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Does Inflation Vary with Income?

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Does Inflation Vary with Income?

Radu Chiru
Prices Division

Summary

The Consumer Price Index (CPI) is widely used to monitor changes in the general level of consumer prices, or in other words, the rate of inflation. Since the purchasing power of money is affected by changes in prices, the CPI is a useful tool for virtually all Canadians.

Consumers can compare movements in the CPI to changes in their personal income to monitor and evaluate changes in their financial situation.

But just how well does the CPI track changes for specific groups, in this case households of different income levels?

This study examined the inflation rate experienced by two sets of households—the 20% with the lowest incomes and the 20% with the highest incomes—between January 1992 and February 2004. The Consumer Price Index tracked closely the inflation experienced by these two groups.

Between January 1992 and February 2004 higher- and lower-income households took turns experiencing higher inflation. At the end of the period, however, the rates of inflation for both groups were almost on par.

Prices rose 24.7% for the one-fifth of households with the lowest incomes, or an annual average rate of 1.86%. On the other hand, they increased 24.4% for the one-fifth with the highest incomes, or 1.83% a year on average.

Beginning in early 1994, lower-income households experienced two years of relatively lower inflation. Then after 2001, conditions reversed and higher-income households saw relatively lower inflation.

Over the entire 12 year span under study, long term price trends of a few items actually favoured higher-income households. This is in large part because of constant lower-than average price increases of items like household electronics and computer equipment, which figure more prominently in the expenditure baskets of higher-income households.

However, at the national level, the effect of these long term price trends was balanced out by the effect of other items like rent, whose low average price increases benefited lower-income households by reducing their CPI increases.

Large differences are seen in the inflation rates experienced in the different provinces, due to important items like home heating costs and tuition fees. While in some provinces, like Ontario, lower-income households saw slightly lower inflation in total over the 12 year span, the opposite was true in other provinces, like Alberta.

In this paper, the first (lower-income) and fifth (higher-income) quintiles of the household income distribution are used as examples to examine the differences in spending patterns and inflation associated with income level. Because the second, third and fourth income quintiles' inflation occupied the middle ground between the first and fifth, they are not discussed.

Large differences in spending patterns

These two sets of households experienced differences in overall price increases because they have different spending patterns.

In other words when a particular item increases in price, its impact is different for two distinct groups if they consume it in different amounts relative to their overall spending.

For example, lower-income households spend a much larger share of their expenditures on food purchased from stores, while higher-income households tend to spend a larger share than other groups on food at restaurants.

In addition, few higher-income households are renters, while few low-income households are homeowners. For this reason, their shelter-related expenses differ, with lower-income households paying on average 23.5% on rent and tenants' expenses compared to only 3.7% for the higher-income group. Lower-income households also spend a smaller proportion of their expenditures on utilities, such as home heating and water, because these are sometimes included with rents.

Other large differences between relatively richer and poorer households are seen in expenses on transportation and recreational items. Lower-income households do not spend a very large share on private transportation items such as buying or leasing cars and paying for gasoline. They spend a smaller share of their expenditures on almost all recreational items, except for very few items like cable television subscriptions.

Since the prices of these items have not all increased at the same rate, differences in inflation appear between relatively lower- and higher-income households.

Taking turns experiencing lower inflation

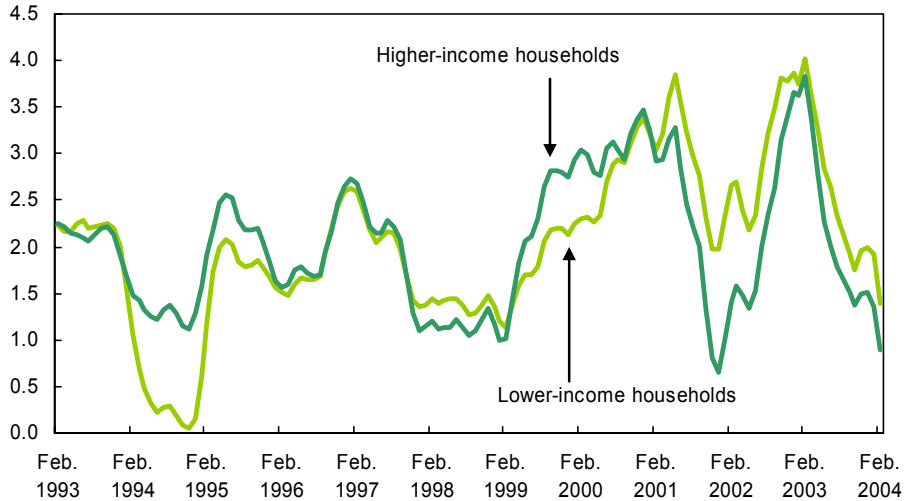
In general, between January 1992 and January 2001, lower-income households generally experienced lower rates of inflation than higher income households.

