition approach to the owner occupied housing index, as recommended by Eurostat for the Harmonised Indices of Consumer Prices, includes six components:

- self-built dwellings and purchases of new dwellings (excluding land)
- investment on renovations
- property taxes
- home insurance premiums
- maintenance and repairs
- other OA expenses.

## Self-built dwellings and purchases of new dwellings (excluding land)

To estimate the net acquisition expenditure weights, data on flows and stocks<sup>43</sup> of fixed residential capital by type of asset were used by province and territory. These data include residential investment on new construction and renovations by region and at the national level.

Residential investment on new construction is calculated through a model developed at Statistics Canada. In this model, the investment for a given month covers only the construction done on units started in that month and the construction done on all the other units under construction. This calculation uses the information on estimated values of construction starts and other dwelling conversions, collected by Statistics Canada's monthly [Building Permits Survey](#), the monthly number of construction starts and completions from the Canada Mortgage and Housing Corporation's [Starts and Completions Survey](#), and [National Accounts quarterly data](#) on land developers' fees and sales taxes.

40. Both data sources generate similar investment values of renovations. CSNA data were used to be consistent with the net acquisition approach calculation method.

41. See [Flows and stocks of fixed residential capital by type of asset \(table 36-10-0099-01\)](#), Statistics Canada.

42. See [National Balance Sheet Accounts \(table 36-10-0580-01\)](#), Statistics Canada.

43. See [Flows and stocks of fixed residential capital by type of asset \(table 36-10-0099-01\)](#), Statistics Canada.

These residential investments cover all institutional sectors: households, non-profit institutions serving households, corporations and general government. To estimate the household residential investment on new construction, the residential investment on new construction is multiplied by the ratio of households' dwellings to total institutional sector residential dwellings.<sup>44</sup>

$$\text{Household residential investment on new construction} = \text{residential investment on new construction} \times \left( \frac{\text{households' residential dwellings}}{\text{total institutional sector residential dwellings}} \right)$$

Official expenditure weights for property taxes, homeowners' insurance premiums, homeowners' maintenance and repairs and other OA expenses were either derived from the SHS or data from the CSNA.

## Rental equivalence approach

### Imputed rent of owner-occupied dwellings

Considered as the largest imputation in the gross domestic product (GDP) accounts, the rental equivalence expenditure weights were estimated using CSNA data on personal expenditure values for GDP imputed rent.<sup>45</sup>

### Homeowners' maintenance and repairs

The weight of homeowners' maintenance and repairs in the rental equivalence series includes expenditures usually incurred by tenants on materials and services for minor maintenance and repairs. Since 2005, the SHS has collected detailed information on maintenance and repairs made by homeowners. This information was used to estimate homeowners' maintenance and repairs under the rental equivalence concept. Only materials and services for painting and wallpapering, interior walls and ceilings, electrical fixtures and equipment, and plumbing fixtures and equipment<sup>46</sup> were used.

### Homeowners' insurance premiums

The weight of homeowners' insurance premiums in the rental equivalence concept is less than the official homeowners' insurance premium expenditure weights because there are differences between homeowner and tenant insurance contract coverage. The first difference is that a homeowner's insurance contract includes the replacement cost (i.e., the insurance company covers the reconstruction cost in a homeowner's insurance contract). By contrast, tenants' insurance covers essentially the tenant's personal belongings, such as furniture, and the payment of any damage to the landlord's building and the personal belongings of neighbours.

The homeowners' insurance premiums expenditure weight in the rental equivalence approach is estimated by multiplying the average value of tenants' insurance premiums per tenant by the ratio of owner to tenant households. This estimation is downward biased because tenant-occupied residences and owner-occupied dwellings are not similar. Owner-occupied dwellings are larger and more expensive, so this is adjusted by a factor that includes this difference.

## User cost approach

The different variants of estimating the user cost depend on the estimation of an expected capital gain and interest rate of return. However, in all user cost approach variants, the official expenditure weights of property taxes, homeowners' insurance premiums, homeowners' maintenance and repairs, and other OA expenses were used.

