Analytical Paper

Analysis in Brief

Consumer Price Inflation by Frequency of Purchase

by Alan Chaffe



Consumer Prices Division 13th Floor, Jean Talon Building, 170 Tunney's Pasture Driveway, Ottawa, ON K1A 0T6

Telephone: 1-800-263-1136



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- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- p preliminary
- r revised
- x suppressed to meet the confidentiality requirements of the Statistics Act
- E use with caution
- F too unreliable to be published

Table of contents

Consumer Price Inflation by Frequency of Purchase

1	Summary	4
2	Price Index of Frequent Purchases propelled by prices for basic necessities	5
3	Annual 2009: All-items CPI and the Price Index of Frequent Purchases increase at about the same rate	7
4	Price Index of Non-frequent Purchases: Falling durable-goods prices temper its advance	8
5	Price Index of Contractual Purchases: Higher insurance and mortgage interest costs contribute most of the rise	9
6	Price indexes based on frequency of purchase and perceptions of inflation	10
7	Tables	13
Abou	ut this article	17
Abou	ut Analysis in Brief	18
Distr	ibution list: Free subscription	19

Consumer Price Inflation by Frequency of Purchase

by Alan Chaffe

1 Summary

During the past decade, prices for the goods and services that consumers purchase frequently have generally increased at a faster rate than the all-items Consumer Price Index (CPI). However, prices for less-frequently bought goods and services generally rose at a lower rate than the all-items CPI.

This has implications for consumers' perceptions of price rises and of the CPI itself. Research has shown that when consumers form their perceptions of inflation, they tend to attach greater importance to changes in the prices of goods they most frequently purchase, as opposed to those they purchase less frequently.

This special study analyses price movements using three groupings of the CPI items based on frequency of purchase (frequent purchases, non-frequent purchases and contractual purchases), to provide a better understanding of the sources of consumer inflation and to help shed light on people's perception of inflation.

From 2000 to 2009, consumer prices for all items increased at an annual average rate of 2.1%: but prices rose 3.2% for frequently purchased items, and only 0.7% for infrequently purchased items.

Gasoline and food price rises accounted for much of the substantial increase for frequently purchased items. However, prices for big-ticket durable consumer goods have been increasing slowly, if not falling. The latter has been the case for computer equipment and supplies.

The average annual increase for items covered by some form of contract was 2.5%, which was more in line with the rate of growth for the all-items CPI.

In 2009 alone, however, this trend reversed. Consumer prices for all items rose at an annual average rate of 0.3% during the year, but the inflation rate for frequently purchased items was 0.2%. Falling gasoline prices was the principal cause, and had a far larger dampening impact on the index for frequently purchased goods than it had on the all-items CPL.

Data sources and methodology:

For the purpose of this paper, the CPI items are re-grouped based on the frequency of purchases:

- 1) Frequent Purchases, which includes goods and services that consumers generally purchase at least monthly, and whose transaction price has not been determined more than a month in advance (by contractual obligation);
- 2) Non-frequent Purchases, which includes goods and services that consumers generally purchase less than monthly, but excludes contractual purchases;
- 3) Contractual Purchases, which includes purchases that involve contractual agreements such as passenger vehicle insurance. Contractual items are less likely to influence consumers' perception of inflation than are frequently purchased items. The contractual agreement category is an intermediate class between frequent purchases and non-frequent purchases. Monthly passenger vehicle lease payments or insurance premiums, for example, are typically visible each month, and could have been classified as frequent purchases. However, since these payments are typically negotiated or reset once a year, they could have also been classified as non-frequent purchases. Defining such purchases as frequent or non-frequent would have been unsatisfactory. Of course, users of these statistics are free to aggregate the contractual category with either of the other categories.

Each of the basic class elements in the CPI has been assigned to one of these three groups, based on professional judgment of price analysis experts and according to information such as response rates from the Survey of Household Spending; durable, semi-durable, and non-durable classifications; frequency of price collection; and market intelligence information (see Table 4). Thus, the all-items CPI represents a weighted average of these three special groups.

