Principles of Economics

Discussion Session 9: The Consumer Price Index

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GDP Deflator vs CPI

- Prices tend to increase from year-to-year due to inflation.
- The **GDP deflator** helps to account for inflation in GDP comparisons.
- The **Consumer Price Index** (CPI) helps to account for inflation in cost-of-living comparisons.

$\Longrightarrow$ GDP includes everything produced in the US in a year, but

$\Longrightarrow$ CPI includes everything US consumers buy in a year.

- If the price of a Honda Civic increases, it affects _____, but not _____.
- If Caterpillar sells more excavators, if affects _____, but not _____.

Calculation of the CPI

- As with GDP deflator, choose a base year and set to 100.
- Unlike GDP deflator, select a "basket of goods" to represent the typical consumer.
  - This will stay constant year-to-year.
- Set up ratios comparing the costs of the basket and the CPIs:

$$\frac{\text{Cost base year}}{\text{Cost new year}} = \frac{\text{CPI base year}}{\text{CPI new year}}$$

Or equivalently,

$$\frac{\text{Cost base year}}{\text{CPI base year}} = \frac{\text{Cost new year}}{\text{CPI new year}}$$

- From there, we can solve for '*CPI new year*' or '*Cost new year*'

Exercise 1: CPI & Inflation Rate

The following table lists the prices of eggs and butter for the months of September, October, and November. Assume that the typical consumer buys 60 eggs and 4 sticks butter each month, and that September is the base period.

Month	Price of Eggs	Price of Butter
September	2	3.5
October	3.5	3.52
November	3.85	3.58

1. What is the consumer price index for October?
2. What is the inflation rate for November?

Exercise 1: CPI & Inflation Rate

Solution:

1. $$\frac{\text{Cost September}}{\text{Cost October}} = \frac{\text{CPI September}}{\text{CPI October}}$$

$$\frac{134}{224.08} = \frac{100}{\text{CPI October}}$$

$$\text{CPI October} = \frac{224.08}{134} \times 100 \approx 167$$

2. Find that CPI November ≈ 183 in the same way, so

$$\text{Inflation Rate November} = \frac{183 - 167}{167} \times 100\% \approx 9.5\%$$

Exercise 2: Price Index

Sue Brown was an economist in 1970 and earned $17,000 that year. Her son, Charlie Brown, is an economist today (economics is hereditary?), and he earned $210,000 in the current year. Suppose the price index was 17.6 in 1970 and 218.4 in the current year.

1. What is Sue Brown's 1970 income as converted to current-year dollars?
2. Which economist is wealthier?

Exercise 2: Price Index

Solution:

1. $$\frac{\text{Income 1970}}{\text{Income Today}} = \frac{\text{CPI 1970}}{\text{CPI Today}}$$

$$\frac{17,000}{\text{Income Today}} = \frac{17.6}{218.4}$$

$$\text{Income Today} = \frac{218.4}{17.6} \times 17,000 \approx 210,955$$

2. Sue Brown was wealthier.

Inflation and Interest

- Interest-paying assets provide year-to-year payments on some principle.
  - A 1-year \$100 US Treasury Bond paid 0.4% interest in 2022.

$\Longrightarrow$ A buyer receives \$100.40 at end of year.

- Inflation causes year-to-year devaluation of currency.
  - Inflation was 6.5% in 2022.

$\Longrightarrow$ The value of a 2022 bond changed by $0.4\% - 6.5\% = -6.1\%$ by the end of the year!

- **Nominal Interest Rate:** The advertised interest rate on the asset.
- **Real Interest Rate:** The interest rate after accounting for inflation:

$$\text{Real} = \text{Nominal} - \text{Inflation}$$

Exercise 3: Inflation Rate & Real Interest Rate

The following table shows real and nominal interest rates for three consecutive years:

Year	Real Interest Rate	Nominal Interest Rate
2017	1%	2.4%
2018	1.5%	2.5%
2019	1.3%	2.1%

Supose 2017 is the base year.

1. What was the inflation rate in 2018?
2. What was the CPI in 2018?

Exercise 3: Inflation Rate & Real Interest Rate

Solution:

1. $$\text{Real 2018} = \text{Nominal 2018} - \text{Inflation 2018}$$
$$1.5\% = 2.5\% - \text{Inflation 2018}$$
$$\text{Inflation 2018} = 1\%$$

2. $$\text{Inflation 2018} = \frac{\text{CPI 2018} - \text{CPI 2017}}{\text{CPI 2017}} \times 100\%$$
$$1\% = \frac{\text{CPI 2018} - 100}{100} \times 100\%$$
$$\text{CPI 2018} = 101$$