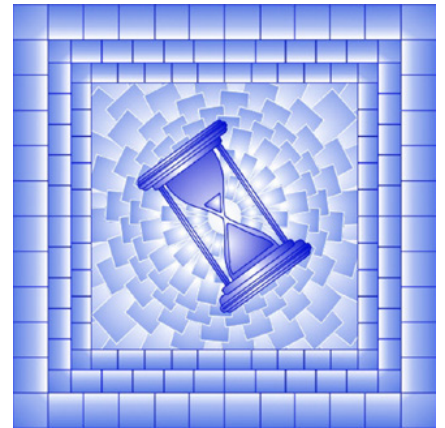


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by Taylor Mitchell

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Introduction

The Consumer Price Index (CPI) is one of the most widely-known, quoted and utilized economic indicators in Canada and is of interest to a wide range of users. It can be used to compare, through time, the cost of a fixed basket of goods and services purchased by consumers. The CPI is used for economic analysis and provides insight into overall economic conditions.

Private and public pension programs, income tax deductions, and some government social payments are adjusted using the CPI. The index is used as a deflator of various economic aggregates to obtain estimates at constant prices. The CPI is also a tool for setting and monitoring economic policy. For example, the Bank of Canada uses the CPI and special aggregates of the CPI for this purpose.

As a Laspeyres-type¹ price index, the CPI basket quantities are those of the reference period of the basket weights, which are used to estimate quantities consumed for upper level aggregation. The larger the basket weight of a given aggregate in the CPI basket, the more a price change in that aggregate will impact the all-items CPI.

Basket weights are derived primarily from household expenditures reported in Statistics Canada's Survey of Household Spending (SHS)² and are updated every two years. The January 2019 CPI marks the introduction of updated basket weights in the calculation of the index. As of its release on February 27 2019, the basket weights used in the aggregation of the CPI were updated based on consumer spending patterns from the 2017 SHS, replacing those from the 2015 SHS. In addition to updates to the classification structure of the basket, these changes enhance the quality of the CPI.