Price indexes for these three groups provide measures that can help shed light on consumers' perceptions of inflation, and provide a deeper understanding of the sources of consumer inflation.²

Similar studies based on frequency of purchase have been done by the Office for National Statistics and Eurostat to explain why consumers' perceptions of inflation may differ from the all-items CPI.³ Research articles have discussed the impact that frequent purchases may have on perceptions of inflation. Many have shown that consumers' perceptions of inflation are likely aligned with price changes for frequent purchases.⁴

2 Price Index of Frequent Purchases propelled by prices for basic necessities

Consumers faced higher average price increases for goods and services that they purchase frequently, such as gasoline and food, over the past 10 years.

Prices for goods and services that Canadians purchase frequently rose at an average annual rate of 3.2% from 2000 to 2009, according to the Price Index of Frequent Purchases (PIFP). This surpassed the 2.1% average annual increase posted for the all-items CPI.

^{1.} See text box "Why contractual items have been classified in a separate index."

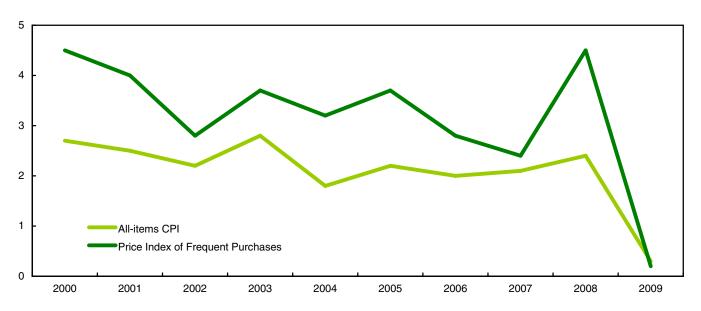
^{2.} For a more detailed discussion, see the section "Price indexes based on frequency of purchase and perceptions of inflation."

^{3.} See Jim O'Donoghue, 2007, "Inflation—experience and perceptions," *Economic and Labour Market Review*, Vol. 1, no. 1, Office for National Statistics; and Ibolya Mile, 2009, "HICP—Frequent out-of-pocket purchases," *Statistics in Focus, Economy and Finance*, Eurostat.

^{4.} See Manfred Fluch and Helmut Stix, 2005, "Perceived inflation In Austria–Extent, explanations, effects," Monetary Policy and the Economy, Quarter 3, JEL classification: E31, E50; Manfred Fluch and Helmut Stix, 2007, "The development of euro prices–Subjective perception and empirical facts," Monetary Policy and the Economy, Quarter 1, JEL classification: E31; Paolo Del Giovane and Roberto Sabbatini, 2006, "Perceived and measured inflation after the launch of the euro: Explaining the gap in Italy," Giornale degli Economisti e Annali di Economia", Vol. 62-N. 2, p. 155–192; and Hans Wolfgang Brachinger, 2006, "Euro or 'teuro'?: The euro-induced perceived inflation in Germany," Department of Quantitative Economics Working Paper no. 5, University of Fribourg Switzerland, JEL classification: C43, E31, D81.

Chart 1
Increases in Price Index of Frequent Purchases higher than all-items CPI

Annual average percentage change



Source(s): Statistics Canada (Consumer Price Index, 2005 basket), CANSIM table 326-0020.

Frequent purchases include items that consumers purchase at least monthly, such as food, toiletries, recreational services, public transportation, and gasoline. It does not include items such as vehicle insurance, rent payments, homeowner's insurance, or payments for leasing of passenger vehicles.

While payments for these items may occur monthly, they are contractual in nature, since the transaction price is negotiated at a set date. Regular payments—typically monthly—are made over a period exceeding one month.

Why contractual items have been classified in a separate index

Owing to the distant nature of the potentially observed price change for contractual purchases, it is less likely that price changes for contractual purchases will greatly influence perceptions of inflation. For example, automobile insurance is generally contracted annually. Most consumers pay monthly according to a monthly plan, but the item is not considered frequently purchased. The price paid each month is set more than a month in advance, and changes only on the renewal date of the insurance policy (typically annually). Price changes for automobile insurance should, therefore, have only a minor impact on consumers' perceived measure of inflation compared with frequently purchased items such as food. The PIFP thus excludes items that may be purchased and paid for monthly but whose purchase price is determined more than a month in advance.

