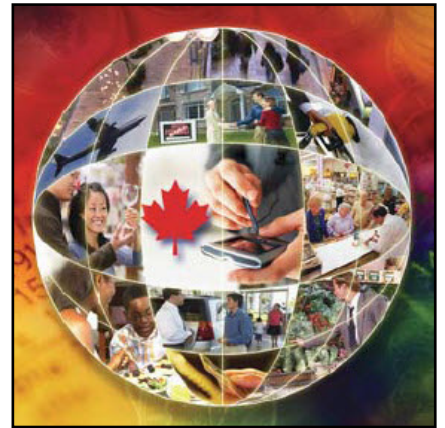


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## Exploring the first century of Canada's Consumer Price Index

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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
- 0<sup>s</sup> value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- <sup>P</sup> preliminary
- <sup>r</sup> revised
- X suppressed to meet the confidentiality requirements of the *Statistics Act*
- <sup>E</sup> use with caution
- F too unreliable to be published
- \* significantly different from reference category ( $p < 0.05$ )

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## Preface

*Exploring the First Century of Canada's Consumer Price Index* surveys the history of Statistics Canada's Consumer Price Index (CPI) from its origins to today. The paper discusses changes in the construction, scope and uses of the CPI within the context of historical events.

This paper was written by Julie Charest and Julia White of the Consumer Prices Division of Statistics Canada. Amanda Wright provided key assistance in the preparation of this document. The authors thank George Bentley, Cyndi Bloskie, Monique Emond, Guy Gellatly, Michèle Lanoue, Mathieu Lequain, John Mallon, Bruno Morin, Daphney Pierre and Philip Smith for their contributions and comments. Thanks are also due to the staff at the Statistics Canada Library for their essential help in locating historical documents.

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## Introduction

The Consumer Price Index (CPI) is one of the most important and influential economic indicators produced by Statistics Canada. It is used to track changes over time in the cost of a fixed basket of consumer goods and services. Since the basket contains products of unchanging or equivalent quantity and quality, the index reflects only pure price change.<sup>1</sup> The CPI is widely used in payment escalation, economic analysis and government policy decisions. As well, since price movements affect the purchasing power of money, consumers can monitor the CPI to evaluate changes in their financial situation.

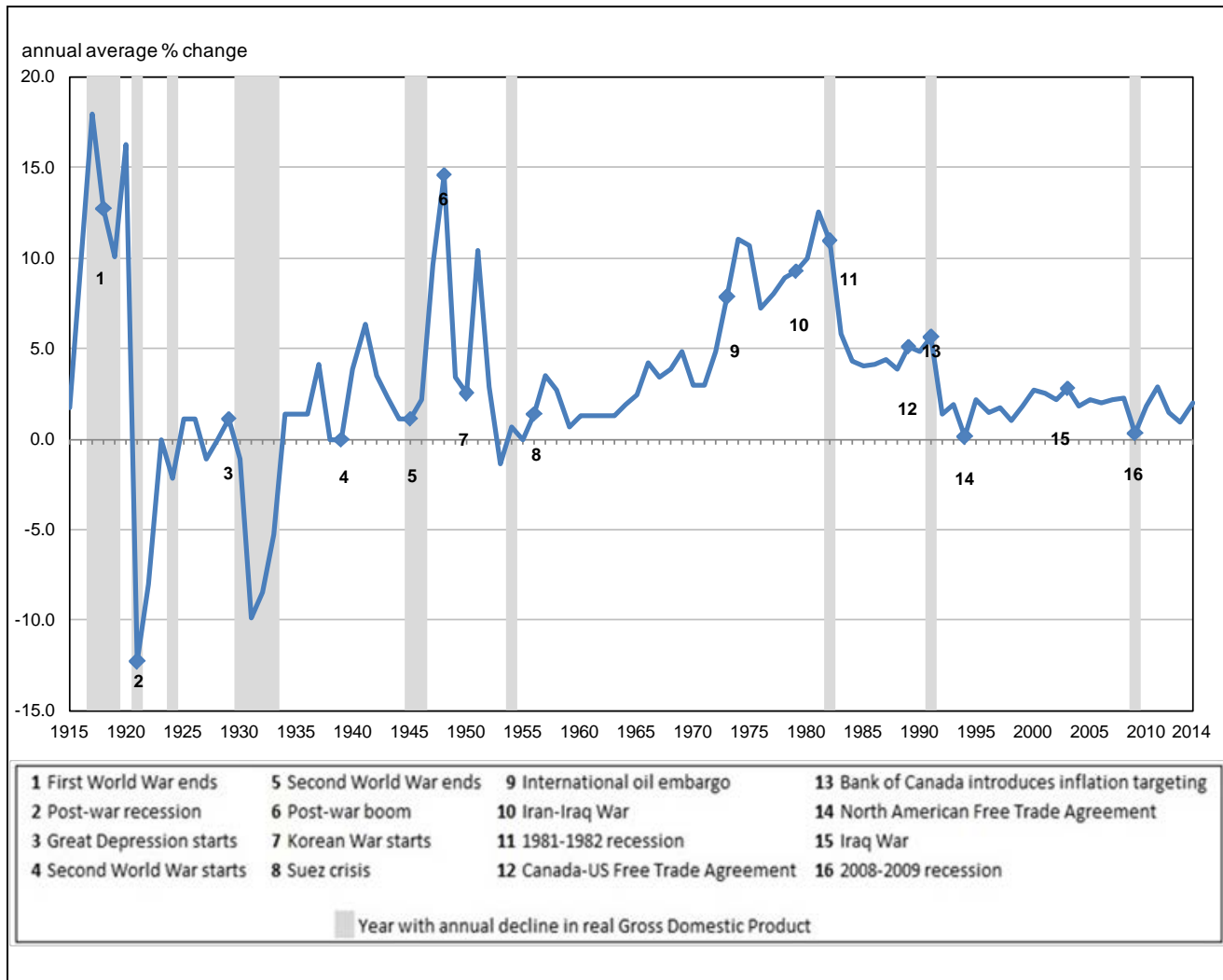
With the release of the CPI for December 2014, Canada's CPI series spans a century of history from 1914 to 2014. Over this time period, movements in the CPI have closely followed the dramatic highs and lows of the Canadian economy (Figure 1). This article tells the story of the CPI from the early twentieth century, when it began as a "Cost-of-Living Index" used to track the cost of workers' necessities, to today, in its current form as a robust statistical measure of overall consumer price change.

