Chapter 6

Measuring the Cost of Living

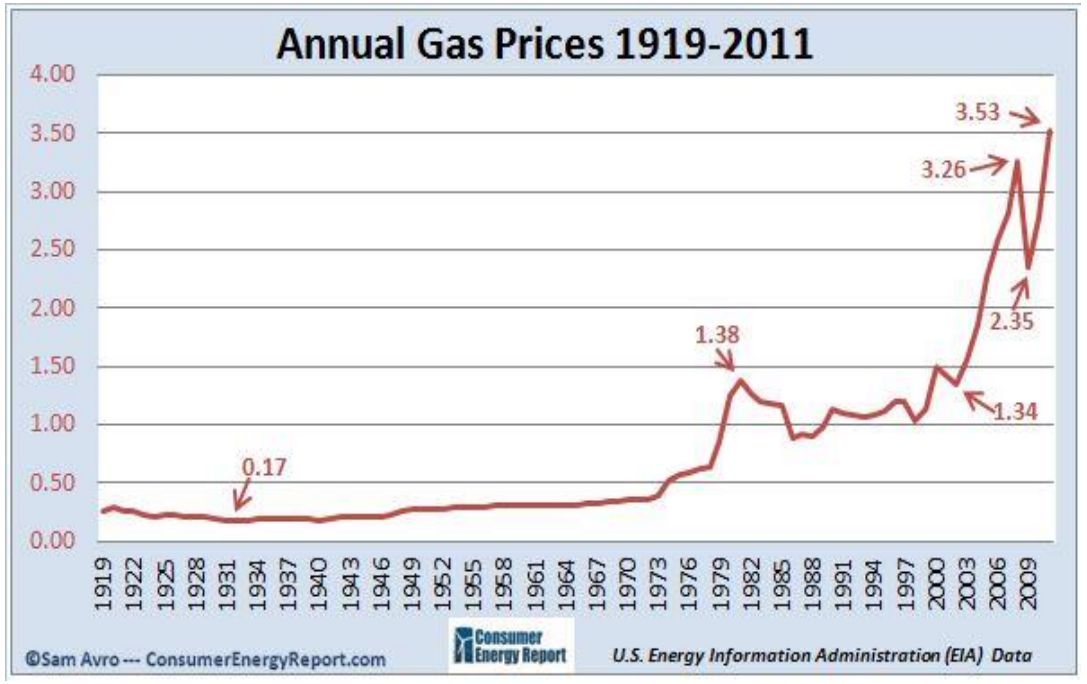
Knowing the *cost of living* is just as important as knowing *income* when evaluating well-being.

Inflation increases both the cost of living and income.

How do people become better off?

When income rises faster than the cost of living.

Economists use a *consumer price index* to evaluate changes in the “cost of living”.



Consumer Price Index (CPI)

The consumer price index (CPI) = a measure of the overall price of the goods and services bought by a typical consumer.

Consumer Price Index (CPI)

