BRINGING FINANCE TO YOUR CLASSROOM

A FinStart Newsletter for Teachers
Inflation Case Study, September 27, 2020

What's new?

The lastest CPI (Consumer Price Index, the official measure of inflation) shows that inflation in Canada fell to almost zero this summer. Yet, an article this weekend in The Wall Street Journal points out that "inflation is already here – for the stuff you actually want to buy".

https://www.wsj.com/articles/inflation-is-already-herefor-the-stuff-you-actually-want-to-buy-11601112630?mod=markets_lead_pos2

Why is it?

Low inflation (or deflation – declining prices and wages) is associated with weak economic conditions. COVID-19 explains the 2020 drop in the official inflation measure. However, prices of goods and services that are in high demand have been rising faster than the CPI, which makes it 'feel' like inflation is higher than the official measure shows.

So what?

A stable and moderate inflation of about 2% is desirable. But that is not likely going forward – and this makes managing personal finances harder. Right now, there is an expectation that over the next few years we may see low inflation or even deflation as the post-COVID economy will be weak. But after that, inflation may get higher, perhaps more so than we'd like and, worse, perhaps without stronger economic growth. Fears of higher inflation are driven by concern over the amount of money governments create and spend to stimulate the economy.

Teaching with FinStart

On the website, we address inflation in the context of saving and investing https://www.finstart.ca/investment-accounts.html. Please click on both inflation links on that page for some cool charts – i) inflation in Canada over the last 100 years and ii) a comparison of investment products according to their ability to beat inflation.

Here, we look at inflation from the purchasing-power perspective. We introduce the concept by tracking the price of the Big Mac over 20 years. Then, we look at Canada's CPI (consumer price index) and its composition.

Our case study can be used to illustrate inflation implications for budgets and post-secondary education financing plans. It aims to develop intuitions about inflation.

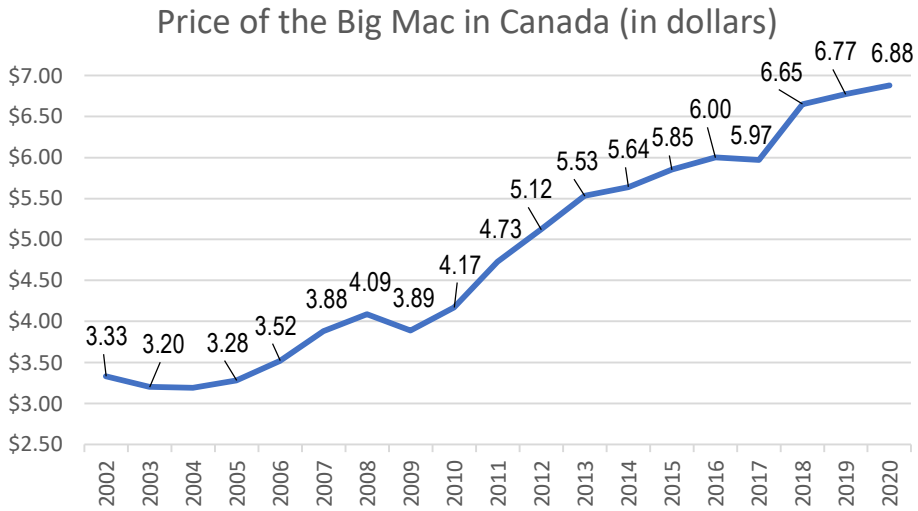
The case study is presented in 6 parts, such that each part can be separately shared with students. Solutions follow. The data we use is publicly available (links are included).

Image from Pixabay.

INFLATION

Case Study – Part 1

James, Sunil, Colin, and Jayden have been buddies since elementary school. Every year since 2002, they've celebrated birthdays by going out for a Big Mac. At the last outing, Colin surprised everyone when he pulled out a piece of paper with the following chart. It turns out that he kept receipts from all these years – and plotted the price of Big Mac they paid each year. "Look at the Big Mac inflation we've experienced", he said.



You can verify Colin's data here: https://www.economist.com/news/2020/07/15/the-big-mac-index

Question 1 (no calculations required)

i) Did the price of Big Mac increase every year?
ii) Which year saw the biggest drop in the price? Research or ask your older family members or friends what was happening in the economy that year that may explain the price drop.
iii) What do you think Colin meant by 'Big Mac inflation'?