The CPI basket has evolved over the last century as the range of goods and services available to consumers has expanded and as consumer spending habits have changed. In addition, the series has been continually improved in line with ongoing technical progress in price index theory and practice. The builders of Canada's CPI have consistently sought to maintain an accurate, up-to-date price index series that meets the diverse needs of CPI users.

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1. "Pure price change" is the change in the price of a product that has consistent characteristics through time; equivalently, it is the change in the price of a product after adjusting for any change in quality, such as changes in package size or material content (Statistics Canada, 2014).

**Figure 1 Movements in the Canadian Consumer Price Index over a century**



Sources: Statistics Canada, CANSIM tables 326-0021 and 383-0027.

## Early years: the Department of Labour and the Board of Inquiry into the Cost of Living

Canadians had a pressing need for a standard measure of consumer price change in the early twentieth century. The public and government were concerned because rapidly increasing prices for common goods and services were eroding purchasing power. At the time, uncertainty about the true magnitude of consumer price change made it a challenge for citizens and businesses to track their purchasing power and to plan for the future. In addition, disagreements between workers and firms about how to adjust wages to account for changes in the “cost of living” were a major source of labour unrest.<sup>2</sup>

The federal Department of Labour was created in 1900 to, among other things, publish impartial economic statistics to aid in the resolution of labour disputes.<sup>3</sup> In 1910, the Department of Labour’s official publication, *The Labour Gazette*, began regularly publishing average retail prices for a basket of household necessities typically purchased by urban working families. *The Labour Gazette* correspondents collected the prices from retailers in 57 Canadian cities. The basket contained 29 food items, laundry starch, five kinds of household fuel and rent.<sup>4</sup> Price statistics were published as dollar values, not in the form of price indexes.

2. Board of Inquiry into the Cost of Living (1915).

3. Department of Labour (1900).

4. Board of Inquiry into the Cost of Living (1915).

Just before the First World War, the Canadian federal government established the Board of Inquiry into the Cost of Living to document and investigate the ongoing increases in consumer prices.<sup>5</sup> The Board of Inquiry submitted a two-volume report in 1915, with the second volume entirely devoted to the findings of Board member Robert H. Coats, Chief of the Statistical Branch of the Department of Labour.

Importantly for the history of the CPI, the second volume of this report contained the first detailed price indexes produced in Canada.<sup>6</sup> Using data already collected for *The Labour Gazette*, Coats and his staff calculated annual price index values for the 36 items in *The Gazette* basket at the municipal, provincial and national levels. The report concluded that working families paid 38.2% more for a basket of necessities in 1913 than they had in 1900.<sup>7</sup>

By the early 1920s, the Department of Labour was occasionally publishing a consumer price index (which they called the "Cost-of-Living Index") using the same basket contents and methodology employed in the Board's report.<sup>8</sup> This index series was published monthly in *The Labour Gazette* starting in 1927. Five major component indexes (food, fuel, rent, clothing and sundries) were averaged to produce an "All-items" index that measured the change in the total cost of the basket.

Today's CPI is directly descended from the price statistics originally published in *The Labour Gazette*. Figure 1 illustrates why Canadians were concerned about rising consumer prices before 1920: the highest annual average increase in the CPI time series was recorded in 1917 (+17.9%).<sup>9</sup> Over the four years of the First World War, the CPI rose 48.3%.

## The interwar years: the Dominion Bureau of Statistics

With the passage of the *Statistics Act* of 1918, the federal government created the Dominion Bureau of Statistics (DBS), a central agency for collecting and analyzing official statistics, under the leadership of the aforementioned Robert H. Coats, who became Dominion Statistician. For some time after the establishment of the DBS, however, measuring movements in consumer prices remained the task of the Department of Labour.

The DBS first published its own consumer price index in 1927. Although this index drew on historical price data from the Department of Labour, it was different from the index published in *The Labour Gazette*.<sup>10</sup> Unlike the index produced by the Department of Labour, which was intended to measure price change faced by urban working households, the DBS index aimed to measure price change experienced by all Canadians. Therefore, the basket weights were based on estimated total Canadian consumption of each basket item in 1913.

The first set of DBS price indexes included annual indexes for food, fuel, lighting and rent for all provinces and eight cities.<sup>11</sup> To create this new index series, which covered the years from 1913 to 1927, the Bureau collected new price data directly from retailers in addition to using historical data from the Department of Labour.<sup>12</sup>

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5. Ibid.

6. Asimakopulos (1964).

7. Board of Inquiry into the Cost of Living (1915). The calculation is based on the price index series (1900=100) published in the Board's report.

8. The indexes that make up the Consumer Price Index series are best described as consumer price indexes, not cost-of-living indexes. In theory, a true cost-of-living index measures change in the minimum cost of maintaining a constant standard of living (International Labour Office p. 42). In practice, defining a constant standard of living (a subjective state that depends on income, family size and personal tastes, in addition to prices) for an entire country is not possible.

9. Data are from CANSIM table 326-0021 (2002=100). All CPI calculations in the rest of this paper are based on this table.

10. The Department of Labour published its Cost-of-Living Index in *The Labour Gazette* until August, 1940. This means that the Department of Labour and the Dominion Bureau of Statistics were publishing separate consumer price indexes between 1927 and 1940.