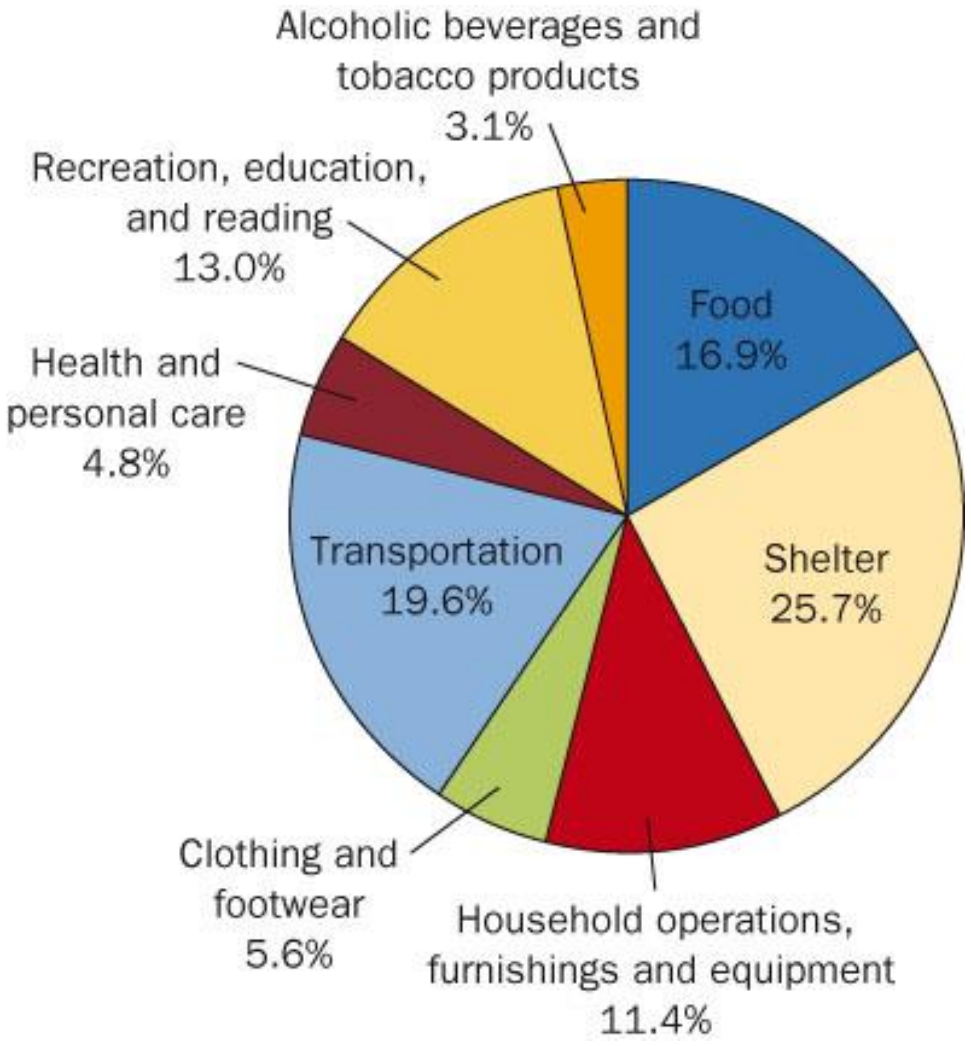
How is the consumer price index is calculated?

1) Determine the "basket" of goods and services consumed by a typical consumer.
2) Find the prices.
3) Compute the basket's cost.
4) Choose a base year and compute the price index.

What Is in the CPI's Basket?

When constructing the CPI, Statistics Canada tries to include all the goods and services that the typical consumer buys.

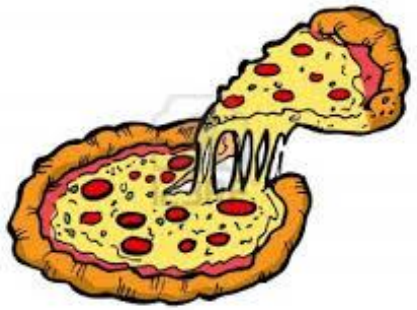
Moreover, it tries to weight these goods and services according to how much consumers buy of each item.



Example

Assume a typical consumer buys 4 pizzas and 10 lattes.

Year	Price of pizza	Price of latte
2011	$10	$2.0
2012	$11	$2.5
2013	$12	$3.0



Cost of basket in 2011 = ($10 × 4) + ($2.0 × 10) = $60

Cost of basket in 2012 = ($11 × 4) + ($2.5 × 10) = $69

Cost of basket in 2013 = ($12 × 4) + ($3.0 × 10) = $78

Formulas

$$\text{GDP deflator} = \frac{\text{nominal GDP}}{\text{real GDP}} \times 100$$

$$\text{CPI} = \frac{\text{Cost of basket in current year}}{\text{Cost of basket in base year}} \times 100$$

Inflation rate: the % change in the price index from the preceding period.

$$\text{Inflation Rate for year X} = \frac{(\text{Index}_{x+1} - \text{Index}_{x})}{\text{Index}_{x}} \times 100\%$$

Example

Using 2011 as the base year:

CPI for 2011 = $60/$60 × 100 = 100

CPI for 2012 = $69/$60 × 100 = 115

CPI for 2013 = $78/$60 × 100 = 130

Inflation rate for 2012 = (115 – 100)/100 × 100% = 15%

Inflation rate for 2013 = (130 – 115)/115 × 100% = 13.04%

The CPI will always equal 100 in the base year.

Base Year?

Choice of the base year does not affect the inflation rate:

Now let's use 2013 as the base year, then

CPI for 2011 =

CPI for 2012 =

CPI for 2013 =

Inflation rate for 2012 =

Inflation rate for 2013 =

Base Year?