Question 2 (calculations required)

iv) Calculate how much (in dollars and percent) the price of Big Mac increased in 2019 (from 2018).
v) Calculate the overall price increase (in dollars and percent) over 17 years, from 2002 to 2019.
vi) What was the average annual price increase in percent between 2002 and 2019? Hint: use the concept of geometric average.

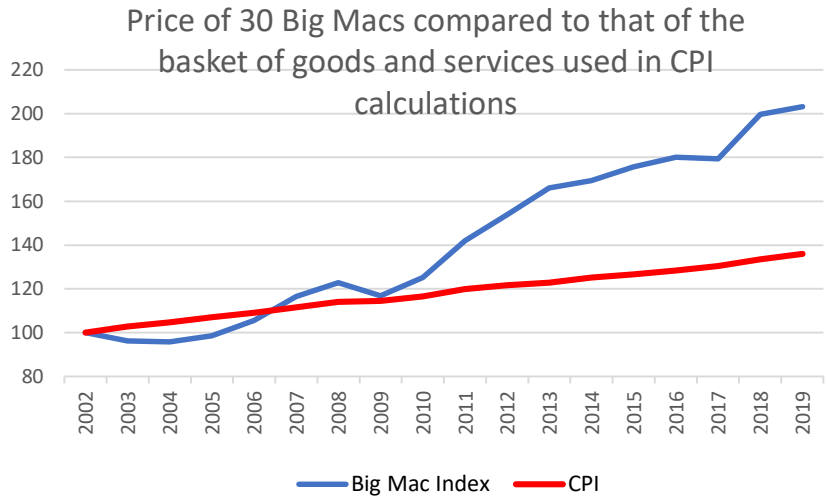
INFLATION

Case Study – Part 2

Jayden showed Colin's Big Mac price chart to his niece, Betty who is taking Grade 12 Economics this year. Jayden's chart looked similar to a chart Betty saw in the unit about inflation. Inflation is the change in prices over time. Betty remembered that inflation cannot be measured by changes in the price of one product, like Big Mac. Rather, to measure inflation we track prices of a broad basket of many different goods and services consumers use.

Betty and Jayden put together the following chart tracking prices of two different baskets of goods.

- Jayden's basket (blue line – the same line as in Part 1) contains 30 Big Macs. He could buy his Big Mac basket for $100 in 2002 (Colin's data in Part 1 shows that one Big Mac cost $3.33 in 2002 so 30 Big Macs cost $100). By 2019, 30 Big Macs cost him a bit more than $200 - a more than 100% increase over 17 years.
- Betty's basket (red line) is one used by Statistics Canada to calculate the Consumer Price Index. The chart shows that in 2002, Betty would have to spend $100 to buy a mini-version of this basket. By 2019, the same mini-basket would cost her $140 – a 40% increase over the same period of time.



You can find the data Betty used here:
Statistics Canada. Table 18-10-0005-01 Consumer Price Index, annual average, not seasonally adjusted

Question 3 (no calculations required)

vii) The price of which basket (Jayden's Big Macs or Betty's CPI basket) rose faster?
viii) The price of which basket increased more smoothly over time? Why do you think that may be?
ix) Which price increased faster from 2002 to 2003, and from 2008 to 2009 – the Big Mac or the CPI basket? What about 2017 to 2018? Hint: compare the slopes of the blue and red lines in those years.
x) Based on what you know about Jayden's and Colin's work, what do you think a price index tracks?

Question 4 (calculations required)

xi) Using the following steps, show how Jayden used Colin's Big Mac price data (from the chart in Part 1) to calculate the Big Mac index.
- What value did he assign to the index at the start (in this case, in 2002)? What Big-Mac price does this index value correspond to?
- How did he calculate the index value in 2003?

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Case Study – Part 3

Betty found additional information about the CPI basket of goods and services on the Statistics Canada website.

The 1,138 products it tracks are grouped into categories. Each category accounts for a certain percentage of the basket (it's referred to as 'weight').

	Basket weight	Number of products
Food and non-alkoholic beverages	16.48%	173
Shelter	27.36%	23
Household operations, furnishings and equipment	12.80%	148
Clothing and footware	5.17%	151
Transportation, excluding Gasoline	16.82%	230
Gasoline	3.13%	
Health and personal care	4.79%	54
Recreation, education and reading	10.24%	301
Alcoholic beverages, tobacco products and recreational cannabis	3.21%	58
TOTAL BASKET	**100.00%**	**1,138**

You can verify Betty's data here:

Statistics Canada. Table 18-10-0007-01 Basket weights of the Consumer Price Index, Canada, provinces, Whitehorse, Yellowknife and Iqaluit

Question 5 (no calculations required)

xii) Identify the 3 biggest categories in the CPI basket. This is where we spend most of our money.
xiii) Which category has the smallest weight?