11. Harnarine (1993b).

12. Asimakopulos (1964).

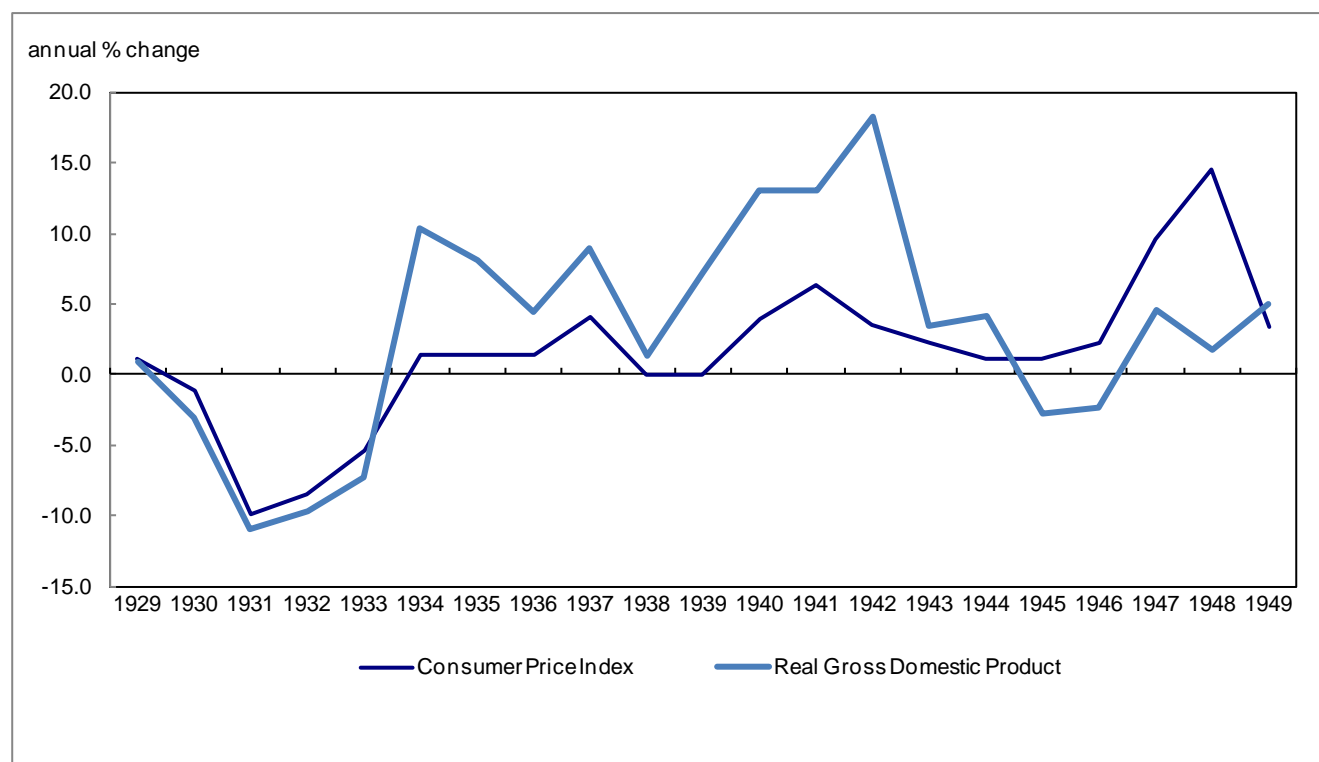
In a time of rapid technological and social change, however, it soon became clear that consumer spending patterns from 1913 were no longer representative of current consumer spending habits. Consequently, in 1930 the DBS revealed its first major Cost-of-Living Index update. The updated basket weights were based on estimated total consumer expenditures for Canada in 1926.<sup>13</sup> The Bureau employed a process called “chain-linking” to maintain a continuous index series across the different baskets. Chain-linking continues to be used today whenever the CPI basket is updated.

The new basket greatly expanded the scope of the index. Dozens of goods and services were introduced into the index, including electricity, clothing, and a variety of “miscellaneous” items such as refrigerators, doctors’ fees, amusements and tobacco products. Tram fares and motor operating costs were also classified as “miscellaneous” and had a combined basket weight of less than 7.0%. Today, transportation is a major CPI component that accounts for almost 20.0% of the basket (Appendix 1).<sup>14</sup> The 1926 basket update set the blueprint for product classification and CPI scope going into the future (Appendix 2).

The prosperity of the 1920s ended with the onset of the Great Depression in 1929. Deflation (an overall decline in consumer prices) accompanied the severe economic hardship experienced by Canadians during this era. For example, 1931 marked the largest annual declines of the decade for both the CPI (-9.9%) and real gross domestic product (-10.6%) (Figures 1 and 2).

The Great Depression demonstrated how deflation can have negative effects on the economy. When consumer prices trend downward, consumers tend to postpone purchases because they expect prices to be lower in the future. This behaviour, in turn, depresses aggregate demand. Furthermore, since debt contracts are usually in nominal dollars, deflation causes the real value of debts to increase, making the burden on debtors increasingly onerous over time.

**Figure 2 Consumer price inflation and economic growth moved together during the 1930s and 1940s**



Sources: Statistics Canada, CANSIM tables 326-0021 and 383-0027.

13. Ibid.

14. Dominion Bureau of Statistics (1930).



## The Second World War: a new Cost-of-Living Index

With the start of the Second World War, the Canadian economy recovered from the Great Depression, producing weapons, manufactured goods and raw materials for the Allied war effort. Labour shortages became an issue instead of unemployment and Canada became a major exporter.<sup>15</sup> As consumers faced wartime shortages, rationing and higher prices for everyday purchases, the “cost of living” became a high-profile public issue.

In 1940, in cooperation with the Department of Labour and the Wartime Prices and Trade Board, the DBS released an updated Cost-of-Living Index, employing basket weights from a 1938-1939 consumer spending survey.<sup>16,17</sup> This new index had important implications for large numbers of Canadians, since federal legislation entitled workers in certain industries (such as utilities, transportation and war production) to a cost-of-living bonus to be calculated with reference to the Bureau's official Cost-of-Living Index.<sup>18</sup>

Whereas previously the target population of the DBS price index had been Canada as a whole, the 1940 update redefined the target population as urban wage-earning families. After Bureau staff had studied the 1931 Census, it was decided that the new Cost-of-Living Index would represent price change experienced by families who:

- had husband and wife as joint heads with one to five children,
- were completely self-supporting, earning \$450 to \$2,500 during the survey year, and
- were living in self-contained dwelling units, not sharing kitchen or bathroom with other families.<sup>19</sup>

Although the details changed with successive basket updates, the Bureau continued to define the CPI's target population by characteristics such as family size and income until the 1970s.

The basket contents and weights were updated based on a consumer survey of 1,439 families who met the target population criteria. Firewood was removed from the fuel index because it no longer accounted for a significant part of families' budgets, while items such as strawberry jam and vegetable shortening were added (Appendix 2).<sup>20,21</sup> Products related to health, personal care, transportation and recreation remained in the miscellaneous index.