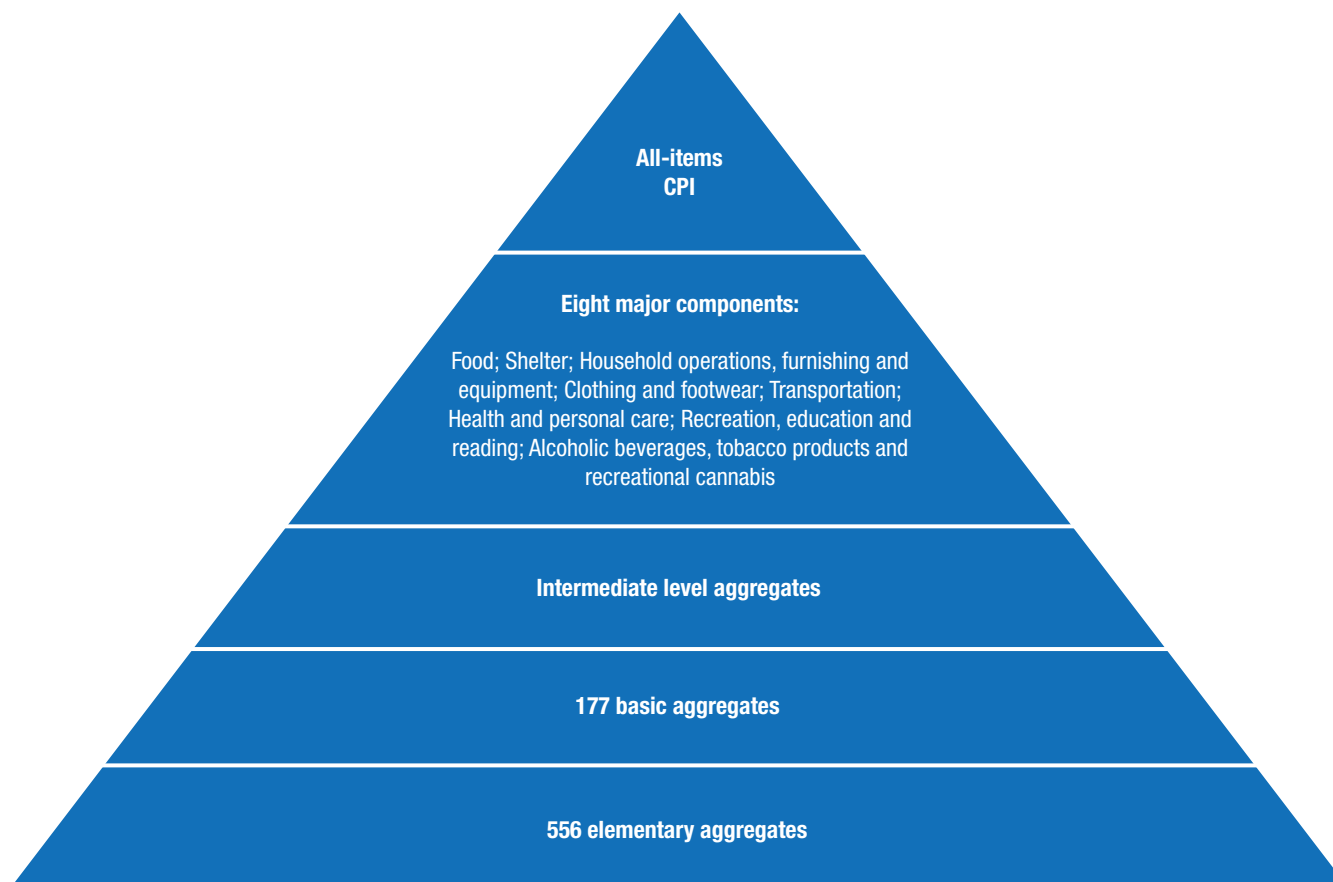
Composition of the CPI Basket

The Consumer Price Index is a weighted average of the price changes of a fixed basket of goods and services, based on the expenditures of a target population³ in a certain reference period. Each good or service in the basket is representative of consumer spending patterns, and price movements are assigned a basket share that is proportional to the consumption expenditure for which they account. For example, 26.92% of total consumer expenditures in scope of the CPI accounted for shelter-related goods and services. This corresponds with the 26.92% weight assigned to shelter in the 2017 CPI basket. The weights of goods and services are fixed during the life of a given basket and play an important role in determining the impact of a given item's price change on the CPI. For instance, Canadians on average spend a much larger share of their total expenditures on gasoline than on milk. As a result, a 10% price increase in gasoline prices will have a greater impact on the all-items CPI than an equivalent increase in the price of milk.⁴

The Consumer Price Index classification of goods and services is organized according to a top-down hierarchical structure (see diagram below). At the top of the structure is the all-items CPI, which contains eight major components. Below the eight major components are intermediate level aggregates, such as owned accommodation and operation of passenger vehicles, which, along with the major components, provide insight into the sources of monthly and annual price change. There are 177 basic aggregates.⁵ These basic aggregates are typically the result of aggregating one or more elementary aggregates, many of which are unpublished.

1. The Laspeyres formula is a basic method for calculating price indices and is consistent with the CPI's fixed basket concept. It expresses the change in the cost between period 0 and period t of buying a fixed basket of products, by aggregating the prices of products in the basket using quantities consumed from the price reference period 0 as weights.
2. CPI basket shares may differ from SHS shares of total expenditure due to differences in item classification. Further, some consumer expenses considered to be in scope of the CPI are not included in the SHS. In addition to the SHS, other expenditure data sources such as national accounts data, retail sales data and census data enters into the calculation of the CPI basket. Users can consult the [Survey of Household Spending](#) for further information.
3. The target population of the CPI consists of families and individuals living in urban and rural private households in Canada.
4. Gasoline comprises 3.34% of the 2017 CPI basket, whereas fresh milk comprises 0.37%.
5. While indices are published for 177 basic aggregates at the Canada level, not all are published at the provincial level and below.