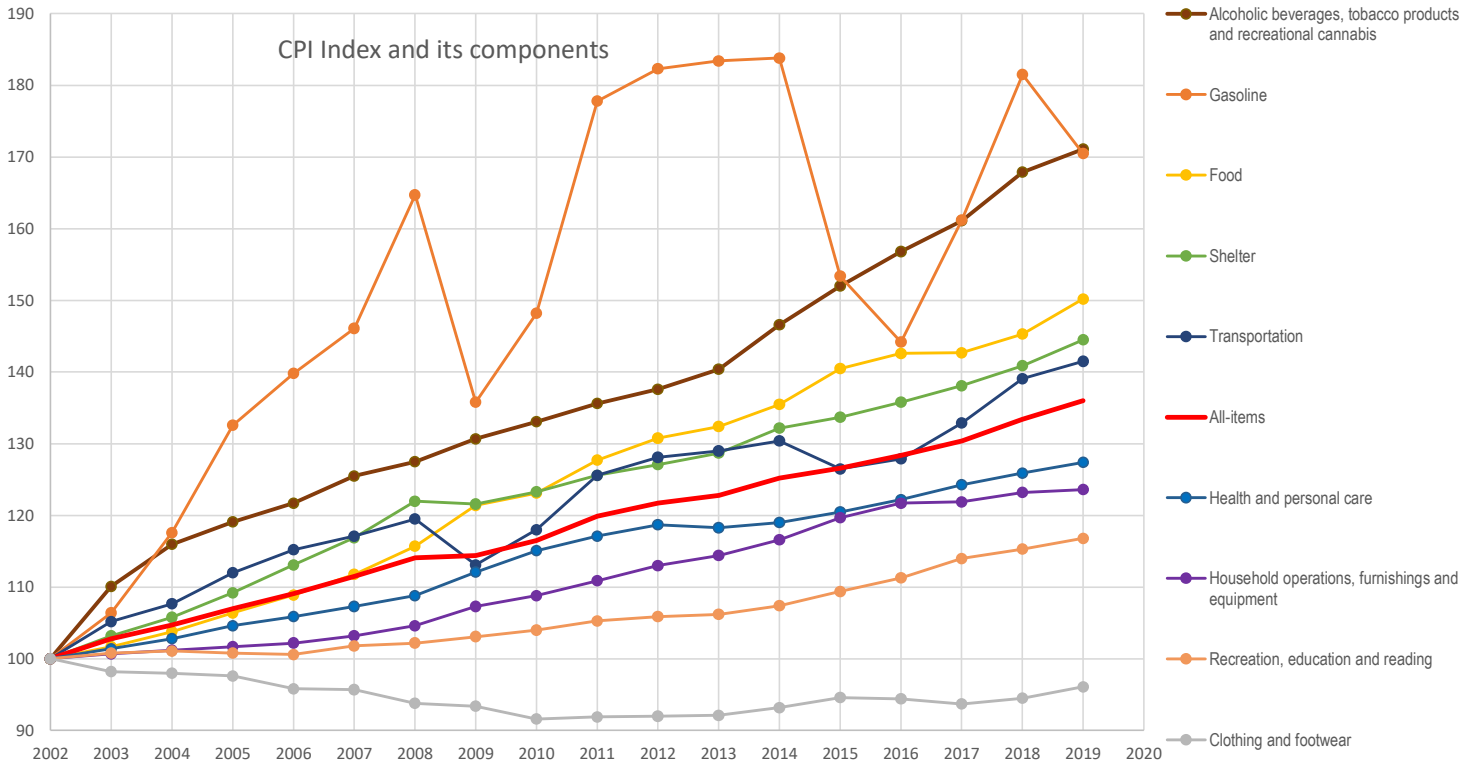
INFLATION

Case Study – Part 4

Betty found additional interesting data on the Statistics Canada's CPI website and prepared the following chart.

- The red line in the middle of the chart is the same as the red line in the chart in Part 2. It shows how the price of the entire CPI basket changed over time.
- The other lines represent various categories of goods and services that the CPI basket includes.

Use this chart to answer questions listed below it.