44. See [National Balance Sheet Accounts \(table 36-10-0580-01\)](#), Statistics Canada.

45. See [Household final consumption expenditure \(table 36-10-0107-01\)](#), Statistics Canada.

46. For the 2001 homeowners' maintenance and repairs calculation, the 2005 ratio of rental equivalence homeowners' material and labour costs to total official homeowners' material and labour costs is applied to the 2001 total official homeowners' material and labour costs.

## Expected capital gain

The capital gain is the most important element of the user cost. Its estimation method has an important effect on user cost estimated values, and thus their reliability.

To estimate the capital gain, the value of OA is calculated by multiplying the reported value of the home owned by the reported percentage of households that are homeowners, upon which an expected annual capital gain is applied.

$$\begin{aligned} \text{Expected capital gain} = & (\text{value of home owned} \times \text{homeowner percentage}) \\ & \times \text{expected real annual capital gain rate} \end{aligned}$$

The expected capital gain price change is a slowly changing function of past house price changes. The number of years over which these expectations are formed will have a significant effect on the result. Therefore, this analysis used various averages:

- In the simple user cost variant, the real expected capital gain is set equal to 2.5%, assumed to be the average long-run natural rate of interest, representing the real rate of interest that would equate saving and investment in full employment. In fact, Kichian (2015)<sup>47</sup> estimates that in equilibrium, the real interest rate is between the values of 2.4% and 2.7%, from 1999 to 2005 in Canada.
- In the user cost (0) variant, the real capital gain is null. In the user cost (10) variant, user cost (25) variant and user cost (30) variant, the real capital gains are based on different horizon lengths of expectation formation. The geometric mean of the 10-year, 25-year and 30-year real capital gains are  $g(10)$ ,  $g(25)$  and  $g(30)$  respectively.

## Interest rate of return

The interest rate of return is also an important element of the user cost. Its estimation method has an important effect on the volatility of user cost indexes, which could make the use of this approach challenging for many CPI users.

To estimate the interest rate of return expenditure weights, the value of homes owned as reported by homeowners is calculated and then multiplied by an annual real interest rate of return. One type of rate for all user cost variants was applied, except for the simple user cost variant.

$$\begin{aligned} \text{Interest return of funds} = & [\text{value of home owned} \times \text{homeowner percentage}] \\ & \times \text{real annual interest rate of return} \end{aligned}$$

For the simple user cost variant, the real interest rate  $\bar{r}_t$  is set equal to 2.5%, the average long-run natural rate of interest. For other user cost variants,  $r_t$  is calculated as the average real interest rate, using a weighted average of Government of Canada real yields and the mortgage real interest rate.<sup>48</sup>

47. Kichian, M., [Identification-Robust Estimates of the Canadian Natural Rate of Interest](#).

48. See Annex B - Price index estimations and data sources for more information.

## Annex B - Price index estimations and data sources

In this annex, the price index calculation of each component of these approaches is described for the Canadian context.

### Acquisition approach

In terms of price indexes, the official price indexes for property taxes, homeowners' insurance premiums, homeowners' maintenance and repairs, and other OA expenses were used.

### Net home purchase

Regarding the net home purchase, three types of housing price indexes were applied:

- **New Housing Price Index**

Statistics Canada's New Housing Price Index (NHPI)<sup>49</sup> measures the change over time in builders' prices of newly built single and semi-detached homes and townhouses. It uses a matched-model approach with explicit quality adjustments. Monthly data are collected through a builders' survey. However, this index has limitations because it does not include new or resale condominiums or resale houses.<sup>50</sup> It could be argued that it would be better to price the series using a residential property price index that covers all types of houses sold in the Canadian housing market.