Figure 1
Classification Structure of the Consumer Price Index



Elementary aggregates are added or deleted from the basket as consumption patterns change over time. The aggregate for DVD rentals,⁶ for instance, was deleted from the basket as they became less popular with consumers and subsequently commanded a lower share of overall expenditures. At the elementary aggregate level, the classification includes a sample of items that are chosen to characterize all products in that class. Representative products are chosen with emphasis on items that are widely available and known to be among the most popular with consumers, ensuring that the items selected are representative of the purchases consumers actually make. The number of representative products assigned to an elementary aggregate can vary based on the basket weight of the aggregate, as well as the price variability and heterogeneity of products in that class. For instance, when pricing certain dry grocery products, representative products typically include both brand-name and store-brand items. At the same time, there is only one representative product priced under the bananas aggregate.

Importance of Updating the Consumer Price Index Basket Weights

If the fixed-quantity basket of goods and services was kept unchanged for an extensive period of time, it would gradually lose accuracy and relevance as a reflection of consumer spending. This is partly due to the nature of consumption patterns, which have a tendency to evolve in response to shifts in relative prices. For example, if the price of chicken increased between basket updates, consumers may opt away from chicken and substitute other meats. A Laspeyres-type price index cannot reflect this expenditure change until the basket weights are updated. This can lead to an overstatement of the importance of changes in the price of chicken in the index and

6. DVD rentals were deleted from the basket in the 2017 basket update, based on 2015 expenditure shares.

a subsequent upward bias in the CPI. Typically, the longer a fixed set of basket weights is used, the greater this upward bias.

Consumer spending patterns are also influenced by factors such as variations in the level and distribution of household income, demographics (such as an aging population), evolving habits and technological advances. New products and services are introduced to the market and existing ones may be modified or become obsolete. As a result, the basket needs to be revised periodically to reflect changes in consumers' spending patterns. For example, the significant increase of the basket share for Internet access services from 0.53% in 2005 to 1.06% in 2017 reflects the growing importance of the Internet in the daily lives of Canadians.⁷ In the same time period, the basket share of cigarettes fell from 1.27% to 0.82% as consumer spending patterns shifted away from cigarettes.

In addition to the review of the expenditure weights, a basket update is also an opportunity to review and update other aspects of the indices. This includes changing the CPI classification to make it more representative of consumer spending and the products and services available for purchase. It is also an opportunity to review and update the sample of prices collected, review price index estimation methodologies, and update documentation and dissemination products, although these activities are not limited to basket updates.⁸

Overview of the 2017 Basket Update

The basket is updated periodically to reflect changes in consumer spending patterns. The continuity of the CPI series is maintained by chain linking⁹ the corresponding indices obtained from consecutive baskets. This is done separately for each aggregate series, which is defined as the intersection of a commodity and a geographic area.

With the introduction of the 2017 basket weights, new product classes were added to reflect the evolving consumption patterns of Canadians, with emphasis on incorporating services that have gained in popularity amid the increasing digitization of the economy. With respect to the rise of the sharing economy,¹⁰ this includes the introduction of an elementary aggregate for ride sharing. The aggregate for other traveller accommodation was expanded to include prices for online vacation property rentals. These additions reflect evolving transportation and accommodation preferences among Canadians. In the previous basket, the basic aggregate video and audio subscription services contained two elementary aggregates: broadcasting subscription services and online subscription services. With the introduction of the 2017 basket weights, the latter aggregate now contains two lower-level indices: video streaming services and audio streaming services.

Amid steadily increasing use of public transportation by Canadians in their daily commutes,¹¹ an elementary aggregate for commuter trains was also introduced to the 2017 basket.

At the basic aggregate level, a number of indices were added to the 2017 basket. The alcoholic beverages and tobacco products major component has been renamed alcoholic beverages, tobacco products and recreational cannabis to reflect the consumption of recreational cannabis by Canadian consumers.¹² Additionally, medicinal cannabis has been added as a basic aggregate under the intermediate aggregate medicinal and pharmaceutical products.

7. Data from the 2016 General Social Survey reveals that 91% of Canadians aged 15 and older used the Internet during the previous month, up from 86% in 2013. Source: Statistics Canada (2016). General Social Survey. Microdata file (45-25-0001) Last updated June 13, 2018.