During the past decade, prices for energy (electricity, natural gas, fuel oil and gasoline) and food components—two basic household necessities—were the primary contributors to the upward change in the PIFP. From 2000 to 2009, costs for energy products rose by an average annual rate of 4.6%, and food prices by an average annual rate of 2.8%. Both were sharper rises than the average annual increase in the all-items CPI.

In particular, price rises for meat (+3.2%), dairy (+3.4%), and bakery (+4.5%) products were the prime contributors to increasing food prices. The primary contributors to rising energy costs were a 5.3% increase in gasoline prices and a 5.6% increase in natural gas prices. Also putting upward pressure on the PIFP were higher prices for tobacco products and restaurant meals.

All the items in the frequent purchases posted annual average price increases over the past decade, except for toilet preparation and cosmetic products, which posted no growth.

The largest gap over the past 10 years between changes in the all-items CPI and the PIFP occurred in 2008. This was mainly because of a 12.7% rise in gasoline prices and a 3.5% increase in food prices. Various food items. including bakery (+11.2%), dairy (+3.9%), and pasta (+31.9%) items contributed to higher food prices. Gasoline and food commodities have a larger weight in the PIFP than they do in the all-items CPI. Price increases in 2008 for these items, therefore, had a greater impact on the PIFP than they did on the all-items CPI.

Price declines for purchasing passenger vehicles, clothing, and computer equipment and supplies, items not included in the PIFP, helped to moderate the increase in the all-items CPI in 2008.

For most of the past decade, except in 2009, the annual average change in the PIFP has been higher than the annual average change in the all-items CPI.

Annual 2009: All-items CPI and the Price Index of Frequent Purchases increase at about the same rate

Sharp price declines for gasoline dampened the overall rise in the PIFP in 2009. As a result, the PIFP rose at about the same rate as the all-items CPI. The PIFP advanced by an annual average of 0.2% in 2009; the all-items CPI rose 0.3%.

The change in the PIFP and the all-items CPI slowed in 2009 from 2008, primarily because of falling gasoline prices: in 2009, they declined at an average annual rate of 17.5%. Since gasoline has a higher relative weight in the PIFP than in the all-items CPI, the effect of this price decline was greater on the PIFP.

Rising prices for food (+4.9%) were the primary upward contributor to both the PIFP and the all-items CPI.

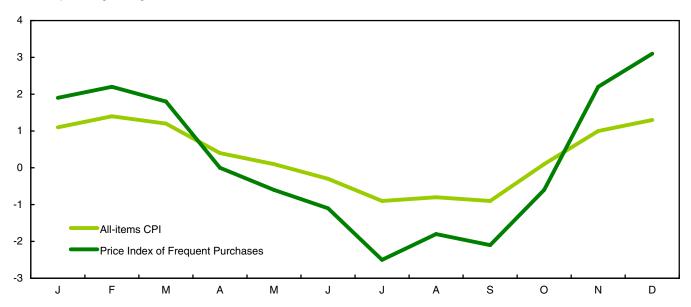
Increasing prices for contractual items, mainly automotive insurance and property taxes, and for non-frequently purchased items such as homeowner's maintenance and repairs and tuition fees, contributed to a stronger change in the all-items CPI.

From April to October, however, a gap opened between the all-items CPI and the PIFP, as the latter fell faster. The 12-month change in the all-items CPI was higher than that of the PIFP between April and October in 2009; the gap was widest in July. In the 12 months to July, the PIFP fell 2.5%, while the all-items CPI declined just 0.9%. Gasoline prices fell 28.3% in the 12 months to July, the largest 12-month drop recorded since the inception of the CPI in 1949. Substantial 12-month price declines for natural gas and fuel oil, as well as other fuels, also occurred in July.

Toward the end of 2009, the 12-month decline in gasoline prices subsided, and in November and December, gasoline prices actually rose on a year-over-year basis. As a result, the PIFP returned to its trend of outpacing the all-items CPI. In December 2009, the 12-month change in the PIFP was 3.1%, compared with 1.3% for the all-items CPI.