- **Resale Residential Property Price Index<sup>51</sup> (Canadian Real Estate Association price indexes)**

The Canadian Real Estate Association (CREA) seasonally adjusted composite Home Price Index (HPI)<sup>52</sup> is applied for the estimation of the Resale Residential Property Price Index. It is a measure used in Canada to track and analyze changes in housing prices over time. The CREA HPI is calculated using a hybrid modelling approach (multivariate regression analysis) that merges the repeat sales and hedonic price approaches. It considers various factors such as property type, location and other relevant attributes.

The index is calculated using a benchmark property or typical home in a given area, which serves as a reference point for comparison. The benchmark home is based on a set of specific characteristics and is assigned an initial value. Over time, the CREA HPI measures changes in the value of the benchmark property, allowing for comparisons and analysis of price movements.

- **Monthly hybrid housing index**

A hybrid housing price index was calculated as a weighted average of the CREA Resale Housing Price Index (80%) and NHPI (20%). These relative weights were derived from the Canada Mortgage and Housing Corporation's Market Absorption Survey and the inventory of repeat sale transactions from Teranet Inc. and the Bank of Canada.

At the urban centre level, imputed prices from a higher geographic region were necessary, because of a low number of transactions or low new house construction activity, which can affect the reliability of the urban centres' house price indexes.

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49. [Technical Guide for the New Housing Price Index \(NHPI\)](#).

50. The net purchase housing stock can include resale houses bought by new homeowners. Thus, the net purchase price should include resale house prices.

51. From January 2001 to December 2004, the [Teranet National Bank House Price Index](#) was used as an index for the Resale Residential Property Price Index.

52. For more information, please see [MLS® HPI Methodology](#).



## Investment on renovations

For investment on renovations, the residential construction price index was used as a proxy for these types of expenditure prices. However, a transformation of these quarterly prices into monthly ones was conducted using the Chow-Lin method.

- **The Chow-Lin method**<sup>53</sup>

The Chow-Lin method is a statistical technique used for temporal disaggregation, which involves deriving high-frequency data from low-frequency data. The main goal of the Chow-Lin method, known as temporal disaggregation, is to create a new time series that is consistent with the low-frequency data while keeping the short-term behaviour of the higher-frequency indicator series.

The Chow-Lin method aims to provide accurate disaggregation results by capturing the relationships and patterns observed in the available data. It is a widely used technique in the field of temporal disaggregation. It has been extensively researched and applied in various domains, providing a solid foundation for its reliability and practicality. One of the main limitations of the Chow-Lin method is its assumption of a linear relationship between the low-frequency and high-frequency data. In addition, the accuracy of disaggregated results heavily depends on the quality and reliability of the available low-frequency data. Finally, the Chow-Lin method may introduce smoothing effects on the disaggregated data. This can potentially obscure certain patterns or trends.

## Net acquisition approach

For self-built dwellings and purchases of new dwellings (excluding land), the NHPI (house only) was used. This is possible because the NHPI program reports the price indexes of the house structure and land components using builders' estimates collected in the survey separately.

For investment on renovations, the residential construction price index,<sup>54</sup> transformed into monthly series using the Chow-Lin method, was used. Finally, for property taxes, homeowners' insurance premiums, homeowners' maintenance and repairs, and other OA expenses, official indexes are used.

## Rental equivalence approach

In this paper, the rental equivalence price index is imputed from the Canadian CPI's rent price index. However, there are two main problems with these series.

First, it is difficult to align Canadian owner-occupied properties with comparable rental units. This issue is partly because the rent index often does not include higher-end residences and focuses mainly on apartment rentals.

Second, the rent price index encompasses both new and existing rental contracts. Yet homeowners usually base their estimates on new rental agreements. Studies by Francois (1989) and Kurz and Hoffmann (2004) indicate that estimated equivalent rents closely reflect the actual rents for new contracts. In fact, rental equivalence estimates rely on the hypothetical rent that homeowners would incur if they were to rent their properties, exclusive of furnishings and utilities. Thus, there is a prevailing tendency among owners to focus on rents established in new rental contracts, as supported by research from Francois (1989) and Frick and Grabka (2002).