8. According to the Canadian Community Health Survey, the percentage of Canadians who identify as daily or occasional smokers has declined from 21.8% in 2005 to 16.2% in 2017. Source: Statistics Canada. No date. Table 13-10-0096-01 Canadian Community Health Survey, Canadian health characteristics, annual estimates. Last updated June 26, 2018.

9. Chain linking is the process of chaining a fixed-basket index to another fixed-basket index in order to create a continuous time series. This process ensures that period-over-period percentage changes in a chain-linked index will only reflect price change and not changes in the fixed quantities.

10. An estimated 9.5% of persons (or 2.7 million people) aged 18 or older living in Canada participated in the sharing economy between November 2015 and October 2016 by using peer-to-peer ride services or private accommodation services. Source: Statistics Canada (2017). [The sharing economy in Canada](#). Last updated February 28, 2017.

11. In Canada, the proportion of people commuting to work by public transit has edged up with every census since collection of this information began in 1996, rising from 10.1% that year to 12.4% in 2016. Source: Statistics Canada (2017). [Journey to work: Key results from the 2016 Census](#). Last updated November 29, 2017.

12. According to the National Cannabis Survey, 14% of Canadians aged 15 years or older reported some use of cannabis products for medical or non-medical purposes in the first quarter of 2018. Source: Statistics Canada (2018). [National Cannabis Survey](#), first quarter 2018. Last updated April 4, 2018.

Table 1
Selected product classes added or deleted from the 2017 CPI basket

Product class	Parent index	Type of aggregate	Added	Deleted
Broadband and other Internet access services	Internet access services	Elementary		✓
Area rugs and mats	Household textiles	Basic		✓
Commuter trains	City bus and subway transportation	Elementary	✓	
Ride sharing	Taxi and other local and commuter transportation	Elementary	✓	
Medicinal cannabis	Medicinal and pharmaceutical products	Basic	✓	
Blank CDs and DVDs	Purchase of digital media	Elementary		✓
Portable drives	Purchase of digital media	Elementary		✓
Other traveller accommodation	Traveller accommodation	Elementary	✓	
Audio streaming services	Audio and video subscription services	Elementary	✓	
Cannabis	Recreational cannabis	Elementary	✓	

While one basic aggregate, area rugs and mats, has been deleted from the 2017 basket, the classification structure of the remaining basic aggregates remains intact. Elementary aggregates for broadband and other Internet access services, blank CDs and DVDs and portable drives were deleted from the basic aggregates Internet access services and purchase of digital media respectively.

As alternative data sources have become available, minor changes were made to the classification of the food component at lower level aggregates to better facilitate the use of scanner data.¹³ This includes the re-allocation of representative products and the introduction of new elementary aggregates. Similar changes were made in the clothing and footwear component, reducing unnecessary detail at the lowest levels of the clothing aggregate.

The index reference period or index base period is the period in which the index is set to equal 100. For the CPI, the index base period is usually a calendar year expressed as “index year=100”. The current index base period for the CPI remains 2002=100 in the 2017 basket.

Update to Basket Weights

Considerations

Between periods, the basket share for a given good or service may either increase, decrease or remain unchanged. Each potential outcome corresponds with the change in the proportion of overall expenditures (increase, decrease or no change) between the 2015 reference year and the 2017 reference year.

It is important to note, however, that expenditure share is a relative measure. Basket weight changes are a function of the expenditure growth within a given category, as well as the growth rate of all other expenditures in scope of the CPI. A basket share that is declining, for instance, indicates that the rate of growth in that category was less than the rate of growth of overall expenditures.