As the war progressed and the availability of consumer goods changed, the index had to be modified. For instance, by 1943 consumers could no longer purchase automobile tires and tubes, steel frying pans, silk stockings or bananas, so the basket weights of these items were reassigned to other goods in the index.<sup>22</sup> In addition, the weights of tea, sugar and motor operating costs were reduced to account for wartime rationing.<sup>23</sup> The Bureau collected the prices that consumers actually paid, even if retailers were charging prices above legislated price ceilings or if subsidies reduced prices for some products (such as tea, coffee, butter, milk and oranges).<sup>24</sup> These are examples of the careful measures the Bureau took to ensure the Cost-of-Living Index remained accurate and representative during the war.

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15. Norrie, Owram and Emery (2007).

16. Dominion Bureau of Statistics (1940).

17. With the 1940 release of the Bureau's new Cost-of-Living Index, the Department of Labour ceased publishing its own Cost-of-Living Index.

18. Department of Labour (1941).

19. Dominion Bureau of Statistics (1940).

20. Dominion Bureau of Statistics (1941).

21. Dominion Bureau of Statistics (1940).

22. Dominion Bureau of Statistics (1943).

23. Ibid.

24. Ibid.

## Post-war era: 1946 to 1972

With the transition to a peacetime economy, production of civilian goods increased, consumer demand went up, and wartime price controls were gradually eliminated. At the same time, increases in consumer prices accelerated. In 1946, public concern about price increases led to the establishment of the Royal Canadian Commission on Prices, which was charged with the mandate of examining the recent causes of inflation, as well as investigating price increases in excess of costs and due to hoarding.<sup>25</sup> Annual average inflation reached its post-war peak of 14.6% in 1948, and consumer prices rose again with the start of the Korean War in 1950 (Figures 1 and 2).

The Dominion Bureau of Statistics kept pace with the changes of the period, unveiling a completely revised and updated consumer price index in 1952 with new weights derived from a 1948-49 consumer spending survey. The index name was changed from the "Cost-of-Living Index" to the more precisely defined "Consumer Price Index" (CPI). The new name better reflected the fact that the index measured changes in the cost of a fixed basket of goods and services, not changes in the cost of maintaining a certain standard of living.<sup>26</sup>

Almost every aspect of the CPI was examined in detail for this update, including the fundamentals of index design, target population, basket contents and weighting scheme, price collection methods and calculation procedures.<sup>27</sup> For example, seasonal weights were introduced for food items in the CPI to reflect variations in the food-buying habits of Canadians throughout the year.<sup>28</sup> Also, the price sampling method adopted more specific descriptions for basket items, which allowed the DBS to more accurately distinguish pure price change from price movement due to quality changes.<sup>29</sup> Recognizing the need for more frequent CPI updates in this era of change, the Bureau made it a policy to conduct small-scale biennial surveys of consumer expenditures to monitor changing consumer spending patterns.

The 1948-49 CPI basket contained 224 items, almost 40.0% more items than the previous Cost-of-Living Index. Broader sampling allowed the Bureau to expand the basket to include children's wear, more fresh fruits and vegetables, and almost twice as many transportation items.<sup>30</sup> Food products like margarine, cake mix, orange juice, chocolate bars and carbonated drinks were added to the basket. Other new items included fur coats, electric irons, lawnmowers, household help, taxi and bus fares, phonograph records and alcoholic beverages (Appendix 2).<sup>31</sup>

The new CPI basket was the first to include the cost of owned accommodation in addition to rent (Appendix 2). Change in the cost of owned accommodation had previously been imputed from movements in the index for rented accommodation. The need to measure the changing costs of home ownership separately arose because consumers felt that home ownership costs were rising faster than rental costs. The CPI now included five categories of owned accommodation costs, namely property taxes, mortgage interest, repairs, homeowners' replacement cost, and insurance.<sup>32</sup>

The Bureau implemented the next CPI basket update in 1961, revising the weights to reflect expenditure data from the 1957 Urban Family Expenditure Survey. The previous basket's miscellaneous index was replaced by four major components: transportation, health and personal care, recreation and reading, as well as tobacco and alcoholic beverages. Hospital rates were dropped from the CPI with the 1961 update, since newly introduced federal-provincial hospital care plans greatly reduced family expenditures for this item (Appendix 2).<sup>33</sup> In future years, more health care services would be removed from the CPI basket as government spending increasingly replaced consumer expenditures in this area.

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25. Harnarine (1993b).

26. Dominion Bureau of Statistics (1954).

27. Dominion Bureau of Statistics (1952).

28. Ibid.

29. Ibid.

30. Dominion Bureau of Statistics (1952).

31. Dominion Bureau of Statistics (1954).

32. Harnarine (1993a).

33. Dominion Bureau of Statistics (1961).

The 1961 update marked the first time that previous index values were not revised, and a new no-revision policy, which remains in place today, was introduced. Prior to 1961, previously published indexes had been revised whenever the CPI basket was updated, using the new basket weights. Since the CPI is widely used in contracts for payment and wage escalations, the no-revision policy eliminated the need for CPI users to modify existing contracts or recalculate previous payments to account for CPI revisions (Box 1).

In the second half of the 1960s, the annual average rate of consumer price inflation was over 3.0% every year and rising. The highest inflation rate of the decade was recorded in 1969, when consumers paid 4.8% more than they had the previous year for their purchases (Figure 1). The increase in consumer prices was enough of a public issue for the federal government to create the Prices and Incomes Commission in 1969. Its general mandate was to investigate the causes and consequences of inflation, and to inform the private and public sectors on how to achieve price stability.<sup>34</sup>

### Box 1: Indexation using the Consumer Price Index

The Consumer Price Index is often used to adjust incomes, wages or other payments in order to maintain purchasing power in the face of changing consumer prices. The practice of making periodic changes to payments using a built-in adjustment factor is known as “indexation.”

Important federal social programs are indexed to the CPI, affecting millions of Canadians. For example, annual cost-of-living indexation was introduced for Old Age Security (OAS) benefits in 1972. The following year, when inflation was very high (particularly for energy and food), the government introduced quarterly indexation to provide better protection against unexpected price increases throughout the year.<sup>35</sup> As well, Canada Pension Plan (CPP) benefits have been indexed to CPI increases on an annual basis since 1974.<sup>36</sup>

Income tax brackets and basic exemptions have been indexed to the CPI since 1974. This measure ensures that Canadians are not taxed at higher rates due to increases in income that simply keep pace with inflation.<sup>37</sup>

The CPI is widely used for indexation in the private sector, as well. For example, it is used to index financial contracts such as wage agreements, child support agreements, loans and rent contracts.