Statistics Canada. Table 18-10-0005-01 Consumer Price Index, annual average, not seasonally adjusted

Question 6 (no calculations required)

xiv) Which category of goods / services saw the biggest change in price in the years 2002-2019?
xv) Which category had the smallest price change in the same period?
xvi) In which categories prices increased steadily over time, and in which prices were volatile (moved up and down a lot)?
xvii) To which category would you compare the Big Mac? Has the price of that category changed more or less in this period than the price of Big Mac we discussed in Parts 1 and 2?

INFLATION

Case Study – Part 5

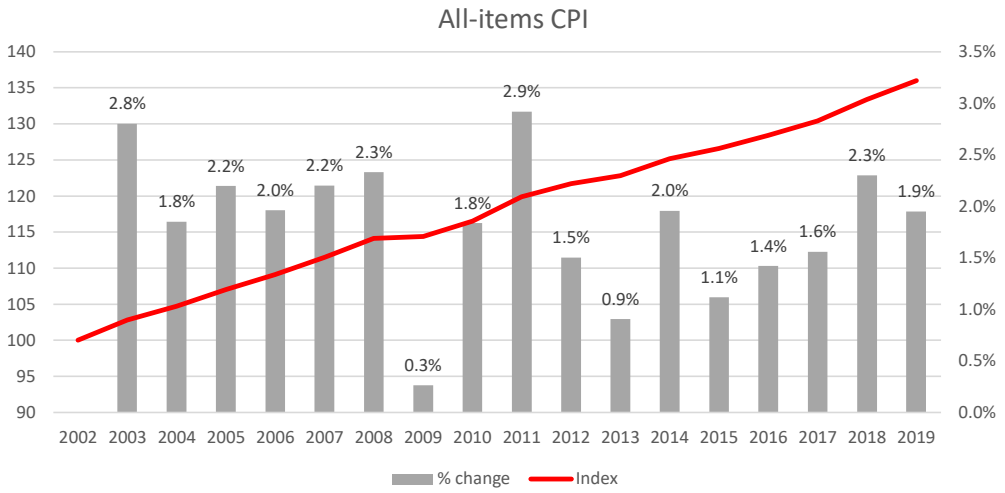
Jayden and Betty tabulated the data they used to plot the price of the CPI basket (the red line in earlier parts). This is shown in the first row of the table below.

Then they calculated the year-over-year percentage change in the price index. This is shown in the second row.

They plotted both in the chart below the table. Index values (red line) are plotted on the left axis, and percentage change (grey columns) on the right axis.

Answer the following questions looking at the numbers in the table and at the chart.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Index	100.0	102.8	104.7	107.0	109.1	111.5	114.1	114.4	116.5	119.9	121.7	122.8	125.2	126.6	128.4	130.4	133.4	136.0
% change		2.8%	1.8%	2.2%	2.0%	2.2%	2.3%	0.3%	1.8%	2.9%	1.5%	0.9%	2.0%	1.1%	1.4%	1.6%	2.3%	1.9%



Question 7 (no calculations required)

xviii) Did the price index a) rise every year, b) fall every year, c) rise in some years and fall in some years, d) none of the above? Hint: look at the red line and examine the pattern in the first row of the table.

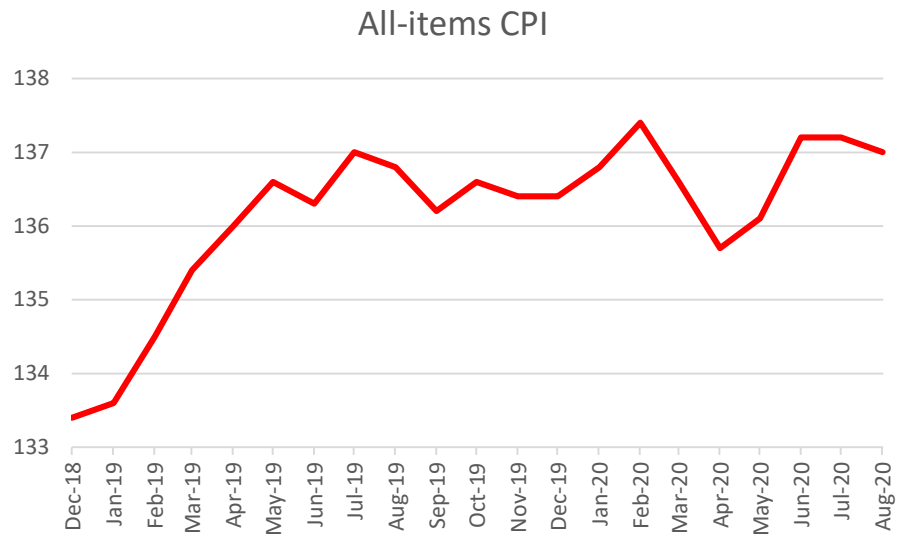
xix) What was the smallest annual inflation (year-over-year change in the price index)? What was the largest annual inflation? Which years did they happen? Hint: look at the grey columns in the chart.

xx) Do you think it's possible for annual inflation to be a negative number (the price index that year would decline)? Hint: look at the 'Gasoline' category in the chart in Part 4.