Chart 2
12-month changes in the Price Index of Frequent Purchases lower than the all-items CPI for most of 2009

12-month percentage change



Source(s): Statistics Canada (Consumer Price Index, 2005 basket), CANSIM table 326-0020.

4 Price Index of Non-frequent Purchases: Falling durable-goods prices temper its advance

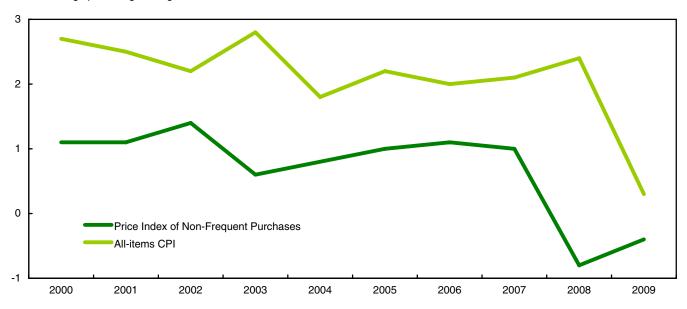
Prices for non-frequently purchased items, primarily the big ticket items that are mainly durable in nature, have generally posted lower increases than both the PIFP and the all-items CPI.

Overall, the Price Index of Non-frequent Purchases (PINFP) rose at an annual average pace of 0.7% over the past 10 years, compared with a 3.2% average increase for the PIFP and a 2.1% average increase in the all-items CPI.

Price increases for the PINFP slowed throughout the decade. This was primarily owing to an average annual drop of 1.5% in durable goods prices during the period. These include items such as passenger vehicles (-1.4%), computer equipment and supplies (-15.7%), clothing (-1.5%), video equipment (-7.3%), and household appliances (-1.4%).

Chart 3
Changes in the Price Index of Non-Frequent Purchases remain below changes in the all-items CPI for the past decade

Annual average percentage change



Source(s): Statistics Canada (Consumer Price Index, 2005 basket, annual), CANSIM table 326-0021.

Offsetting these drops somewhat were price increases over the past 10 years for a number of services included in the PINFP, such as homeowner's replacement costs (+4.3%), tuition fees (+4.2%), maintenance and repair services associated with housing (+2.7%), and health care services (+3.5%).

A large portion of the items in the PINFP are subject to rapid technological change, and this leads to product quality enhancements. For example, prices for computers have declined over the last decade, mainly because of quality enhancements. Computer processing and storing capacities have substantially increased.

Consumers may not always take account of this quality change when estimating computer price changes over time. Therefore, it is not only more difficult for consumers to measure price changes in infrequently purchased items because of the length of time between purchases: it is also complex, because quality enhancements make the same product difficult to compare over time.

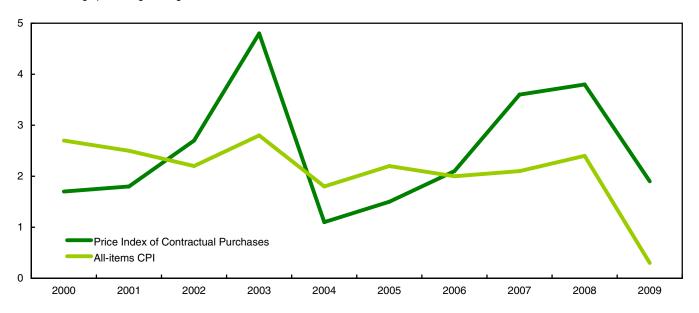
5 Price Index of Contractual Purchases: Higher insurance and mortgage interest costs contribute most of the rise

The 10-year average change in prices for items that are contractual in nature was more in line with the all-items CPI than were changes in the PIFP and PINFP over the past decade.

The Price Index of Contractual Purchases (PICP) advanced an average 2.5% over the past 10 years, more in line with the 2.1% rise in the all-items CPI than the 3.2% gain in the PIFP or the 0.7% increase in PINFP.

Chart 4 Average annual changes in the Price Index of Contractual Purchases over the past decade

Annual average percentage change



Source(s): Statistics Canada (Consumer Price Index, 2005 basket, annual), CANSIM table 326-0021.