As a result, by January 2001, the typical lower-income household in Canada would have experienced an overall CPI increase of 1.53% per year, while the average higher-income household saw higher inflation at 1.65%.

In early 2001 however, conditions reversed, and higher-income households experienced lower inflation: an average of 2.07% per year between January 2001 and February 2004 compared with 2.61% for the average lower-income household.

Lower- and higher-income households experienced inflation at different times

12-month % change, index smoothed with a centered 3-month moving average

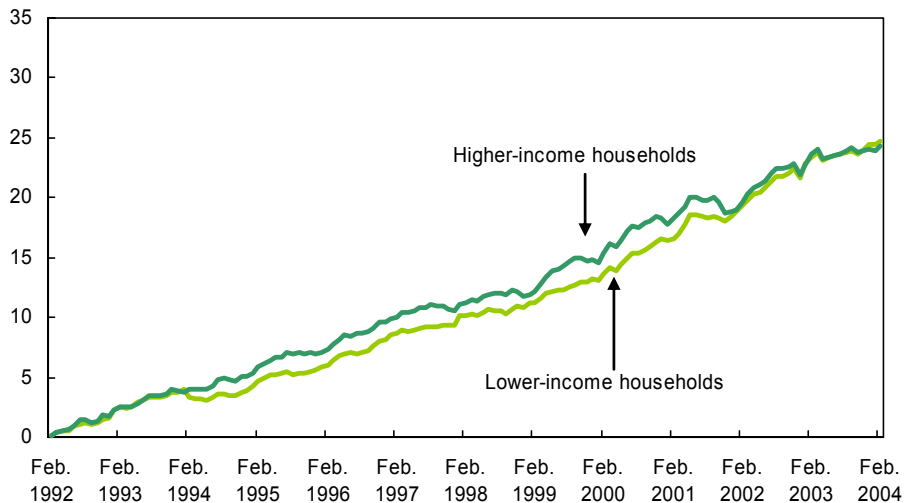


Source: Statistics Canada, special tabulation based on the Survey of Household Spending and the Consumer Price Index.

By February 2004, the total inflation experienced by lower and higher-income households in Canada between 1992 and 2004 was almost equal.

Inflation rates by income levels were almost equal by February 2004

% increase relative to January 1992



Source: Statistics Canada, special tabulation based on the Survey of Household Spending and the Consumer Price Index.

Lower-income households saw lower inflation until 2001

From January 1992 to January 2001, lower-income households in Canada experienced relatively lower inflation mostly because of lower price increases for rents, food in stores and tobacco prices, as well as higher prices for automobiles and gasoline.

However, the impact of some other items partly countered these effects, with lower price increases for household electronics, clothing and mortgage interest payments lowering the CPI increases of higher-income households.

On average after 1992, rents increased at a slower rate than the overall CPI, slowing the growth in the inflation rate for lower-income households. However, some of this difference was countered by slow price increases of mortgage interest payments, which increased by only just over 10%, while the overall CPI increased by almost 17%. This had the impact of tempering CPI increases of mortgage-paying households, which are very rarely found in the lowest income quintile.

In most provinces, prices of food purchased from stores had increased at a rate lower than the All-items CPI. Since this is a more important part of lower-income households' expenditure basket, lower food prices had the effect of dampening total CPI increases for this group.