### Stagflation years: 1973 to 1982

In 1973, world oil prices spiked during the international oil embargo that accompanied the Arab-Israeli War (Figure 1).<sup>38</sup> Overall consumer prices in Canada rose 7.8% in 1973 compared with the previous year (Figures 1 and 3), reflecting a 7.0% increase in the price of gasoline, an 8.0% gain in electricity costs, and a 14.9% advance in food prices. These price increases initiated a stretch of years in which the annual average rate of consumer price inflation was well over 5.0% and usually closer to 10.0%. At the same time, economic growth slowed and unemployment was high. This phenomenon of high inflation combined with slow economic growth is called “stagflation” (Figure 3).

34. Harnarine (1993b).

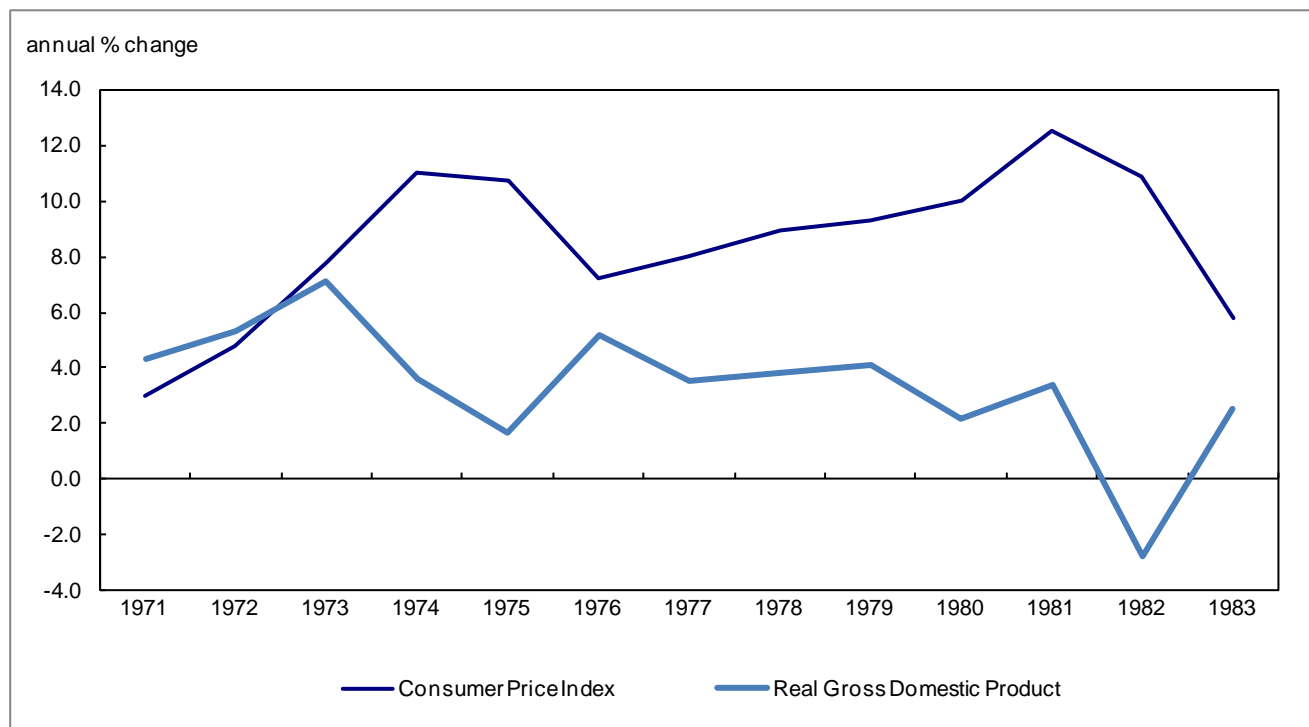
35. Léonard (2011).

36. Human Resources Development Canada (n.d.).

37. Department of Finance Canada (1981).

38. Norrie, Owram and Emery (2007).

**Figure 3 Consumer price inflation rose while economic growth slowed during the stagflation era**



Sources: Statistics Canada, CANSIM tables 326-0021 and 383-0027.

In 1973, Statistics Canada (the Bureau's name from 1971 onwards) updated the CPI basket in accordance with the 1967 Urban Family Expenditure Survey. Highlights of this CPI update included the introduction of price indexes for home ownership at the city level, as well as the re-introduction of annual weights for food items, replacing the seasonal weights that had been employed since 1952.<sup>39</sup>

Widespread concern about high consumer price inflation led the federal government to create the Anti-Inflation Board (AIB) in 1975. Until 1978, the AIB monitored movements in prices and wages, and had the legal power to regulate the price and wage decisions of large businesses, with the aim of restraining inflation.<sup>40</sup>

In 1975, Statistics Canada began publishing seasonally adjusted CPI series on an annual basis. Eventually, as statistical software became more sophisticated, seasonally adjusted indexes were produced on a monthly basis.<sup>41,42</sup>

39. Statistics Canada (1973).

40. Norrie, Ooram and Emery (2007).

41. Harnarine (1993b).

42. McCrae (n.d.).

With the next CPI basket update in 1978 (based on 1974 expenditure weights), the target population was significantly broadened to include all families and unattached individuals in urban centres of more than 30,000 people. For the first time since 1940, family size and income were not used to define the target population. This modification was partly motivated by demographic change, but also by the increasingly extensive application of the CPI.<sup>43</sup> By the 1970s, the CPI was used as a broad indicator of inflation, an escalation and bargaining tool in wage contracts, an indexation tool for government transfer payments (Box 1), and a deflator of monetary values expressed in current dollars. Therefore, it had become important that the CPI reflect overall consumer price change, rather than price change experienced by a subset of households.<sup>44</sup>

Several technical improvements accompanied the implementation of the 1974 basket weights. Statistics Canada adopted a “matrix concept” of CPI calculation, in which the Canada-level indexes were calculated as a weighted average of the indexes for 59 urban centres.<sup>45</sup> The price sample was expanded to include many new items (Appendix 2) and to cover a broader geography.<sup>46</sup> In a major step forward, an automated data processing system was introduced with this update, permitting more speed and flexibility in index calculations and analysis.<sup>47</sup>

The Iran-Iraq War broke out in 1979, leading to steep increases in world oil prices.<sup>48</sup> In 1980, consumers paid 10.0% more on an annual average basis for goods and services, while gasoline prices rose 19.1% (Figures 1 and 3). In response, in 1980, the federal government implemented the National Energy Program, which imposed price ceilings on domestically produced oil.<sup>49</sup>

Annual average CPI inflation reached a 33-year high of 12.5% in 1981 (Figures 1 and 3), as prices for gasoline (+36.1%), natural gas (+27.3%) and fuel oil (+43.6%) rose further. Prices for food purchased from stores were 12.0% higher in 1981 than in the previous year, while only a few items with relatively small basket weights, such as apples and coffee, declined in price.

