

24 Measuring the Cost of Living

PRINCIPLES OF ECONOMICS FOURTH EDITION

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In this chapter, look for the answers to these questions:

- What is the Consumer Price Index (CPI)? How is it calculated? What's it used for?
- What are the problems with the CPI? How serious are they?
- How does the CPI differ from the GDP deflator?
- How can we use the CPI to compare dollar amounts from different years? Why would we want to do this, anyway?
- How can we correct interest rates for inflation?

CHAPTER 24 MEASURING THE COST OF LIVING

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The Consumer Price Index (CPI)

- Measures the typical consumer's cost of living.
- The basis of cost of living adjustments (COLAs) in many contracts and in Social Security.

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How the CPI Is Calculated

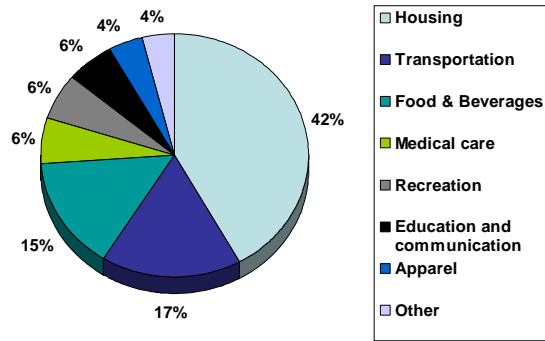
1. Fix the "basket."

The Bureau of Labor Statistics (BLS) surveys consumers to determine what's in the typical consumer's "shopping basket."

Example: {4 pizzas, 10 lattes}

In the real world...

What's in the CPI's Basket?



How the CPI Is Calculated

2. Find the prices.

The BLS collects data on the prices of all the goods in the basket.

For example:

year	price of pizza	price of latte	
2003	\$10	\$2.00	
2004	\$11	\$2.50	
2005	\$12	\$3.00	

In the real world

Every month, 400 data collectors are visiting stores, recording prices on the items in the CPI baskets such as eggs, coffee, cloths, glasses, shoes...

In total, over 85,000 price quotes flow into BLS every month.

How the CPI Is Calculated

3. Compute the basket's cost.

Use the prices to compute the total cost of the basket.

For example,

year	price of pizza	price of latte	cost of basket
2003	\$10	\$2.00	$\$10 \times 4 + \$2 \times 10 = \$60$
2004	\$11	\$2.50	$\$11 \times 4 + \$2.5 \times 10 = \$69$
2005	\$12	\$3.00	$\$12 \times 4 + \$3 \times 10 = \$78$

In the real world...

- AT BLS, around 40 commodity price specialists hunch over reports with the 85,000 price quotes gathered by data collectors, to compute and publish CPI.

How the CPI Is Calculated

4. Choose a base year and compute the index.

The CPI in any year equals

$$100 \times \frac{\text{cost of basket in current year}}{\text{cost of basket in base year}}$$

Compute CPI in each year:

2003: $100 \times (\$60/\$60) = 100$

2004: $100 \times (\$69/\$60) = 115$

2005: $100 \times (\$78/\$60) = 130$

How the CPI is Calculated

5. Compute the inflation rate.

The percentage change in the CPI from the preceding period.

$$\text{inflation rate} = \frac{\text{CPI this year} - \text{CPI last year}}{\text{CPI last year}} \times 100\%$$

In the previous example:

Inflation rate:

2003: $100 \times (\$60/\$60) = 100$

2004: $100 \times (\$69/\$60) = 115$

2005: $100 \times (\$78/\$60) = 130$

15%

13%

**ACTIVE LEARNING 1:
Calculate the CPI**

The basket contains 20 movie tickets and 10 textbooks.

The table shows their prices for 2004-2006.

The base year is 2004.

	movie tickets	text-books
2004	\$10	\$50
2005	\$10	\$60
2006	\$12	\$60

- A. How much did the basket cost in 2004?
- B. What is the CPI in 2005?
- C. What is the inflation rate from 2005-2006?