Some categories of consumer items such as private transportation (mainly automobile and gasoline) and tobacco impacted evenly all across Canada. This is because their price movements and expenditure patterns of lower- and higher-income households are very similar across the country.

Since lower-income households tend to spend a much smaller portion of their expenditures on gasoline and car purchases, increasing costs of these private transportation items tend to have a smaller impact in raising their inflation rate. Relatively poorer households spend just over 2.5% of their expenditures on gasoline.

By January 2001, gasoline prices across Canada had increased over 30% on average compared to January 1992. Since the highest income households spend a larger chunk of their expenditures on gas (over 4% on average nation-wide), they have experienced much sharper rises in inflation during times when there were spikes in the price of gasoline.

When automobile prices rise, this has a smaller inflation impact on lower-income households than those with higher incomes because they spend a much smaller proportion on automobile purchases compared to the highest income group, 1.8% compared to 6.0% of their expenditures on average.

Automobile prices increased rapidly in the years leading up to 1998, when they levelled off. By January 2001 however, car prices across Canada had still increased by over 25% compared to January 1992. This had the effect of increasing inflation experienced by higher-income households more than for the lower-income ones.

The effect of tobacco prices also favoured lower inflation for lower-income households for almost an entire decade starting in 1992. The lowest income households tended to spend, on average, a larger chunk of their expenditures on tobacco compared to the highest income households, of just over 2.5% compared to just over 1%.

In February 1994, tobacco prices fell by almost half relative to January 1992, due to cuts in taxes, and then only went up slowly until early 2002. This had the effect of lowering CPI increases experienced by lower-income households relative to higher-income ones until 2002.

After 2001, lower-income households experienced higher inflation

Across Canada, after January 2001, the situation changed and lower-income households experienced higher price increases.

Much of this effect is due to increasing tobacco prices starting in early 2002, falling price increases for private transportation items such as cars, and continuing lower price increases for electronics and clothing as well as some entertainment items.

Continuing lower price increases for rents mitigated some of this effect, having the effect of lowering the inflation experienced by lower-income households.

The price of automobiles, an item that figures more prominently in the expenditure basket of higher-income households, decreased slightly from January 2001 to February 2004, lowering inflation for higher-income households during this period of time.

However, the largest effect behind lower-income households' higher CPI during this time is that of higher tobacco prices starting in 2002. By February 2004, they were almost 80% higher than on January 2001, this effect pushing up inflation for lower-income households by about 1.3 percentage points compared to the higher-income group.

Some trends favoured higher-income households

Between 1992 and 2004, a few items in the consumer basket saw very steady price increases, either consistently higher or lower than the All-items CPI. The continuous effects of these items actually favoured lower inflation for higher-income households.

This occurred in large part because of constant lower-than-average price increases for big-ticket items, such as household electronics and computer equipment. These items figure more prominently in spending patterns of higher-income households.

The most important of these were computer equipment and supplies, as well as other household electronic goods, grouped under the home entertainment category. Prices of electronic items have fallen very steadily since 1992.

The prices of computers in 2004 were only 18% of what they were in January 1992. Since higher-income households spend a larger chunk of their expenditures on this category of goods compared to lower-income households, a fairly large impact of this category favoured higher-income households over the 12 years covered here.

Other items with steady price increases were city transportation (+58%) and cable television (+75%). Their prices consistently increased at a rate faster than the All-items CPI. Since lower-income households spend, on average, a larger chunk of their expenditures on these services, their impact was to raise their total CPI faster than that of all other households.

Tuition fees, at the Canada level, continuously increased in price faster than other items in the CPI. In most provinces however, lower and higher-income households spend a similar proportion of their expenditure basket on tuition fees, making the continuous effect of tuition fees quite small.

