Measuring the Cost of Living

- **Inflation** refers to a situation in which the economy’s overall price level is rising.
- The inflation rate is the percentage change in the price level from the previous period.
- One of those key macroeconomic variables guiding the economy.

THE CONSUMER PRICE INDEX

- The consumer price index (CPI) is a measure of the overall cost of the goods and services bought by a typical consumer.
- It is used to monitor changes in the cost of living over time.
- Very similar to the GDP deflator.
- Five steps that the Bureau Labor of Statistics (BLS) follow:

How the Consumer Price Index Is Calculated

- **Fix the Basket**: Determine what prices are most important to the typical consumer.
  - The Bureau of Labor Statistics (BLS) identifies a market basket of goods and services the typical consumer buys.
  - One of the key differences between GDP deflator and CPI.
How the Consumer Price Index Is Calculated

• Find the Prices: Find the prices of each of the goods and services in the basket for each point in time.

• Compute the Basket’s Cost: Use the data on prices to calculate the cost of the basket of goods and services at different times.

How the Consumer Price Index Is Calculated

• Choose a Base Year and Compute the Index:
  • Designate one year as the base year, making it the benchmark against which other years are compared.
  • Compute the index by dividing the price of the basket in one year by the price in the base year and multiplying by 100.
  • GDP deflator and CPI both use a base year.

How the Consumer Price Index Is Calculated

• Compute the inflation rate: The inflation rate is the percentage change in the price index from the preceding period.

How the Consumer Price Index Is Calculated

• The Inflation Rate
  • The inflation rate is calculated as follows:

\[
\text{Inflation Rate in Year 2} = \frac{\text{CPI in Year 2} - \text{CPI in Year 1}}{\text{CPI in Year 1}} \times 100
\]
Table 1: Calculating the Consumer Price Index and the Inflation Rate: An Example. Going through the 5 steps.

Step 1: Survey Consumers to Determine a Fixed Basket of Goods

- 4 hot dogs, 2 hamburgers

Step 2: Find the Price of Each Good in Each Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Price of Hot Dogs</th>
<th>Price of Hamburgers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>$1</td>
<td>$2</td>
</tr>
<tr>
<td>2002</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2003</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Step 3: Compute the Cost of the Basket of Goods in Each Year

<table>
<thead>
<tr>
<th>Year</th>
<th>(Price of Hot Dogs × Number of Hot Dogs) + (Price of Hamburgers × Number of Hamburgers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>$8</td>
</tr>
<tr>
<td>2002</td>
<td>$14</td>
</tr>
<tr>
<td>2003</td>
<td>$20</td>
</tr>
</tbody>
</table>

Step 4: Choose One Year as a Base Year (2001) and Compute the Consumer Price Index in Each Year

<table>
<thead>
<tr>
<th>Year</th>
<th>((Cost in Year - Cost in Base Year) / Cost in Base Year) × 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>(100 - 100) / 100 × 100 = 0%</td>
</tr>
<tr>
<td>2002</td>
<td>(175 - 100) / 100 × 100 = 75%</td>
</tr>
<tr>
<td>2003</td>
<td>(250 - 175) / 175 × 100 = 43%</td>
</tr>
</tbody>
</table>

Step 5: Use the Consumer Price Index to Compute the Inflation Rate from Previous Year

<table>
<thead>
<tr>
<th>Year</th>
<th>((Cost in Year - Cost in Previous Year) / Cost in Previous Year) × 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>(175 - 100) / 100 × 100 = 75%</td>
</tr>
<tr>
<td>2003</td>
<td>(250 - 175) / 175 × 100 = 43%</td>
</tr>
</tbody>
</table>

FYI: What’s in the CPI’s Basket? BLS attempts to include all the goods and services that the typical consumers buys.

- Food and beverages: 16%
- Transportation: 17%
- Housing: 41%
- Education and communication: 6%
- Medical care: 6%
- Recreation: 4%
- Apparel: 4%
- Other goods and services: 4%

Problems in Measuring the Cost of Living

- The CPI is an accurate measure of the selected goods that make up the typical bundle, but it is not a perfect measure of the cost of living.
- Why?
  - Substitution bias
  - Introduction of new goods
  - Unmeasured quality changes
Problems in Measuring the Cost of Living

- **Substitution Bias**
  - The basket does not change to reflect consumer reaction to changes in relative prices.
  - Consumers substitute toward goods that have become relatively less expensive. For example, if apples rise high enough, consumers will switch to kiwi. CPI doesn’t account the switch.
  - As a result, the index overstates the increase in cost of living by not considering consumer substitution.

- **Introduction of New Goods**
  - The basket does not reflect the change in purchasing power brought on by the introduction of new products.
  - Eventually, it will become a part of the CPI, but it may take some time. For example, a computer eventually became a part of the CPI in the 80s. Before that, not part of the CPI.

- **Unmeasured Quality Changes**
  - The quality of a good rise or fall from one year to the next.
  - The BLS measures quality at a constant rate, not changing from one year to the next. This type of change difficult to measure.

- **The substitution bias, introduction of new goods, and unmeasured quality changes cause the CPI to overstate the true cost of living.**
  - The CPI overstates inflation by about 1 percentage point per year.
Economists and policymakers monitor both the GDP deflator and the consumer price index to gauge how quickly prices are rising. There are important differences between the indexes that can cause them to diverge.

How can CPI diverge from GDP Deflator? Look at definitions…

The GDP deflator reflects the prices of all goods and services produced domestically, whereas…

…the consumer price index reflects the prices of all goods and services bought by consumers.

The consumer price index compares the price of a fixed basket of goods and services to the price of the basket in the base year (only occasionally does the BLS change the basket)…

…whereas the GDP deflator compares the price of currently produced goods and services to the price of the same goods and services in the base year.