The PICP includes items—such as insurance, mortgage interest costs, property taxes, rent, and leasing of passenger vehicles—that involve contractual agreements with regular, set payments over a period longer than a month. These items are generally paid monthly, but their prices are typically negotiated for over longer periods of time.

The primary contributors to the push in the PICP over the past 10 years were a 5.2% average rise for automotive insurance prices and a 2.2% average increase in mortgage interest costs. Also putting upward pressure on the index were property taxes (+2.5%) and rent (+1.4%). Downward pressure came from lower prices for leasing passenger vehicles.

Price indexes based on frequency of purchase and perceptions of inflation

Statistics Canada does not measure perceptions of inflation. However, media reports and inquiries received from the general public suggest that consumers sometimes believe their 'personal' inflation rate differs from the all-items CPL⁵

As shown above, price developments of the PIFP have differed notably from those of the PINFP, PICP and the all-items CPI from 2000 to 2009. The PIFP has been more volatile than the PINFP and the PICP, and was the primary source of inflation pressure to the all-items CPI over the past 10 years.

Faced with higher prices for frequently purchased commodities, consumers might perceive that inflation is increasing at a faster rate than that measured by the all-items CPI. Given the gap that exists between changes in the PIFP and the all-items CPI, this may explain in part why consumers sometimes hold this belief.

TD Economics, Special Report, 2006, "Say it ain't so: Canadians don't believe inflation numbers," TD Bank Financial Group, http://www.td.com/economics/special/sc0706_infl.pdf (accessed February 10, 2010); Beth Johnston, 2008, "Reality check in store: Consumer wrong to buy into idea of soaring inflation," Ottawa Sun, April 14, 2008.

Factors that may contribute to the gap between the all-items CPI and perceived rates of consumer inflation can be grouped into two categories:

1. Measurement and conceptual factors of the CPI

The CPI measures the change in the average cost of a typical household's purchases of a fixed basket of goods and services, with unchanging or equivalent quantities and qualities. It is unlikely that any single household consumes, in the exact proportions, the fixed basket of goods and services. Consumers are also unlikely to identify the full impact of quality changes over time. These measurement and conceptual factors will necessarily produce a gap between a household's perceived rate of consumer inflation and the all-items CPI. The various measurement and conceptual factors can be summarized as follows:

a) The CPI is based on averages

The CPI measures the change in prices of consumer goods and services purchased by the average household. Particular households likely differ from the average; in reality, no single household purchases, in the exact proportions, the items in the CPI basket. For example, not all households consume alcohol, and not all own their place of residence.

b) The notion of a fixed basket

Expenditure weights of the goods and services in the basket are fixed for a specified time, usually four years. Not only may an expenditure weight for a particular household differ from the average household, but the weight may vary considerably over time.

c) Quality adjustments

In reality, the quality of many goods is continually changing, as new models and varieties replace earlier ones. Changes are particularly important in markets with a high rate of technological progress, like computers and televisions. Since the CPI measures only 'pure' price change, adjustments are made to prices of goods that have experienced quality changes.

d) Prices are collected only for representative items within the CPI basket

Items priced for the CPI are representative of purchases made by the average household. While more than 60,000 price quotes are collected every month for some 600 goods and services, it is neither practical nor necessary to price every item that consumers purchase. Prices for similar items are expected to move together over time, on average. For a particular household, however, this may not be the case.

e) Outlet selection

Retail outlets where prices are collected are representative of the places where consumers shop, and the measured price is the average price across all of these outlets. A particular household may do most of its shopping in different outlets from those where prices are collected.

2. Psychological factors

Consumers form their perceptions based on their experiences. Not only do perceptions vary among individuals owing to consumption patterns and knowledge of the CPI methodology, but several psychological factors also play a role. The main psychological factors can be summarized as follows:

a) Individuals tend to place greater weight on negative news6

Individuals have the tendency to respond more to upward as opposed to downward price movements, and to apply such extremes to their perception of the overall rate of inflation.

b) Consumers are more sensitive to price movements of larger magnitude

Consumers have a greater tendency to recall larger price movements than smaller ones. This psychological factor, combined with a) above, will likely cause individuals to put more emphasis on large price increases, rather than price declines, when forming perceptions of inflation.⁷

c) Outside factors

Various factors outside one's realm can affect perception. For example, media coverage of extreme price movements will only increase the consumer's awareness of them.

d) Perceptions of inflation are heavily influenced by price changes for frequent purchases8

Frequently purchased products are more often than not used as benchmarks when individuals conceptualize the level of consumer inflation. The literature widely notes that frequently purchased items have a strong signalling effect on consumers' perceptions of inflation.