From 1992 to 2004, the effects of expenditure items whose price movements were not persistent over the long term mostly erased the effects of "continuous" items. Although items with continuous

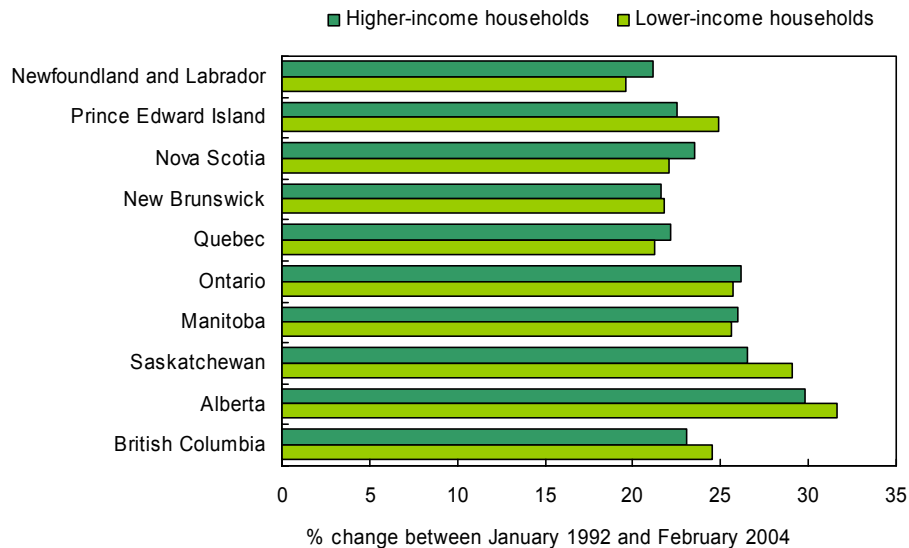
effects contributed to a 1.3 percentage points lower inflation for higher-income households compared to the lower-income households, the effects of other items mostly cancelled this out.

Provincial differences larger

From January 1992 to February 2004, differences in the inflation rates of higher- and lower-income households within the different provinces were smaller than the differences in inflation between the provinces themselves.

This is because the price movements of some important items, such as tuition fees, utilities (gas, electricity), mortgage interest payments and car insurance differ quite a bit between the different provinces. Some of these differences were also due to some different spending patterns of richer and poorer households that change according to province.

Provincial differences are larger than differences between higher- and lower-income households



Source: Statistics Canada, special tabulation based on the Survey of Household Spending and the Consumer Price Index.

Because of these price factors and spending pattern differences, total inflation rates for households of different income groups between 1992 and 2004 differed between the provinces. In British Columbia, Alberta and Saskatchewan, relatively lower-income households experienced higher price increases, while the opposite was true in Ontario and Quebec.

One example of different price movements is that of mortgage interest payments, whose prices did not increase evenly across the country. For example, in Quebec, the increase was of almost 34% between January 1992 and February 2004 while Ontario homeowners experienced an increase of less than 14%. On the other hand, homeowners of British Columbia saw an average fall of 12% in their mortgage interest payments. The differences were due not so much to differences in mortgage rates as in house prices and the distribution of the housing stocks.

An example of the impact of different spending patterns is that in some provinces, lower-income households tend to spend a lower proportion of their expenditures on tuition fees for example.

In Saskatchewan, lower-income households on average spent a much larger share of their expenditures on tuition payments (over 2.5%) while this item accounted for well under 1% in the average basket of the highest income households. A similar, but smaller difference is seen in Alberta and British Columbia, while in the Maritime Provinces, the opposite was true.

These differing expenditure patterns meant that, with rapidly increasing tuition fees almost everywhere in the country in the 1990s, the impact of tuition on inflation was different for households of different income levels, depending on the province.

There are many factors that come into play in estimating inflation for two different groups in Canada. For example, renting or owning a home, the type of home heating used or having a smoker in the household all make major differences in the inflation likely to be experienced by a particular household. Because in this paper, these factors were not looked at separately from a household's level of income, a future article will analyse them together. This article will then come closer to identifying what characteristics are the most important in how households experience different inflation rates.