Ideally, the most accurate way to calculate the rental equivalence price index would be through a survey targeting homeowners' rental equivalence, although this method would be expensive.

The index of homeowners' maintenance and repairs under the rental equivalence approach is based on prices of the types of maintenance and repair materials and services that are covered under the rental equivalence approach. The index of homeowners' insurance premium is based on the tenants' insurance premium price indexes<sup>55</sup> adjusted to the furniture price index.

53. Denton's benchmarking method was also tested. However, there is no significant impact on the final output.

54. Before 2017, the NHPI (structure only) is applied.

55. The tenants' insurance premiums price index is escalated by the furniture price index.

## User cost approach

The different options of estimating the user cost vary only in the estimation of the expected capital gain, forgone rate of return on owned funds and mortgage interest cost. Therefore, in all user cost approach options, the official price indexes of property taxes, homeowners' insurance premiums, homeowners' maintenance and repairs, and other OA expenses were used.

### Expected capital gain

In different variants of the user cost, where the real capital gains  $g(10)$ ,  $g(25)$  and  $g(30)$  are the geometric mean of the 10-year, 25-year and 30-year real rates of capital gain, the monthly capital gain rate is defined as follows:

$$\text{monthly real capital gain rate}_t^n = \left( \frac{\text{monthly housing price change}_t - \text{monthly inflation rate}_t}{\text{monthly housing price change}_{t-12 \times n} - \text{monthly inflation rate}_{t-12 \times n}} \right)^{\frac{1}{12 \times n}}$$

$n$  corresponds to different scenarios: 10 years, 25 years and 30 years.

### Real interest rate of return

The real interest rate of return index for any given month is calculated as follows:

$$r_t = \left[ \begin{array}{l} 30\% \times (\text{Government of Canada marketable bonds 10 years, average yields}) \\ + 70\% \times (\text{mortgage interest rate 5 year fixed rate}) \end{array} \right] - 1.9\%$$

The expected inflation rate is assumed to equal 1.9% (average inflation rate of the 2001 to 2021 period).

## Annex C - International practices: Treatment of owned accommodation in consumer price indexes

At the international level, the rental equivalence approach is the most commonly used approach to measuring owned accommodation (OA). The next most common practice is to exclude OA altogether.

**Table C.1**  
**International practices: Treatment of owned accommodation in consumer price indexes**

Country	Excluded	Net acquisition	Rental equivalence	User cost	Payments
Argentina	X				
Australia		X			
Azerbaijan		X			
Belgium	X				
Brazil	X				
Canada				X	
China	X				
Czech Republic			X		
Denmark			X		
European Union HICP	X				
European Union HICP Pilot		X			
Finland		X			
France			X		
Germany			X		
Iceland				X	
India	X				
Indonesia	X				
Ireland					X
Italy			X		
Japan			X		
Mexico			X		
Netherlands			X		
New Zealand		X			
Norway			X		
Poland			X		
Russian Federation	X				
Saudi Arabia	X				
Slovakia			X		
South Africa			X		
South Korea	X				
Sweden				X	
Switzerland			X		
Turkey	X				
United Kingdom			X		
United States			X		

**Note:** HICP = Harmonised Indices of Consumer Prices

**Source:** Organisation for Economic Co-operation and Development, Methodological Notes Compilation of G-20 Consumer Price Index and Consumer Prices Advisory Committee paper (12)14: "Decision on the Recommended Approach to Incorporating Owner Occupiers' Housing Costs in an Expanded Consumer Prices Index," Table D1—International practices for treatment of owner occupiers' housing costs in national CPIs, 2009.

## Annex D - Distribution of expenditures on owned accommodation among its components according to different approaches and baskets

The distribution of expenditures on owned accommodation among its components varies depending on different approaches and baskets.