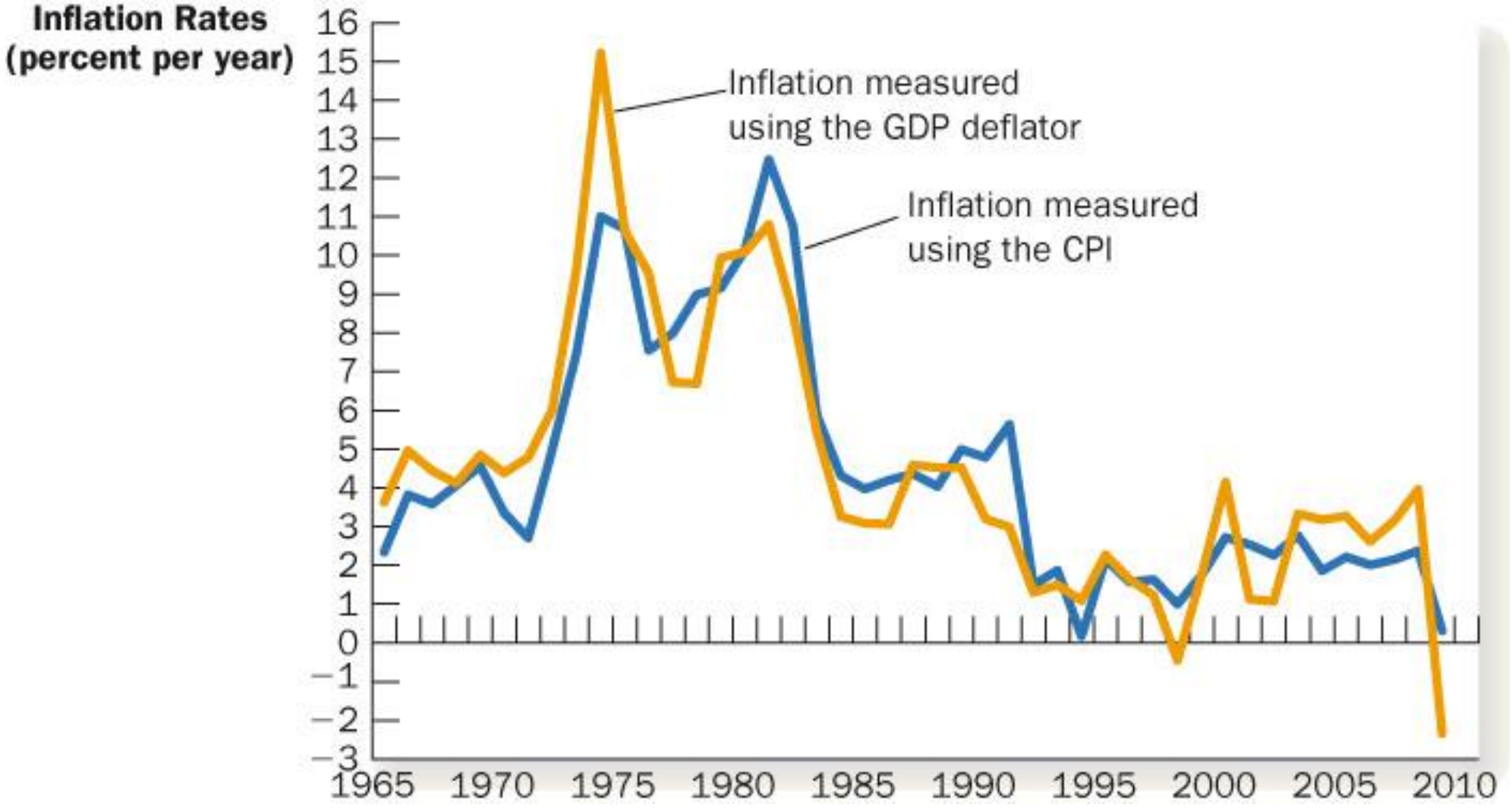
If we choose some unknown year as the base year and assume the basket's cost is $y, then

$$\text{CPI for 2011} = \frac{\$60}{\$y} \times 100, \text{ CPI for 2012} = \frac{\$69}{\$y} \times 100, \text{ and CPI for 2013} = \frac{\$78}{\$y} \times 100.$$

$$\text{Inflation rate for 2012} = \frac{\frac{\$69}{\$y} \times 100 - \frac{\$60}{\$y} \times 100}{\frac{\$60}{\$y} \times 100} \times 100\% = \frac{\$69 - \$60}{\$60} \times 100\% = 15\%.$$

$$\text{Inflation rate for 2013} = \frac{\frac{\$78}{\$y} \times 100 - \frac{\$69}{\$y} \times 100}{\frac{\$69}{\$y} \times 100} \times 100\% = \frac{\$78 - \$69}{\$69} \times 100\% = 13.04\%.$$

Two Measures of Inflation



The GDP Deflator and CPI

The GDP deflator and CPI both measure the overall price level. But they give different rates of inflation, because:

1) The GDP deflator includes goods and services produced domestically. CPI includes goods and services consumed by a typical consumer. So prices of imported goods affect CPI but not the GDP deflator.