ACTIVE LEARNING 1:

Answers

The basket contains 20 movie tickets and 10 textbooks.

	movie tickets	text-books
2004	\$10	\$50
2005	\$10	\$60
2006	\$12	\$60

A. How much did the basket cost in 2004?

$$(\$10 \times 20) + (\$50 \times 10) = \$700$$

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ACTIVE LEARNING 1:

Answers

The basket contains 20 movie tickets and 10 textbooks.

	movie tickets	text-books
2004	\$10	\$50
2005	\$10	\$60
2006	\$12	\$60

B. What is the CPI in 2005?

$$\begin{aligned} \text{cost of basket in 2005} \\ = (\$10 \times 20) + (\$60 \times 10) = \$800 \end{aligned}$$

$$\text{CPI in 2005} = 100 \times (\$800/\$700) = 114.3$$

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ACTIVE LEARNING 1:

Answers

The basket contains 20 movie tickets and 10 textbooks.

	movie tickets	text-books
2004	\$10	\$50
2005	\$10	\$60
2006	\$12	\$60

C. What is the inflation rate from 2005-2006?

$$\begin{aligned} \text{cost of basket in 2006} \\ = (\$12 \times 20) + (\$60 \times 10) = \$840 \end{aligned}$$

$$\text{CPI in 2006} = 100 \times (\$840/\$700) = 120$$

$$\text{Inflation rate} = (120 - 114.3)/114.3 = 5\%$$

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Problems With the CPI:
Substitution Bias

- Over time, some prices rise faster than others.
- Consumers substitute toward goods that become relatively cheaper.
- The CPI misses this substitution because it uses a fixed basket of goods.
- Thus, the CPI overstates increases in the cost of living.

Problems With the CPI:
Introduction of New Goods

- When new goods become available, variety increases, allowing consumers to find products that more closely meet their needs.
- This has the effect of making each dollar more valuable. The purchasing power of dollars goes up.
- The CPI misses this effect because it uses a fixed basket of goods.
- Thus, the CPI overstates increases in the cost of living.

Problems With the CPI:
Unmeasured Quality Change

- Improvements in the quality of goods in the basket increase the value of each dollar.
- The BLS tries to account for quality changes, but probably misses some quality improvements, as quality is hard to measure.
- Thus, the CPI overstates increases in the cost of living.

Problems With the CPI

- Each of these problems causes the CPI to overstate cost of living increases.
- The BLS has made technical adjustments, but the CPI probably still overstates inflation by about 0.5 percent per year.

A lot of debates...

- Economists/statisticians/government argue that, due to the substitution bias, new product bias, and the quality change bias, CPI overestimates the cost of living.
- Many are against it.
- Who are they?
 - Retirees: because they receive social security adjusted for inflation based on CPI.
 - Labor Unions: because they bargain over nominal wages according to CPI.

Desperate Collectors...

Every month, 400 data collectors are visiting stores, recording prices on the items in the CPI baskets such as eggs, coffee, cloths, glasses, shoes...

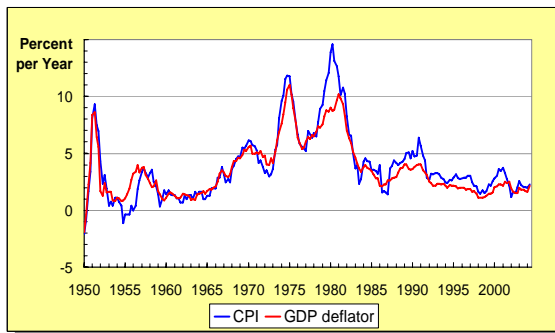
But old models keep disappearing and often they can no longer find the old model they used to have the price record. Hence, they try to find the price of the closest model.

For example, to accurately calculate the price of TVs, they go through a four-page checklist of TV features such as the screen size, type of remote controls.

Optional Homework: the student price index

- Choose five (or more) different products that you purchase most frequently.
 - be specific e.g., unleaded gasoline, Budweiser beer
- 2. Pick a quantity for each product. This will be your market basket.
 - e.g., 15 gallons gasoline, 12 pack of Budweiser
- 3. Find the actual price for each product (I want to see the receipts).
- 4. Calculate the total cost of buying these products for January, February, and March.
- 5. Calculate the inflation rate based on the SPI.

Two Measures of Inflation



Contrasting the CPI and GDP Deflator

Imported consumer goods:

- included in CPI
- excluded from GDP deflator

Capital goods:

- excluded from CPI
- included in GDP deflator (if produced domestically)

The basket:

- CPI uses fixed basket
- GDP deflator uses basket of currently produced goods & services

This matters if different prices are changing by different amounts.