**Table D.1**

### Distribution of expenditures on owned accommodation among its components according to different approaches and baskets

	Baskets					
	2013	2015	2017	2020	2021	Average
	percent					
<b>Official approach</b>						
Owned accommodation components						
Mortgage interest cost	25.1	21.7	20.0	18.9	16.1	<b>20.4</b>
Replacement cost	28.1	29.8	31.4	26.9	32.3	<b>29.7</b>
Property taxes (including special charges)	20.9	21.2	20.4	17.8	13.4	<b>18.7</b>
Homeowners' insurance premiums and mortgage insurance	8.1	8.3	8.0	7.1	7.0	<b>7.7</b>
Homeowners' maintenance and repair	7.8	8.9	8.3	8.6	9.6	<b>8.6</b>
Other owned accommodation expenses	10.0	10.2	11.9	20.6	21.5	<b>14.8</b>
<b>Payment approach</b>						
Owned accommodation components						
Mortgage interest cost	34.9	30.9	29.2	25.9	23.8	<b>28.9</b>
Property taxes (including special charges)	29.1	30.2	29.8	24.4	19.8	<b>26.6</b>
Homeowners' insurance premiums and mortgage insurance	11.2	11.8	11.7	9.7	10.4	<b>11.0</b>
Homeowners' maintenance and repair	10.9	12.6	12.0	11.8	14.2	<b>12.3</b>
Other owned accommodation expenses	13.9	14.5	17.4	28.2	31.8	<b>21.1</b>
<b>User cost approach</b>						
Owned accommodation components						
Interest rate of return	44.7	20.8	28.1	3.6	3.2	<b>20.1</b>
Replacement cost	37.6	38.0	37.1	33.2	38.5	<b>36.9</b>
Capital gain	-44.7	-20.8	-22.6	-3.6	-3.2	<b>-19.0</b>
Property taxes (including special charges)	27.9	27.1	24.1	21.9	16.0	<b>23.4</b>
Homeowners' insurance premiums and mortgage insurance	10.8	10.6	9.4	8.7	8.4	<b>9.6</b>
Homeowners' maintenance and repair	10.4	11.3	9.7	10.7	11.5	<b>10.7</b>
Other owned accommodation expenses	13.3	13.0	14.1	25.4	25.7	<b>18.3</b>
<b>Rental equivalence approach</b>						
Owned accommodation components						
Rent equivalent	96.7	96.5	96.4	95.3	94.6	<b>95.9</b>
Homeowners' insurance premiums (rental equivalence)	1.4	1.5	1.6	1.7	1.8	<b>1.6</b>
Homeowners' maintenance and repair (rental equivalence)	2.0	2.0	2.0	3.0	3.6	<b>2.5</b>
<b>Net acquisition approach</b>						
Owned accommodation components						
New construction	35.3	34.4	35.4	30.7	33.4	<b>33.9</b>
Renovations	27.4	27.7	26.9	22.9	24.8	<b>26.0</b>
Property taxes (including special charges)	17.1	16.9	16.2	15.5	11.0	<b>15.3</b>
Homeowners' insurance premiums	5.6	5.7	5.6	5.4	5.1	<b>5.5</b>
Homeowners' maintenance and repair	6.4	7.1	6.5	7.5	7.9	<b>7.1</b>
Other owned accommodation expenses	8.1	8.1	9.4	18.0	17.7	<b>12.3</b>
<b>Acquisition approach</b>						
Owned accommodation components						
Net home purchase	45.1	37.8	38.3	39.6	52.8	<b>42.7</b>
Renovations	23.3	26.3	25.7	20.0	17.6	<b>22.6</b>
Property taxes (including special charges)	14.5	16.1	15.4	13.5	7.8	<b>13.5</b>
Homeowners' insurance premiums	4.7	5.4	5.3	4.7	3.6	<b>4.8</b>
Homeowners' maintenance and repair	5.4	6.7	6.2	6.6	5.6	<b>6.1</b>
Other owned accommodation expenses	6.9	7.7	9.0	15.6	12.5	<b>10.4</b>

Source: Statistics Canada, Consumer Prices program.