2) The CPI uses a fixed basket of G&S. The GDP deflator uses all domestically produced G&S.

Exercise

In each scenario, determine the effects on the CPI and the GDP deflator.

1) Starbucks raises the price of Frappuccinos.

2) Canadian Machinery Corp. raises the price of its precision tools it manufactures at its Kitchener plant.

3) Armani raises the price of the Italian jeans it sells in Canada.

Problems with the CPI

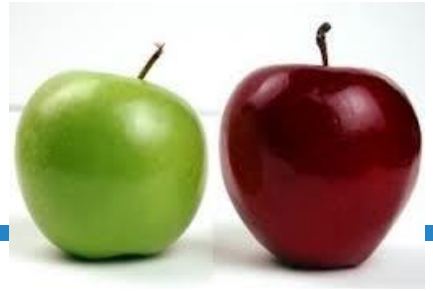
1. **Substitution bias**

When the relative price changes, consumers will substitute away from the relatively expensive good and substitute toward the relatively inexpensive good.

CPI is calculated using a fixed basket of goods and services, it does not allow for this substitution.

This implies that the CPI overstates the increase in the cost of living over time.

Substitution Bias: An Example



Problems with CPI

2. Introduction of new goods

When a new good is introduced, consumers have a wider variety of G&S to choose from, and many new G&S allow us to save time or money.

Because the CPI is based on a fixed basket of goods and services, it does not reflect the increase in the value of purchases that arises from the introduction of new goods.

As a result, CPI overstates the increase in the cost of living.

Problems with CPI

3. Unmeasured quality changes

Cell phones add immeasurable benefits to our lives.

If the quality of goods rises from one year to the next, the value of a dollar increases. Then the CPI overstates increases in the cost of living.

If the quality of goods falls from one year to the next, the value of a dollar falls. Then the CPI understates increases in the cost of living.

Translucent Lululemon pants

Correcting Economic Variables for Inflation

1. Dollar Figures from Different Times

Question: Was the 1957 gas price of 9.5 cents per litre high or low compared with 2003 price of 65 cents per litre?

CPI in 1957 = 17.6, CPI in 2003 = 122 (base year 1992)

$$\text{1957 gas price in 2003 dollars} = 9.5 \text{ cents} \times \frac{\text{(CPI in 2003)}}{\text{(CPI in 1957)}}$$

$$= 9.5 \text{ cents} \times 122/17.6$$

$$= 65.85 \text{ cents} > 65 \text{ cents}$$

So the 1957 gas price is slightly higher.

Correcting Economic Variables for Inflation

Dollar figures from different times

Alternatively, we can compare the price measured in 1957 dollars:

2003 gas price in 1957 dollars

=

So the 2003 gas price is

Exercise

1980: CPI = 90, average starting salary for econ majors = $24,000

Today: CPI = 180, average starting salary for econ majors = $50,000

Are econ majors better off today or in 1980?

Correcting Economic Variables for Inflation

2. Indexation

Indexation: the automatic correction of a dollar amount (e.g. wages) for the effects of inflation.

Examples:

There is a COLA (cost-of-living allowance) in many multi-year labor contracts, which automatically raises the wages when the CPI increases.

The CPP (Canada Pension Plan) and OAS (Old Age Security) benefits are adjusted every year to compensate the elderly for increases in prices.

3.The Real and Nominal Interest Rate

Nominal interest rate: the interest rate that measures the change in dollar amounts.

Real interest rate: the interest rate corrected for the effects of inflation.

Fisher Equation:

Real interest rate = nominal interest rate – inflation rate ➔ $r = i - \pi$

Example

Assume the nominal interest rate is 2%.

1) If the inflation rate is also 2%, then the real interest rate =

2) If the inflation rate is 0%, then the real interest rate =

3) If the inflation rate is 5%, then the real interest rate =