In response to higher inflation rates and faster changes in relative prices, when the CPI basket was updated in 1982 to incorporate 1978 expenditure weights, Statistics Canada implemented a new policy of updating the CPI basket every four years. The updates were tied to the four-year cycle of Statistics Canada's Family Expenditure Survey.<sup>50</sup>

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43. Hamarine (1993a).

44. Ibid.

45. Statistics Canada (1978).

46. Ibid.

47. Ibid.

48. Norrie, O'wram and Emery (2007).

49. Ibid.

50. Statistics Canada (1982).

## Box 2: International cooperation and standards

Internationally, the Consumer Price Index is one of the most widely used statistics for measuring price change and economic performance. For decades, Statistics Canada has been actively involved with international organizations dedicated to improving and standardizing CPI methodology, such as the International Labour Organization (ILO) and the International Monetary Fund (IMF).

Statistics Canada CPI staff confer annually with the agency's Price Measurement Advisory Committee (PMAC), an external, independent panel of Canadian and international experts in price measurement. The Advisory Committee provides advice on conceptual topics related to price indexes as well as feedback on projects and changes in the various price measurement surveys at Statistics Canada. PMAC plays a critical role in bringing international expertise and best practices to inform Statistics Canada's approach to constructing the CPI.<sup>51</sup>

In 1994, Statistics Canada helped found the International Working Group on Price Indices (known as the Ottawa Group), which consists of CPI experts from national statistical agencies and universities around the world. This group, run by the United Nations Statistics Division, meets regularly to discuss theoretical and operational challenges in constructing price indexes.<sup>52</sup>

Numerous quality assessment reports by the IMF have concluded that Canada's CPI meets all international standards for methodological soundness, accuracy and reliability.<sup>53</sup>

## Late twentieth century: 1983 to 1999

Consumer prices rose 5.8% on an annual average basis in 1983, marking the smallest rise since 1972 (Figures 1 and 3). Compared with the preceding years, annual average consumer price increases during the remainder of the 1980s were moderate.

The CPI basket was updated to reflect 1982 expenditure weights with the release of the January 1985 CPI. New items such as microwave ovens, video cassette recorders and contact lenses were added to the CPI basket, while metal dinette furniture and black-and-white televisions were removed (Appendix 2).<sup>54</sup>

In 1991, the federal government and the Bank of Canada agreed on an inflation targeting monetary policy regime. Annual average inflation subsequently decelerated from 5.6% in 1991 to 1.4% in 1992. The CPI took on even greater importance as a macroeconomic indicator and policy guide. Since 1993, the joint agreement has been for the central bank to adjust its interest rates to maintain year-over-year growth in the All-items CPI within a 1.0% to 3.0% range.<sup>55</sup>

A six-year interval (instead of the usual four years between reference periods) elapsed between the 1986 basket update in 1989 and the 1992 update in 1995. This interruption in the CPI basket-update cycle coincided with the introduction of the federal Goods and Services Tax (GST) in January 1991. Because tax changes can affect consumer spending behaviour, Statistics Canada chose the 1992 reference period to ensure the CPI reflected any adjustments to consumption patterns resulting from the introduction of the GST.

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51. Statistics Canada (2013).

52. Diewert (2007).

53. Statistics Canada (2013).

54. Statistics Canada (1985).

55. Bank of Canada (2013).

With the introduction of the 1992 CPI basket in 1995, the CPI target population was redefined to include all private households in Canada, regardless of urban or rural residence.<sup>56</sup> This remains the CPI target population to this day. The 1992 basket update expanded price collection to better represent provinces with significant rural and small-city populations.<sup>57</sup> Starting with the 1992 CPI basket update, the national-level CPI was calculated as a weighted average of the indexes for the ten provinces and two territories, whereas previously it had been a weighted average of city indexes.<sup>58</sup> Also beginning with this basket update, provincial indexes were produced using prices collected to represent the entire province, as opposed to individual urban centres.<sup>59</sup>

Government-wide downsizing in the 1990s led to funding cuts to several of Statistics Canada's programs, including the CPI program. The number of price quotes from field collection used annually to calculate the CPI was significantly reduced during this decade. To uphold quality standards, the number of published indexes had to be reduced, as well.

While consumer prices as a whole increased during 1980s and 1990s, certain CPI components saw dramatic declines, reflecting factors such as technological change, global manufacturing and increasingly competitive world markets. For example, on an annual average basis, consumers paid less almost every year for electronic equipment. Between 1995 and 2000, prices for audio equipment fell 14.3%, while prices for video equipment declined 18.6%. Over the same time period, consumers saw a 62.4% decline in prices for digital computing equipment. In order to improve the measurement of pure price change in consumer electronics, in 1996 Statistics Canada adopted the hedonic quality adjustment technique for the computer equipment, software and supplies index.<sup>60</sup> This method was later applied to the Internet access services index in 2008.

### Box 3: Bias in the Consumer Price Index

A bias is a systematic error that consistently leads to over- or underestimation of the phenomenon being measured.<sup>61</sup> Although techniques and methodologies exist to minimize CPI bias, all consumer price indexes are subject to some degree of bias because of the complexity of measuring price change.