**ACTIVE LEARNING 2:
CPI vs. GDP deflator**

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

- A. Starbucks raises the price of Frappuccinos.
- B. The price of the industrial tractors is raised at an Illinois factory.
- C. Armani raises the price of the Italian jeans it sells in the U.S.

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Correcting Variables for Inflation:

Comparing Dollar Figures from Different Times

- Due to inflation, dollars have different purchasing powers at different times.
- The purpose of measuring the overall level of price in the economy is to permit comparison between dollar figures from different times.
- We can use the CPI to adjust figures so that they can be compared.

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EXAMPLE: The High Price of Gasoline

- Price of a gallon of regular unleaded gas:
 - \$1.42 in March 1981
 - \$2.50 in August 2005
- One dollar in 1981 is not the same as one dollar in 2005.
- What is the 1981 price of regular unleaded gas in 2005 dollars?

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EXAMPLE: The High Price of Gasoline

date	Price of gas	CPI	Gas price in 2005 dollars
3/1981	\$1.42/gallon	88.5	\$3.15/gallon
8/2005	\$2.50/gallon	196.4	\$2.50/gallon

- 1981 gas price in 2005 dollars
= $\$1.42 \times 196.4/88.5$
= **\$3.15**
- After correcting for inflation, gas was more expensive in 1981.

**ACTIVE LEARNING 3:
Exercise**

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

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

Are econ majors better off today or in 1980?

**ACTIVE LEARNING 3:
Answers**

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

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

Solution

Convert 1980 salary into "today's dollars"

$\$24,000 \times (180/90) = \mathbf{\$48,000}$.

After adjusting for inflation, salary is higher today than in 1980.

**Correcting Variables for Inflation:
Indexation**

A dollar amount is *indexed* for inflation if it is automatically corrected for inflation by law or in a contract.

For example, the increase in the CPI automatically determines

- the COLA in many multi-year labor contracts
- the adjustments in Social Security payments and the brackets of the federal income tax.

Interest rate

- Dollars value differently at different points of time, because
1. Price is changing so that the same amount of money has different purchasing power;
 2. Holding price constant, they can create more purchasing power in addition to the one they already represent.

We receive interest by depositing money in a bank;

We pay interest by borrowing from a bank.

Hence...

- Interest rate measures the growth rate of the purchasing power of money.
- However, while the purchasing power of money grows, the price grows over time as well!

Suppose the interest rate is 3% and the inflation rate is also 3%.

Would you get more money by depositing \$100?

Would you get more purchasing power?

**Correcting Variables for Inflation:
Real vs. Nominal Interest Rates**

The nominal interest rate:

- the interest rate not corrected for inflation
- the rate of growth in the dollar value of a deposit or debt

The real interest rate:

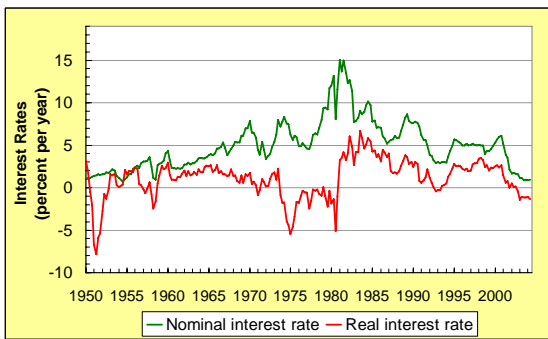
- corrected for inflation
- the rate of growth in the purchasing power of a deposit or debt

Real interest rate
= (nominal interest rate) – (inflation rate)

**Real and Nominal Interest Rates:
EXAMPLE**

- Deposit \$1,000 for one year.
- Nominal interest rate is 9%.
- During that year, inflation is 3.5%.
- Real interest rate
= Nominal interest rate – Inflation
= 9.0% – 3.5% = **5.5%**
- The purchasing power of the \$1000 deposit has grown 5.5%.

Real and Nominal Interest Rates in the U.S.



CHAPTER SUMMARY

- The Consumer Price Index is a measure of the cost of living. The CPI tracks the cost of the typical consumer's "basket" of goods & services.
- The CPI is used to make Cost of Living Adjustments, and to correct economic variables for the effects of inflation.
- The real interest rate is corrected for inflation, and is computed by subtracting the inflation rate from the nominal interest rate.