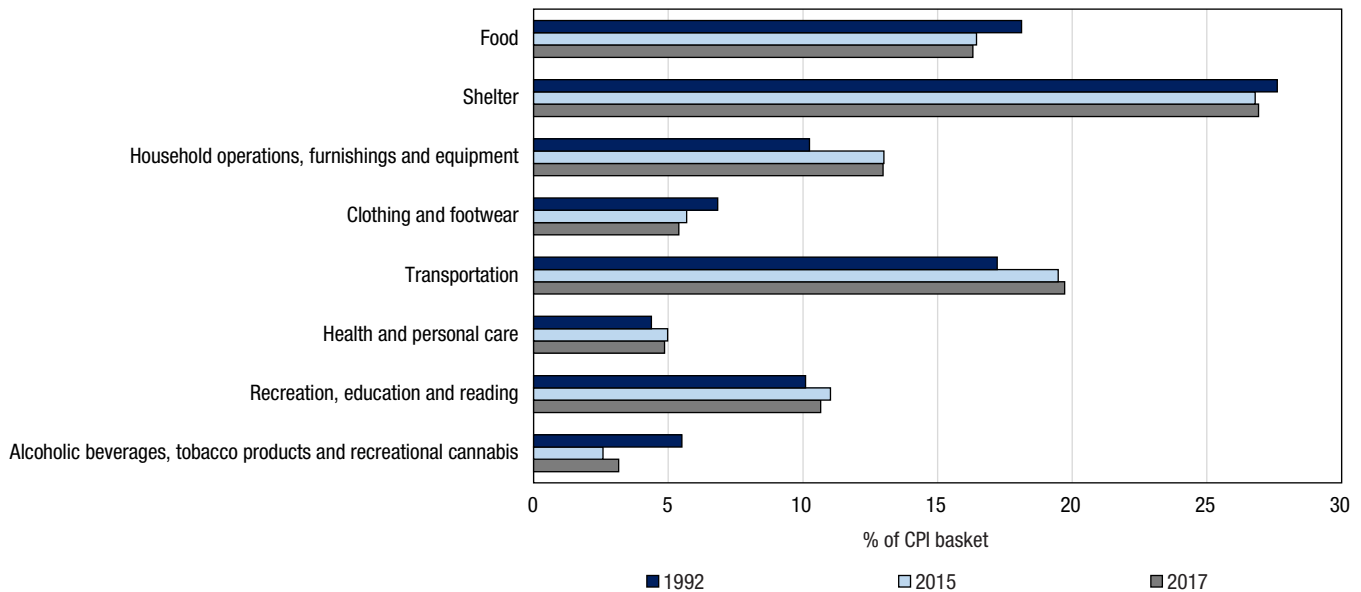
For the following analysis of basket weight changes, the effect of rounding on basket weights should also be taken into consideration. Given that basket weights are rounded and published at the second decimal place, minute changes in expenditure share may not be apparent. Basket share changes of smaller magnitudes are, however, accounted for in the CPI, as full-precision expenditure weights are used in its calculation.

13. In 2018, the Canadian CPI first introduced scanner data as a method of collection for grocery products. The use of scanner data allows the CPI to capture actual transaction prices paid by consumers, increasing the relevance of the data captured. Scanner data will be further incorporated into the CPI as data sources become available.

Analysis of Basket Weights

The chart below shows the evolution from 1992¹⁴ to 2017 of CPI basket weights for Canada by major component. Over the past 25 years, the basket share of the transportation component has increased the most, while the respective basket shares of the food component and the alcoholic beverages, tobacco products and recreational cannabis component posted the largest declines. A consistently declining trend was observed in the latter since its weight was first published in 1986, with the basket shares for alcoholic beverages and tobacco products both steadily decreasing over time. The 2017 basket, however, recorded the first increase in the basket share of the alcoholic beverages, tobacco products and recreational cannabis component as its weight increased from 2.58% to 3.16%. This increase reflects, in part, the introduction of recreational cannabis to the CPI basket.

Chart 1
Basket share by major component, Canada, 1992 to 2017



Notes: Weights are expressed as proportions of total household consumption expenditures in scope of the CPI in the weight reference period dollars. Additional weights from CPI basket updates in 1996, 2001, 2005, 2009, 2011 and 2013 not shown.

Source: Statistics Canada Table 18-10-0007-01 Basket Weights of the Consumer Price Index.