In 1996, consumer price indexes around the world came under public scrutiny with the publication of the final report of the Advisory Commission to Study the Consumer Price Index (commonly called the Boskin Commission). The report examined the American CPI and made a range of technical and methodological recommendations for reducing its bias.<sup>62</sup>

In light of the Boskin Commission's findings, in 1997 Statistics Canada published a report describing the steps that had been taken to reduce bias in Canada's CPI to that date.<sup>63</sup> For example, Statistics Canada was the first statistical agency in the world to employ a geometric mean for aggregating prices at the micro level in 1995, thus eliminating a source of upward bias.<sup>64</sup> As well, bias in the CPI was reduced by frequently updating the basket and by introducing new products between basket updates.<sup>65</sup> More recently, Statistics Canada has made important progress in reducing bias in the CPI as part of the Consumer Price Index Enhancement Initiative (see page 17).

56. Statistics Canada (1995).

57. Ibid.

58. Yukon is represented by Whitehorse and the Northwest Territories by Yellowknife. Nunavut, which is represented by Iqaluit, was added to the CPI in 2002.

59. Statistics Canada (1995).

60. For more information on the hedonic method and on other methods of quality adjustment used in the Canadian Consumer Price Index, please refer to Statistics Canada (2014).

61. Statistics Canada (2003).

62. Boskin et al (1996).

63. Ducharme (1997).

64. Ryten (1997).

65. Ibid.

## Twenty-first century changes

The first basket update of the twenty-first century was implemented in January 2003 to reflect 2001 basket weights. A five-year gap (instead of the usual four years) separated the implementations of the 1996 and 2001 basket weights because the annual Survey of Household Spending (SHS) had replaced the Family Expenditure Survey in 1997. The year 2001 was used as the basket reference period because SHS estimates for the territories were not available for the year 2000.<sup>66</sup> Budget constraints and concerns about computer software bugs related to the year 2000 also contributed to the choice of a 2001 basket reference period.<sup>67</sup>

Also with the 2001 basket update, a methodology change was made so that seasonally adjusted aggregate indexes, including the All-items CPI, were no longer calculated as weighted averages of their seasonally adjusted sub-component indexes.<sup>68</sup> As of the January 2003 reference period, the All-items CPI, the eight major component indexes, and special aggregates were seasonally adjusted directly, independently of their respective sub-indexes.

In 2006, an error was discovered in the traveller accommodation index of the CPI. It was estimated that this error, which was processing related, caused the annual average change in the All-items CPI to be understated by an average of 0.1 percentage points every year between 2001 and 2005. While the mistake was corrected going forward, the historical series was not revised because of the no-revision policy of the CPI. In response to the error, Statistics Canada implemented a series of measures to improve the governance and management methods used when systems are developed and also significantly raised testing standards.

In 2008, Canada, along with the rest of the world, experienced a recession as the global financial crisis unfolded. The Canadian CPI edged up 0.3% in 2009, its smallest annual average increase since 1994 (Figure 1). Consumers paid 0.3% less for shelter and 5.4% less for transportation in 2009 compared with 2008, illustrating once more the close relationship between CPI inflation and overall economic performance.

The CPI basket incorporated a range of new goods and services in the twenty-first century. Internet access services and financial services were added to the CPI basket as part of the 2001 basket update in 2003. Later, the growing importance of digital devices was reflected in the CPI basket update based on the 2009 SHS, which was introduced in 2011. The multipurpose digital devices component was created to measure price change for emerging consumer technologies such as tablet computers and smartphones. These items have continually decreased in price since they were introduced into the CPI. Retail club memberships, funeral services, government services (such as passport fees) and legal services were also added to the CPI basket (Appendix 2).

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66. Survey of Household Spending estimates were produced for the provinces and territories in odd-numbered years and for the provinces only in even-numbered years.

67. Statistics Canada (2014).

68. This change was made to improve the quality of the seasonally adjusted series and to adhere to Statistics Canada guidelines on seasonal adjustment.



## The Consumer Price Index Enhancement Initiative

In 2009, Statistics Canada began the Consumer Price Index Enhancement Initiative. The objective of this five-year project was to produce an even better measure of consumer price movement in Canada, based on high-quality and internationally respected methodologies combined with a more efficient technical infrastructure.

As part of the initiative, Statistics Canada increased the number of prices collected to make the CPI sample more representative of consumer habits. The number of field-collected price quotes in the CPI sample nearly doubled. As well, the design of the sample was enhanced to include a more varied selection of stores and products, and the geographic coverage was improved.<sup>69</sup>

The initiative also led to enhanced methodologies for calculating pure price change by accounting for quality change for more than 100 products.<sup>70</sup> For example, between 2009 and 2013, Statistics Canada implemented a series of methodological improvements to the indexes for prescribed medicines, for travel tours, for the purchase of passenger vehicles, as well as for passenger vehicle parts, maintenance and repairs.

These activities were supported by major projects for improving data collection infrastructure and data processing. For instance, field data collection devices were used more extensively in the collection of price quotes for goods and services, eliminating many paper forms. As well, a more modern price index estimation system was developed.

As part of the initiative, Statistics Canada began updating the CPI basket every two years instead of every four years, aligning the agency's practice with that of other advanced statistical agencies (Box 2).<sup>71</sup> This goal was achieved with the 2011 basket update, which came into effect with the release of the February 2013 CPI. More frequent basket updates enable the index to better reflect recent changes in consumers' buying habits, and thus help reduce the product substitution bias in the CPI (Box 3). In addition, compared with the previous basket update, the elapsed time between the basket weight reference period and the update implementation date was shortened by three months.

## Conclusion

With the release of the December 2014 Consumer Price Index, Canada's CPI covers a century of change in consumer prices. This historical time series spans periods of economic expansion, recessions, war, demographic changes, technological advancements and ongoing improvements in price index theory and practice. The history of the CPI illustrates the challenges involved in measuring changing consumer prices over time. The constant maintenance, updates and research required to keep the index accurate and relevant require the work of hundreds of people at Statistics Canada headquarters and regional offices. With the completion of the Consumer Price Index Enhancement Initiative in 2015, the quality of the CPI is better than it has ever been, and Statistics Canada is well positioned to continue the evolution of the CPI into the future.