Tables

Average expenditure patterns by income level (quintile) at the Canada level

| Expenditure category | Income quintile | | | | | Price change, Jan. 1992 to Feb. 2004 |
|--|-----------------------------|-----------------|-----------------|-----------------|------------------------------|--------------------------------------|
| | 1 st (lowest) | 2 nd | 3 rd | 4 th | 5 th (highest) | |
| | % | | | | | |
| Food & non-alcoholic beverages from stores | 18.3 | 16.3 | 14.6 | 13.2 | 10.6 | 22.3 |
| Food & non-alcoholic drinks from restaurants | 2.6 | 3.3 | 3.7 | 4.1 | 4.6 | 27.8 |
| Rent / Tenants' expenses | 23.5 | 12.5 | 8.1 | 5.1 | 3.7 | 19.3 |
| Mortgage, taxes, other homeowners' expenses | 7.2 | 12.1 | 13.8 | 15.3 | 16.2 | 24.2 |
| Utilities (water, electricity, gas, heating oil) | 5.4 | 6.0 | 5.1 | 4.8 | 4.1 | 43.6 |
| Household goods and operation | 10.8 | 10.9 | 11.1 | 11.1 | 11.6 | 13.8 |
| Clothing and footwear | 4.6 | 5.2 | 5.8 | 6.2 | 6.7 | 4.0 |
| Private transportation (car, licence, gas, etc.) | 8.3 | 13.4 | 16.3 | 17.5 | 18.3 | 35.7 |
| Public transportation (including air travel) | 2.2 | 1.8 | 1.7 | 1.6 | 1.8 | 70.5 |
| Health and personal care | 5.1 | 6.0 | 5.2 | 4.9 | 4.4 | 18.9 |
| Recreational/sports equipment and services | 5.5 | 6.7 | 8.1 | 9.9 | 12.1 | 19.0 |
| Tuition fees, reading, educational materials | 2.4 | 2.1 | 2.5 | 2.7 | 2.8 | 78.7 |
| Alcohol and tobacco | 4.2 | 3.6 | 3.8 | 3.7 | 3.3 | 36.2 |
| All-items¹ | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 24.7 |

1. Components might not add up to the total due to rounding.

Source: Statistics Canada, special tabulation from the 2001 Survey of Household Spending and the Consumer Price Index.

**Factors behind the differences seen between lower- and higher-income households,
January 1992 to January 2001**

| | CAN | N.L. | P.E.I. | N.S. | N.B. | Que. | Ont. | Man. | Sask. | Alta. | B.C. |
|--|--|------------|------------|------------|------------|------------|------------|------------|-------------|------------|-------------|
| | % difference between January 1992 and January 2001 | | | | | | | | | | |
| Higher-income CPI | 17.8 | 17.4 | 17.1 | 17.5 | 15.4 | 16.1 | 19.6 | 20.8 | 19.5 | 18.8 | 16.9 |
| Lower-income CPI | 16.4 | 15.1 | 16.4 | 14.5 | 13.8 | 14.0 | 17.0 | 18.2 | 20.1 | 16.5 | 17.1 |
| Difference¹ | 1.4 | 2.3 | 0.7 | 3.0 | 1.6 | 2.1 | 2.6 | 2.6 | -0.6 | 2.2 | -0.1 |
| | contribution to the difference in percentage points ² | | | | | | | | | | |
| Food & non-alcoholic beverages from stores | 0.3 | 0.0 | 0.1 | 0.0 | 0.1 | -0.2 | 0.1 | 0.2 | 0.6 | 0.4 | 0.2 |
| Food & non-alcoholic drinks from restaurants | 0.0 | -0.1 | -0.1 | -0.1 | -0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| Rent / Tenants' expenses | 1.0 | 1.1 | 1.0 | 0.8 | 0.8 | 1.0 | 0.0 | 1.5 | 0.5 | 0.0 | 0.8 |
| Mortgage, taxes and other homeowners' expenses | -0.5 | 0.2 | -0.2 | 0.5 | 0.2 | 0.6 | -0.4 | 0.0 | 0.2 | 0.4 | -1.9 |
| Utilities (water, electricity, gas, heating oil) | -0.1 | 0.0 | -0.1 | -0.4 | -0.4 | -0.1 | 0.1 | 0.0 | -0.8 | 0.3 | 0.1 |
| Household goods and operation | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 | 0.2 | -0.2 | -0.1 | 0.1 | -0.1 |
| Clothing and footwear | -0.3 | -0.3 | -0.3 | 0.0 | -0.3 | -0.4 | -0.3 | -0.1 | -0.5 | -0.3 | -0.2 |
| Private transportation (car, licence, gas, etc.) | 0.6 | 1.3 | 0.5 | 1.2 | 1.0 | 0.8 | 1.6 | 1.2 | 0.6 | 1.0 | 0.5 |
| Public transportation (including air travel) | 0.1 | 0.7 | 0.2 | 0.3 | -0.1 | 0.2 | 0.3 | -0.1 | 0.3 | 0.4 | 0.3 |
| Health and personal care | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.2 | 0.3 | 0.1 | 0.0 |
| Recreational/sports equipment and services | -0.3 | -1.2 | -1.7 | -0.6 | -0.6 | -0.2 | 0.1 | -0.7 | -0.4 | -0.1 | 0.0 |
| Tuition fees, reading and educational materials | 0.0 | 0.3 | 0.6 | 0.6 | 0.3 | 0.0 | -0.1 | 0.3 | -1.4 | -0.3 | 0.0 |
| Alcohol and tobacco | 0.5 | 0.2 | 0.8 | 0.6 | 0.6 | 0.5 | 0.8 | 0.3 | 0.1 | 0.2 | 0.2 |