Amos Tversky and Daniel Kahneman (1991, "Loss aversion in riskless choice: A reference-dependent model," The Quarterly Journal of Economics, Vol. 106, no. 4., p. 1039-1061) indicate that losses may be perceived nearly twice as intensively as gains.

Sabbatini and Del Giovane (2006) provide support that perceptions are influenced more by a price increase rather than by an equivalent price decrease, or that people over-react to extreme price changes.

Hans Wolfgang Brachinger (2006) formulates an index of perceived inflation whereby greater weight is given to more-frequently purchased items and to price increases than to reductions.

Tables

Table 1 Annual average consumer inflation rates, percentage

Year	All-items CPI	Price Index of Frequent Purchases	Price Index of Non-Frequent Purchases	Price Index of Contractual Purchases
		percent	<u> </u>	
2000	2.7	4.6	1.1	1.6
2001	2.5	4.0	1.1	1.8
2002	2.2	2.8	1.4	2.7
2003	2.8	3.6	0.6	4.8
2004	1.8	3.2	0.8	1.1
2005	2.2	3.6	1.0	1.5
2006	2.0	2.8	1.1	2.0
2007	2.2	2.4	1.1	3.6
2008	2.3	4.5	-0.9	3.6 3.8
2009				
January	1.1	1.9	-0.8	3.0
February	1.4	2.2	-0.5	3.0
March	1.2	1.8	-0.6	3.0
April	0.4	0.0	-0.5	2.5
May	0.1	-0.6	-0.1	1.9
June	-0.3	-1.1	-0.4	2.0
July	-0.9	-2.5	-0.5	1.8
August	-0.8	-1.8	-0.6	1.4
September	-0.9	-2.1	-0.5	1.1
October	0.1	-0.6	0.2	1.3
November	1.0	2.2	-0.4	0.7
December	1.3	3.1	-0.6	0.7
2009 average	0.3	0.2	-0.5	1.9
10-year average	2.1	3.2	0.7	2.5

Note(s): The all-items CPI is a weighted average of the PIFP, PINFP and PICP. Results may not coincide due to rounding. **Source(s):** Statistics (Consumer Price Index), CANSIM tables 326-0020 and 326-0021.

Table 2 Main upward and downward contributors to the 10-year average annual percentage change in the three special indexes

	10-year average annual change
	percent
Price Index of Frequent Purchases (PIFP)	
Upward contributors	
Food purchased from stores	2.8
Gasoline	5.3
Water, fuel and electricity	4.1
Tobacco products and smokers' supplies	8.9
Food purchased from restaurants	2.8
Price Index of Non-Frequent Purchases (PINFP)	
Upward contributors	
Homeowner's replacement cost	4.3
Tuition fees	4.2
Homeowner's maintenance and repairs	2.7
Heath care services	3.5
Downward contributors	
Purchase of passenger vehicles	-1.4
Computer equipment and supplies	-15.7
Clothing	-1.5
Price Index of Contractual Purchases (PICP)	
Upward contributors	5.0
Automotive vehicle insurance premiums	5.2
Mortgage interest cost	2.2
Property taxes	2.5
Rent	1.4
Downward contributors	1.0
Leasing of passenger vehicles	-1.8

Source(s): Statistics Canada (Consumer Price Index), CANSIM table 326-0021.