Shifting basket shares often result from sustained price changes, which require consumers to reallocate their expenditures. For example, the basket share of the shelter component grew the most in Ontario and British Columbia, reflecting the increasing cost of housing in Canada’s highest priced housing markets.¹⁵ At the national level, the basket share of mortgage interest cost has declined with every basket since 2009, reflecting the increasingly low interest rates offered by commercial banks between 2009 and 2017.¹⁶

In 2017, consumers allocated a smaller share of spending to clothing and footwear, as well as several durable household goods, including furniture, audio equipment and video equipment. These declines in basket share are attributable, in part, to lower prices for these commodities in 2017 compared with 2015.¹⁷

Shifting basket shares can also result from evolving social and economic factors. For example, Canadian consumers allocated a larger share of spending to health care goods in 2017 than they did in 2005,¹⁸ an increase

14. 1992 is the first year where weights for all eight major components were published.

15. Data from the New Housing Price Index reveals that the annual average price of a new house rose 14.1% in Toronto and 11.1% in Vancouver between 2015 and 2017, compared with a 6.2% increase at the Canada level. Source: Statistics Canada. No date. Table 18-10-0205-01 New Housing Price Index, monthly (2016=100). Last updated December 13, 2018.

16. Canadian Mortgage and Housing Corporation data reveals that the average 5-year residential mortgage rate quoted by institutional lenders over the course of 2009 was 5.05% and declined to 3.79% in 2017. Source: Statistics Canada. No date. Table 34-10-0145-01 Canada Mortgage and Housing Corporation, conventional mortgage lending rate, 5-year term. Last updated December 10, 2018.

17. Source: Statistics Canada. No date. Table 18-10-0005-01 Consumer Price Index, annual average (2002=100). Last updated January 18, 2019.

18. The basket share of health care goods rose to 1.70% in 2017 from 1.39% in 2005, the year its weight was first published.

that coincided with the aging of the Canadian population.¹⁹ Similarly, the basket share of cigarettes continued to decline in the 2017 basket, falling to 0.82%, reflecting the changing smoking habits of Canadians.²⁰

While the basket share of food purchased from stores declined between 2015 and 2017, food purchased from restaurants grew in importance from 4.92% in the 2015 basket to 5.03% in 2017. This greater emphasis on food consumed outside the home reflects changing lifestyles and increasing preferences for quick meal solutions, as does the growth in basket share of the other food products and non-alcoholic beverages index, which includes prepackaged foods.

The operation of passenger vehicles index decreased in basket share from 9.45% in 2015 to 9.14% in 2017. Canadians allocated a smaller percentage of their budgets to gasoline in 2017, as expenditures grew more slowly between 2015 and 2017 compared with other commodities. Higher consumer prices for gasoline during the same time period were moderated by reduced growth in gasoline consumption,²¹ which contributed to a decline in basket share from 3.49% in 2015 to 3.34% in 2017. Other driving-related expenses, including passenger vehicle insurance premiums and passenger vehicle maintenance and repairs, also declined in basket share.

The importance of cellular and Internet services continued to increase in the 2017 basket, which is consistent with the increasing popularity of both technologies, particularly among older Canadians.²² A greater share of consumer expenditures was allocated to multipurpose digital devices, including tablets and smartphones, in 2017 than in 2015. At the same time, the basket share of newspapers continued to decline, reflecting widespread access to online digital media that provides much of the same content. Similarly, the importance of the purchase of digital media index, which includes CDs and DVDs, declined in the 2017 basket.

Conclusion

With the 2019 basket update, important changes aimed at improving the quality of the Canadian Consumer Price Index (CPI) were introduced. The contents included in the basket were updated to reflect changing consumer behaviours and ensure the CPI remains a reliable indicator of consumer price change.

19. The median age in Canada increased from 38.6 years in 2005 to 40.8 years in 2017 and the proportion of Canadians over the age of 65 increased from 13.1% in 2005 to 16.8% in 2017. Source: Statistics Canada. No date. Table [17-10-0005-01](#) Population by Age and Sex, annual. Last updated June 11, 2018.

20. Data from the Canadian Community Health Survey reveal that the percentage of Canadians who identify as daily or occasional smokers declined from 17.7% in 2015 to 16.2% in 2017. Source: Statistics Canada. No date. Table [13-10-0096-01](#) Canadian Community Health Survey, Canadian health characteristics, annual estimates. Last updated June 26, 2018.