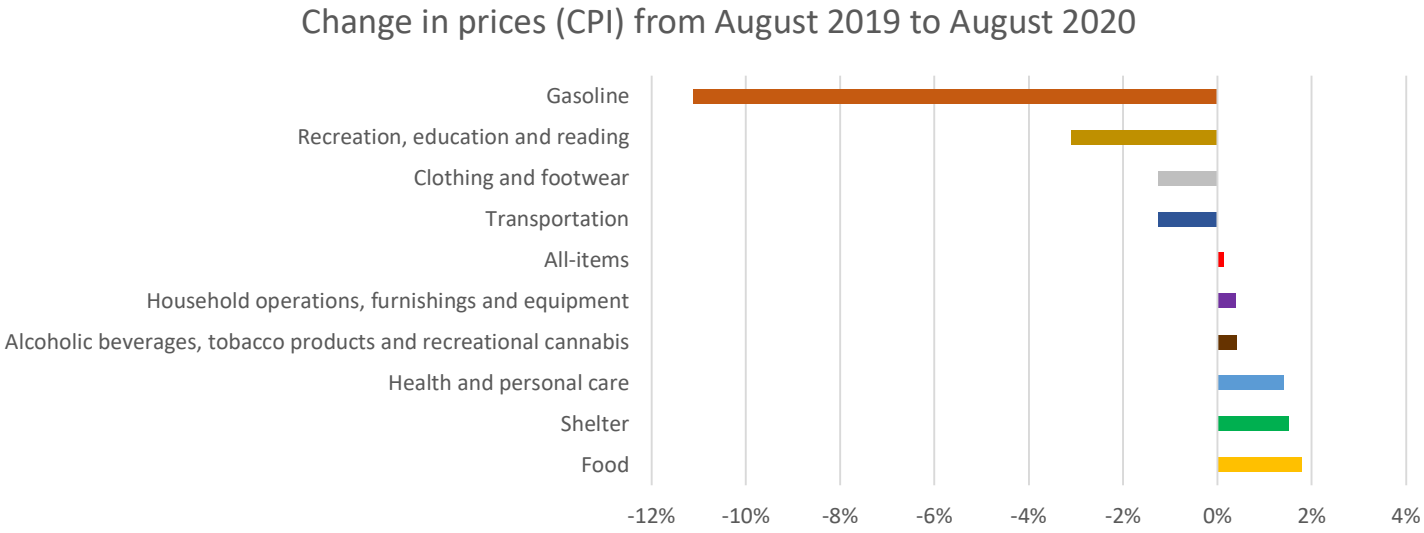
INFLATION

Case Study – Part 6

Betty thought the inflation data she found seemed old as the last data point was 2019. She returned to the Statistics Canada website and realized that in addition to the annual statistics they track inflation every month. She plotted two of the charts we saw earlier using the monthly data, up to August 2020. Use Betty's charts to answer questions below.



You can verify Betty's data here: Statistics Canada. Table 18-10-0005-01 Consumer Price Index, annual average, not seasonally adjusted



Question 8 (no calculations required)

xxi) Examine the pattern of the CPI (red line in the first chart) from March 2020 to August 2020 and describe what has been happening to prices month by month since April. What do you think caused this?

xxii) Looking at the second chart, which CPI categories saw the biggest declines in prices in the last 12 months? Which categories saw biggest price increases? Discuss how changes in goods and services consumers are buying / not buying since the start of the pandemic can explain the data.

INFLATION

Solutions and Talking Points

Talking points that are not directly related to the solution and provide additional 'colour' are highlighted in green.

Solution: Part 1

Question 1

i) Not every year but in most years. There were 3 years when the price of Big Mac declined.
ii) The biggest decline was in 2009.
We didn't ask for calculations but here's the math: 3.89/4.09-1=-5% or 4.89% without rounding.
2003 looks like a much smaller decline and it is smaller [3.20/3.33-1=4%, or 3.90% without rounding].
2009 was the year of the great financial crisis (GFC) and economic downturn. Here in Canada, the Bank of Canada officially declared a recession in July 2009. It didn't end until November 2009.
iii) Colin referred to the increase in the price of Big Mac since 2002.