1. Due to rounding, the subtraction of the components may not correspond to the difference.

2. Due to rounding, the contributions may not add to the difference.

Source: Statistics Canada, special tabulation based on the 1997 Survey of Household Spending and the Consumer Price Index.

**Factors behind the differences seen between lower- and higher-income households,
January 2001 to February 2004**

| | CAN | N.L. | P.E.I. | N.S. | N.B. | Que. | Ont. | Man. | Sask. | Alta. | B.C. |
|--|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | % change between January 2001 and February 2004 | | | | | | | | | | |
| Higher-income CPI | 6.5 | 3.8 | 5.5 | 6.0 | 6.2 | 6.0 | 6.6 | 5.1 | 7.0 | 11.1 | 6.1 |
| Lower-income CPI | 8.3 | 4.5 | 8.4 | 7.6 | 7.9 | 7.3 | 8.7 | 7.3 | 8.9 | 15.1 | 7.4 |
| Difference¹ | -1.7 | -0.7 | -3.0 | -1.7 | -1.7 | -1.2 | -2.1 | -2.2 | -1.9 | -4.0 | -1.4 |
| | contribution to the difference in percentage points ² | | | | | | | | | | |
| Food & non-alcoholic beverages from stores | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.7 | 0.1 |
| Food & non-alcoholic drinks from restaurants | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 |
| Rent / Tenants' expenses | 0.6 | 0.0 | 0.7 | 0.5 | 0.5 | 0.8 | 0.5 | 0.3 | 0.6 | 1.0 | 0.8 |
| Mortgage, taxes and other homeowners' expenses | 0.1 | 0.2 | -0.2 | 0.2 | -0.1 | 0.5 | 0.1 | -0.1 | 0.0 | -0.3 | -0.4 |
| Utilities (water, electricity, gas, heating oil) | 0.0 | 0.1 | -0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | -0.3 | -1.8 | 0.1 |
| Household goods and operation | 0.0 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | -0.2 | 0.1 |
| Clothing and footwear | -0.2 | -0.2 | -0.3 | -0.3 | -0.1 | -0.1 | -0.2 | -0.2 | -0.1 | -0.3 | -0.1 |
| Private transportation (car, licence, gas, etc.) | -0.7 | -0.2 | -1.0 | -0.8 | -0.7 | -0.7 | -0.7 | -0.7 | -1.0 | -1.1 | -0.3 |
| Public transportation (including air travel) | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Health and personal care | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.2 | 0.0 |
| Recreational/sports equipment and services | -0.5 | 0.0 | -0.5 | -0.3 | -0.2 | -0.5 | -0.5 | -0.5 | -0.4 | -0.7 | -0.8 |
| Tuition fees, reading and educational materials | 0.0 | -0.1 | 0.0 | 0.0 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Alcohol and tobacco | -1.3 | -0.8 | -2.0 | -1.4 | -1.2 | -1.4 | -1.5 | -1.1 | -1.1 | -1.3 | -0.9 |

1. Due to rounding, the subtraction of the components may not correspond to the difference.

2. Due to rounding, the contributions may not add to the difference.

Source: Statistics Canada, special tabulation based on the 2001 Survey of Household Spending and the Consumer Price Index.