21. Gross sales of gasoline increased 0.8% between 2015 and 2017, after increasing 3.9% between 2013 and 2015. Source: Statistics Canada. No date. Table [23-10-0066-01](#) Motor Vehicle Fuel Sales. Last updated October 4, 2018.

22. While people aged 15 to 44 had similarly high Internet usage rates, individuals aged 45 and older increased their Internet use substantially from 2013 to 2016. Among 65- to 74-year-olds, Internet use rose from 65% to 81% while it rose from 35% to 50% in those over the age of 75. Source: Statistics Canada (2016). General Social Survey. Microdata file ([45-25-0001](#)) Last updated June 13, 2018.

Appendix

Table 2
Basket Share (%) by Consumer Price Index Component, 2005 – 2017

	Basket reference year					
	2005	2009	2011	2013	2015	2017
Major components, selected product groups	percent					
Food	16.85	16.05	16.35	16.07	16.45	16.31
Food purchased from stores	11.72	11.22	11.48	11.36	11.54	11.28
Other food products and non-alcoholic beverages	3.01	2.75	2.77	2.77	2.71	2.79
Food purchased from restaurants	5.13	4.83	4.88	4.71	4.92	5.03
Shelter	25.71	27.52	25.86	26.19	26.79	26.92
Rent	5.34	6.04	5.76	5.67	6.20	6.24
Mortgage interest cost	5.16	5.81	4.13	4.03	3.50	3.30
Homeowners' replacement cost	3.04	4.05	4.25	4.52	4.80	5.18
Household operations, furnishings and equipment	11.41	11.84	12.57	12.92	13.01	12.98
Telephone services	2.35	2.20	2.37	2.42	2.37	2.39
Internet access services	0.53	0.70	0.78	0.89	0.97	1.06
Furniture	1.66	1.42	1.17	1.05	1.23	1.19
Clothing and footwear	5.58	5.61	6.20	6.25	5.68	5.39
Transportation	19.60	19.25	20.05	20.01	19.48	19.72
Purchase, leasing and rental of passenger vehicles	7.94	7.75	7.64	7.38	7.97	8.55
Purchase of passenger vehicles	6.44	6.57	6.64	6.68	7.08	7.60
Operation of passenger vehicles	9.84	9.61	10.42	10.47	9.45	9.14
Gasoline	4.49	4.42	4.85	4.77	3.49	3.34
Passenger vehicle maintenance and repairs	1.19	1.12	1.08	1.17	1.60	1.54
Passenger vehicle insurance premiums	2.94	2.74	2.92	2.88	2.80	2.68
Public transportation	1.82	1.89	1.99	2.16	2.06	2.02
Air transportation	0.96	1.04	1.14	1.25	1.19	1.14
Health and personal care	4.83	4.95	4.95	4.75	4.98	4.86
Health care goods	1.39	1.47	1.85	1.64	1.67	1.70
Recreation, education and reading	12.95	11.79	11.26	11.07	11.02	10.66
Multipurpose digital devices	..	0.04	0.11	0.22	0.23	0.29
Audio equipment	0.21	0.20	0.18	0.10	0.08	0.05
Video equipment	0.62	0.76	0.46	0.33	0.30	0.26
Purchase of digital media	0.31	0.22	0.18	0.15	0.12	0.07
Traveller accommodation	1.20	1.28	1.33	1.12	1.16	1.13
Travel tours	1.03	0.96	0.95	1.00	1.25	1.31
Newspapers	0.20	0.15	0.06	0.04	0.03	0.02
Alcoholic beverages, tobacco products and recreational cannabis	3.07	2.97	2.76	2.74	2.58	3.16
Alcoholic beverages	1.74	1.79	1.60	1.63	1.66	1.74
Tobacco products and smokers' supplies	1.33	1.18	1.16	1.11	0.92	0.87
Cigarettes	1.27	1.14	1.10	1.04	0.89	0.82
Recreational cannabis	0.55

.. not available for a specific reference period

Notes: Figures may not add to 100% due to rounding. Weights are expressed as proportions of All-items CPI in the weight reference period dollars. Basket weights are at basket weight reference year price.

Source: Statistics Canada, Consumer Prices Division.