Table 3 Allocation of the major components in the three special indexes

	Price Index of Frequent Purchases (PIFP)	Price Index of Non-Frequent Purchases (PINFP)	Price Index of Contractual Purchases (PICP)
	percent		
Food	100.0	0.0	0.0
Shelter	17.7	24.0	58.4
Household operations, furnishings and equipment	55.5	44.5	0.0
Clothing and footwear	5.7	94.3	0.0
Transportation	28.3	51.6	20.1
Health and personal care	70.9	29.1	0.0
Recreation, education and reading	24.7	72.5	2.7
Alcoholic beverages and tobacco products	100.0	0.0	0.0
Share in all-items CPI	43.6	36.2	20.1

Note(s): Based on 2005 basket weights at April 2007 prices, Canada. Figures may not add to 100% due to rounding. Source(s): Statistics Canada (Consumer Price Index, 2005 basket), CANSIM table 326-0020.

Table 4 Allocation of basic class components in the three special indexes

	Price Index of Frequent Purchases	Price Index of Non-Frequent Purchases	Price Index of Contractual Purchases
Major component Food Shelter	All components Electricity; water; natural gas;	- Tenants' maintenance, repairs and	- Rent; tenants' insurance premiums;
	and fuel oil and other fuels	other expenses; homeowner's replacement cost; homeowners' maintenance and repairs; and other owned accommodation expenses	mortgage interest cost; property taxes (including special charges); and homeowners' home and mortgage insurance
Household operations, furnishings and equipment	Telephone services; internet access services; postal services and other communication services; child care; domestic services; detergent and soap (other than personal care); other household chemical products; paper supplies; plastic and foil supplies; pet food and supplies; and financial services	Seeds, plants and cut flowers; other horticultural goods; other household supplies; other household services; upholstered furniture; wooden furniture; other furniture; window coverings; bedding and other household textiles; area rugs and mats; cooking appliances; refrigeration and air conditioning appliances; laundry and dishwashing appliances; other household appliances; non-electric kitchen utensils and tableware; household tools (including lawn, garden and snow removal equipment); other household equipment; and services related to household furnishings and equipment	
Clothing and footwear	Laundry services; and dry cleaning services	Women's clothing; men's clothing; children's clothing; women's footwear; men's footwear; children's footwear; athletic footwear; leather accessories; watches; jeweller (excluding watches); other accessories; clothing material and notions; and other clothing services	
Transportation	Gasoline; parking fees; city bus and subway transportation; and taxi and other local and commuter transportation	Purchase of passenger vehicles; rental of passenger vehicles; passenger vehicle parts and supplies; passenger vehicle maintenance and repair services; passenger vehicle registration fees; drivers' licences; all other passenger vehicle operating expenses; air transportation; and rail, highway bus and other inter city transportation	Leasing of passenger vehicles; and passeng vehicle insurance premiums
Health and personal care	Prescribed medicines; non-prescribed medicines; other heath care goods; personal soap; toilet preparations and cosmetics; oral-hygiene products; other personal care supplies and equipment; and personal care services	Optical goods; optical services; dental care; and other health care services	

Table 4 – continued

Allocation of basic class components in the three special indexes

	Price Index of Frequent Purchases	Price Index of Non-Frequent Purchases	Price Index of Contractual Purchases
Recreation, education and reading	Fuel, parts and supplies for recreational vehicles; rental of digital video discs and videogames; spectator entertainment (excluding cablevision); cablevision and satellite services (including pay television); newspapers; magazines and periodicals; and books (excluding textbooks) and other printed material	Sporting equipment; toys non-video games and hobby supplies; computer equipment and supplies; photographic equipment and supplies; photographic services; other recreational equipment and services; purchase of recreation vehicles; audio equipment; video equipment; purchase of digital video discs and compact discs; other home entertainment equipment, parts and services; traveller accommodation; travel tours; use of recreational facilities and services; tuition fees; school textbook and supplies; and other lessons, courses, and education services	Insurance, licenses and other services for recreation vehicles
Alcoholic beverages and tobacco products	All components	-	-

Source(s): Statistics Canada (Consumer Price Index, 2005 basket), CANSIM tables 326-0020 and 326-0021.

About this article

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Correspondence, in either Canada's official language, should be addressed to:

Editor-in-chief, Analysis in Brief Statistics Canada 170 Tunney's Pasture Driveway 3-A2 Jean Talon Ottawa, Ontario K1A 0T6

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