**Contribution to difference between lower- and higher-income households,
from expenditures items with long-term price movements**

| Expenditure items with continuous effects (from a total of 88) | Price change from Jan. 1992 to Feb. 2004 | Contribution to the difference between higher- and lower- income households |
|---|--|--|
| | % | % point |
| Cooking appliances | -6 | -0.01 |
| City bus & subway transportation | 58 | -0.19 |
| Rail, highway bus and other inter-city transportation | 57 | -0.03 |
| Other health care goods | 0 | 0.00 |
| Computer equipment & supplies | -82 | -0.85 |
| Home entertainment equipment & services | -13 | -0.13 |
| Spectator - entertainment performances | 68 | 0.18 |
| Cablevision (including pay TV) | 74 | -0.27 |
| Tuition fees | 134 | -0.04 |
| Total continuous effects | . | -1.33 |
| Total difference between higher- and lower-income | ... | -0.33 |

. not available

... not applicable

Source: Statistics Canada, special tabulation based on the Survey of Household Spending and the Consumer Price Index.

Methodology

Differences between the official CPI and this study

This paper does not provide an official measure of inflation by income levels; it is a study to examine the differences between lower- and higher-income households.

The study has only examined inflation differences between lower- and higher-income households due to different spending patterns. However, inflation differences could also arise if lower-income households experience different price movements than higher-income households for the same good or service.

For example, if they tend to shop for clothes at a certain outlet while higher-income households tend to favour another outlet where prices moved differently, different inflation would be experienced by these two groups. Since there are no price data available by class of consumers, this study assumes that price changes are the same for all households.

Results are slightly different from official CPI due to mortgage interest, chaining and less detail in consumer baskets.

Mortgage payments are considered to consist of two portions: principal on the home and interest. The interest portion of mortgage payments was fixed at 47.6% of the mortgage payments of all mortgage-paying households, a figure established as the Canada-wide average by Price Division, Statistics Canada.

Less detail was used to calculate individual household expenditure baskets for this study than in the official CPI. From January 1992 to January 2001, individual household CPIs were calculated by using the 1997 Survey of Household Spending to a detail of 88 expenditure items and applying price movements as collected by Prices Division.

For January 2001 to February 2004, household CPIs were calculated by using the 2001 Survey of Household Spending to a detail of 111 expenditure items. These individual CPIs were chained at January 2001.

These items and their contribution to the differences seen between lower-income households and higher-income households were then regrouped into more general expenditure categories to show their cumulative effects. Most of the missing details were in the Food and Clothing categories.

Grouping households into five income quintiles

The measure of income used is post-transfer and before-tax income. Household income is adjusted for household composition (household size and ages of household members), by dividing the reported annual household income by the adjustment factor. The adjustment is the sum of individual factors: one adult is counted as 1, each additional adult as 0.4; and each child under age 16 is counted as 0.3—except in a household with only one adult, where the first child is counted as 0.4.

All the surveyed households in each province were then regrouped according to this adjusted income so that an equal (weighted) number of households fell in each of the five income quintiles for that province.

Calculating the factors behind differences in two groups' CPIs

The factors behind divergence at a certain cut-off point can be investigated. Using a Bortkiewicz decomposition analysis, two baskets (representing two distinct groups) can be studied in light of the same price movements. These price movements can be at the Canada level or at the provincial level. This analysis allows us to pinpoint what items had the largest impact in differentiating group CPIs.

For an item to have an impact in differentiating groups' CPIs, it would have to both be bought in different proportions (out of total expenditure) by the two groups and also have experienced price movements higher or lower than the rest of the items in the consumer basket.

Definition of continuous, long-term effects

An item can cause continuous, long term effects between two groups' inflation rates if in all years of the 12-year period studied, this item's average annual price change over the previous year was either above or below that of the All-items CPI at the Canada level.