'Burgernomics' is a lighthearted idea pursued since 1986 by The Economist (www.economist.com). As part of a bigger project, they track prices in local currencies of the MacDonald's Big Mac.

Question 2

iv) Price increase in 2019 in dollars is $0.12 [6.77-6.65]), in percent 1.80% [6.77/6.65-1].
v) Between 2002 and 2019, the price increased 103% [6.77/3.33=103.33%].
vi) The average price increase in percent (geometrical average) was 4.26% (average Big Mac annual inflation rate). Calculation: $-1+(6.77/3.33)^{(1/17)}$ (geometric average to account for the compounding effect).

The reason we're not using the 2020 data point in this section is that in the following parts we are comparing the Big Mac inflation to the CPI inflation – and the latest annual CPI data point available is for 2019. We look at 2020 in Part 5.

Solution: Part 2

Question 3

vii) The price of Jayden's basket rose faster than Betty's.
viii) The price of Betty's basket rose more smoothly than Jayden's, most likely because Betty's basket includes many goods and services – each price changes at a different rate and there is an averaging effect.
ix) The slope of the blue line (Big Mac) is downward between 2002 and 2003 as well as between 2008 and 2009, while the red line slopes upward. This means that the price of Big Mac decreased and that of the CPI basket increased. From 2017 to 2018, both slopes are upward but the slope of the blue line is steeper – the price of Big Mac increased faster than that of the CPI basket.
x) A price index tracks CHANGES in prices. Those changes can be represented by price levels (the actual prices – our blue and red lines) or by changes in prices (the slopes of the lines), usually expressed in percent.

This infographics https://www150.statcan.gc.ca/n1/en/pub/11-627-m/11-627-m2020069-eng.pdf?st=4Sp5puxU explains in a simple way how Stats Can ensures it tracks pure price changes, without mixing them up with product quality changes.

Question 4

xi) It's customary and convenient to start an index at 100, although any other number will do. Jayden's starting price if #3.33. His basket has 30 Big Macs, which gives $100 as the starting value of his index (3.33*30, rounded up).

In 2003, he calculated the value of the index as 30*3.20=96.1, where $3.20 is the price of Big Mac in 2003 and 30 is the number of Big Macs in his basket (this number stays constant).

Solution Part 3

Question 5

xii) The 3 biggest categories in the CPI basket are 'Shelter', 'Transportation', and 'Food'.
xiii) 'Alcoholic beverages, tobacco products and recreational cannabis' has the smallest weight.

Solution Part 4

Question 6

xiv) 'Alcoholic beverages, tobacco and recreational cannabis' and 'Gasoline' tied for the biggest change in price.
xv) 'Clothing and footware' had the smallest price change in the same period.
xvi) The most gradual price increases (smoothest lines) are in the 'All' category – because of the averaging of price changes of a large number of goods and services in many categories (their prices change at different rates, some rise when others may fall). In the individual categories, 'Shelter' is probably the smoothest line (except for a bump in 2008). 'Healthcare' and 'Household operations' are also quite smooth. The two most volatile are 'Gasoline' and 'Transportation. Much less, but still volatile, is 'Food'.
xvii) 'Food' is the comparable category for the Big Mac. The price of Big Mac changed more than the price of the 'Food' category (just over 200% for Big Mac (chart in Part 2) vs. 150% for 'Food' in this chart).

Solution Part 5

Question 7

xviii) It rose every year, though not at the same rate.
xix) The smallest annual inflation in this time period was 0.3% in 2009. The largest was 2.9% in 2011.
xx) Yes, it's possible. It's called deflation – a decline in prices.

Solution Part 6

Question 8

xxi) There was a big drop in inflation in March and April 2020 – quite likely explained by the lockdown (we consumed less of a lot of things). Prices rose in May and June, and have since been stable with a bit of a decline in August.
xxii) Biggest price declines are in gasoline, recreation, transportation and clothing. This is consistent with the effects of lockdown—less travel and recreation opportunities, and more working from home. Food, shelter, and personal care have seen the biggest increases – some of which can be related to increased consumption of these goods and some to pandemic-related changes in supply chains (where the goods come from and how they are transported). The Wall Street Journal article we mentioned on page 1 addresses this topic, though the inflation data is of course somewhat different in Canada than in the US.

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