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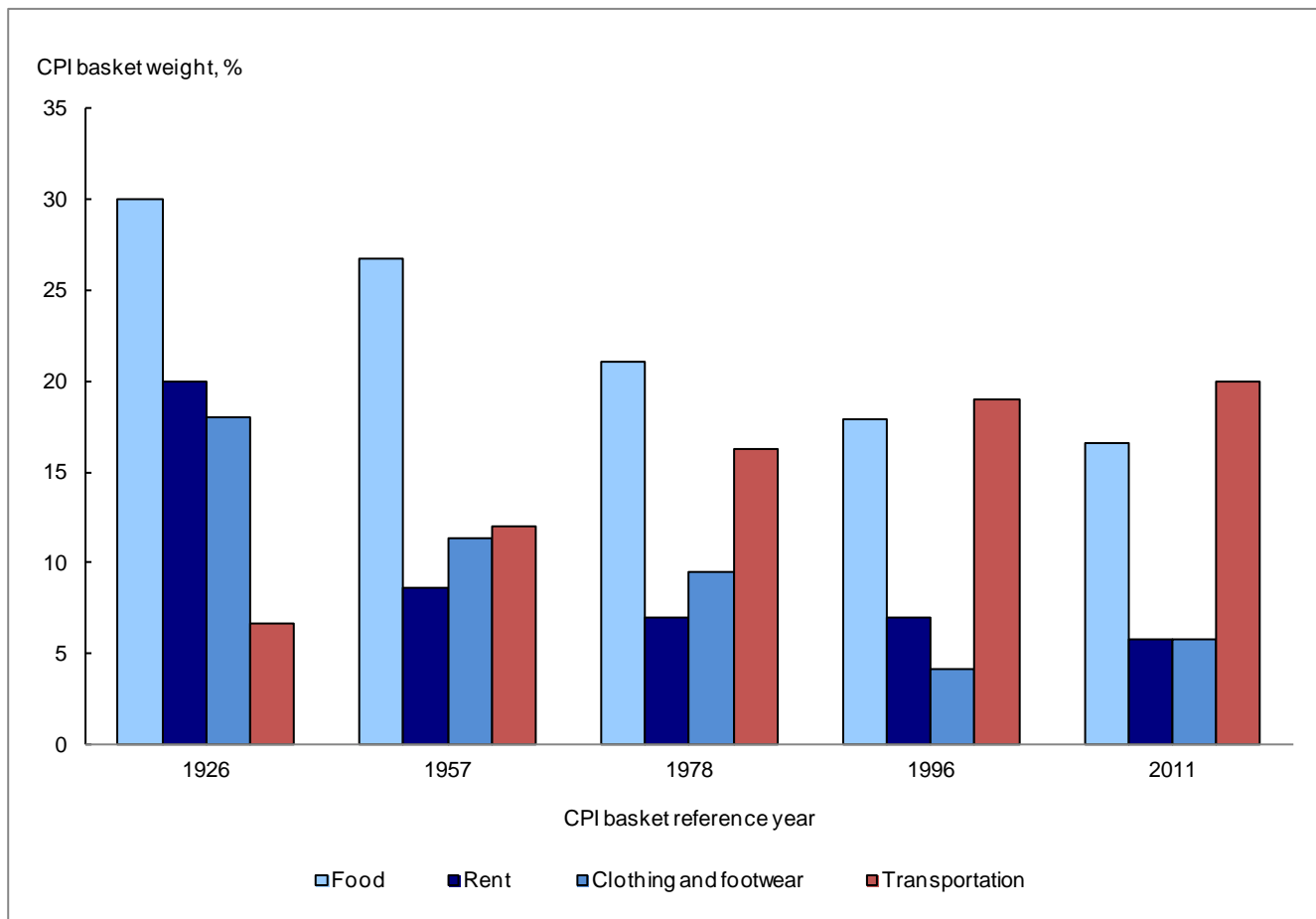
69. Statistics Canada (2013).

70. Ibid.

71. France, the Netherlands and the United Kingdom update their baskets every year. The United States updates its basket every two years, and New Zealand every three (Statistics Canada, 2013).

## Appendix 1

**Figure A-1 The basket weights of Consumer Price Index components have changed over time**



**Notes:** This chart provides an indication of how the relative importance of four broad Consumer Price Index (CPI) components have changed over time. Please note, however, that the contents of each category were not necessarily the same for every basket. The scope and target population of the CPI varied over the years, as well.

**Sources:** Dominion Bureau of Statistics (1930 and 1961) and Statistics Canada (1982, 2001 and 2013).

## Appendix 2

## The evolution of the Consumer Price Index basket over the past century

Basket reference period, by decade	Consumer Price Index basket contents (selected items)		
1910s	<b>Items added:</b> Beef, mutton and pork Flour Apples	Sugar Tea and coffee Laundry starch	Coal Firewood Rent
1920s	<b>Items added:</b> Canned vegetables Clothing for adults Electricity	Refrigerators Amusements Tobacco	Doctors' fees Telephones Motor operating costs
1930s	<b>Items added:</b> Strawberry jam Vegetable shortening Broadcloth smocks	Smoked ham Flannelette	Oil-cloth Chloride of lime
	<b>Item removed:</b> Firewood		
1940s	<b>Items added:</b> Cake mixes Orange juice Children's clothing	Phonograph records Taxi and bus fares Electric irons	Prepaid medical care Beer and liquor Home ownership costs
	<b>Items removed:</b> Dried beans Prunes	Woollen hosiery Bed springs	Coke (fuel) Kitchen pails
1950s	<b>Items added:</b> Restaurant meals Frozen foods Jewellery	Sports equipment Plane fares Admission to sports events	Television sets Toys Automatic clothes dryers
	<b>Items removed:</b> Ice Brooms	Hospital rates Women's housedresses	Men's overalls Radio licenses
1960s	<b>Items added:</b> Snack foods Garden supplies Parking	Stereo combinations Cameras Camping equipment	Hotels/motels Tuition fees Pet expenses
	<b>Items removed:</b> Lard Coal	Wool blankets Men's hats	Doctors' services Prepaid medical care
1970s	<b>Items added:</b> Pears Dry-cell batteries Long-distance telephone calls	Sandals Power tools Car rental	Cablevision Ski equipment Package holiday trips
1980s	<b>Items added:</b> Yogurt Day-care centres Air conditioning equipment	Driver's licenses Video cassette recorders Golf club memberships	Contact lenses Compact discs Pay TV
	<b>Items removed:</b> Black-and-white televisions	Metal dinette furniture	
1990s	<b>Item added:</b> Wine served in licensed premises		
2000s	<b>Items added:</b> Internet access services Financial services Funeral services	Smartphones Tablet computers	Government services Retail club memberships

Sources: Dominion Bureau of Statistics and Statistics Canada, various documents.

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