Figure 2 Two Measures of Inflation. As discussed earlier, in general CPI slightly overstated as expected.
**CORRECTING ECONOMIC VARIABLES FOR THE EFFECTS OF INFLATION**

- Price indexes are used to correct for the effects of inflation when comparing dollar figures from different times. Two examples: Babe Ruth’s salary and Popular Movies.
- When some dollar amount is automatically corrected for inflation by law or contract, the amount is said to be indexed for inflation. (Amgen example)

**Real and Nominal Interest Rates**

- The *nominal interest* rate is the interest rate usually reported and not corrected for inflation.
  - It is the interest rate that a bank pays.
- The *real interest rate* is the nominal interest rate that is corrected for the effects of inflation.

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**Real and Nominal Interest Rates**

- You invest $1,000 for one year (Certificate of deposit: CD).
- Nominal interest rate was 15%.
- During the year inflation was 10%.

\[
\text{Real interest rate} = \text{Nominal interest rate} - \text{Inflation}
\]

\[
= 15\% - 10\% = 5\%
\]
- What if nominal IR is 5% and inflation is 4%?
- What is the real IR?

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**Summary**

- The consumer price index is used to measure the overall level of prices in the economy.
- The percentage change in the CPI measures the inflation rate.
- The consumer price index is an imperfect measure of the cost of living for the following three reasons: substitution bias, the introduction of new goods, and unmeasured changes in quality.
Summary

- **Very important point:** The GDP deflator includes goods and services produced domestically while CPI focuses on goods and services consumed.
- **Another key point:** CPI uses a fixed basket of goods, while the GDP deflator automatically changes the group of goods and services over time as the composition of GDP changes.
- **Last key point:** The real interest rate equals the nominal interest rate minus the rate of inflation.

Production and Growth

- In the United States over the past century, average income as measured by real GDP per person has grown by about 2 percent per year.
- GDP is a decent gauge of economic prosperity.
- GDP growth is a good gauge of economic progress.
- Chap 12:
  - Start off with international data on real GDP.
  - Next, look at productivity.
  - Finally, link between productivity and economic policies.

Table 1 The Variety of Growth Experiences

<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>Real GDP per Person at Beginning of Period</th>
<th>Real GDP per Person at End of Period</th>
<th>Growth Rate (per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>1995-2003</td>
<td>$1,280</td>
<td>$28,620</td>
<td>2.79%</td>
</tr>
<tr>
<td>Brazil</td>
<td>1900-2003</td>
<td>663</td>
<td>7,480</td>
<td>2.38</td>
</tr>
<tr>
<td>Mexico</td>
<td>1900-2003</td>
<td>987</td>
<td>8,950</td>
<td>2.16</td>
</tr>
<tr>
<td>China</td>
<td>1900-2003</td>
<td>610</td>
<td>4,990</td>
<td>2.06</td>
</tr>
<tr>
<td>Germany</td>
<td>1870-2003</td>
<td>1,859</td>
<td>27,440</td>
<td>2.05</td>
</tr>
<tr>
<td>Canada</td>
<td>1970-2003</td>
<td>4,002</td>
<td>27,740</td>
<td>2.04</td>
</tr>
<tr>
<td>United States</td>
<td>1870-2003</td>
<td>3,413</td>
<td>37,500</td>
<td>1.82</td>
</tr>
<tr>
<td>Argentina</td>
<td>1900-2003</td>
<td>1,952</td>
<td>10,920</td>
<td>1.69</td>
</tr>
<tr>
<td>India</td>
<td>1900-2003</td>
<td>573</td>
<td>7,860</td>
<td>1.58</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1970-2003</td>
<td>4,094</td>
<td>27,850</td>
<td>1.45</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1900-2003</td>
<td>709</td>
<td>3,210</td>
<td>1.41</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1900-2003</td>
<td>629</td>
<td>2,040</td>
<td>1.16</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1900-2003</td>
<td>531</td>
<td>1,870</td>
<td>1.16</td>
</tr>
</tbody>
</table>

*Real GDP is measured in 2003 dollars.*
Living standards, as measured by real GDP per person, vary significantly among nations.

What is a higher standard of living?

- Better quality of life: life expectancy, healthcare...
- Literacy, housing, so forth...

This is not guarantee the rich will stay rich and poor will stay poor (i.e. United Kingdom at the beginning of the century).

Productivity plays a key role in determining living standards for all nations in the world.

Why is productivity so important?

- Productivity refers to the amount of goods and services that a worker can produce from each hour of work.
- To understand the large differences in living standards across countries, we must focus on the production of goods and services.

How Productivity Is Determined

- The Factors of Production (Know these four determinants of productivity).
  - Physical capital
  - Human capital
  - Natural resources
  - Technological knowledge

Physical Capital

- is a produced factor of production.
  - It is an input into the production process that in the past was an output from the production process.
  - is the stock of equipment and structures that are used to produce goods and services.
  - Tools used to build or repair automobiles.
  - Tools used to build furniture.
  - Office buildings, schools, etc.
How Productivity Is Determined

- **Human Capital**
  - the economist’s term for the knowledge and skills that workers acquire through education, training, and experience
  - Like physical capital, human capital raises a nation’s ability to produce goods and services.

- **Natural Resources**
  - inputs used in production that are provided by nature, such as land, rivers, and mineral deposits.
  - Renewable resources include trees and forests.
  - Nonrenewable resources include petroleum and coal.
  - Can be important but are not necessary for an economy to be highly productive in producing goods and services.
  - Helpful to have natural resources, but not absolutely necessary (i.e., Japan).

How Productivity Is Determined

- **Technological Knowledge**
  - society’s understanding of the best ways to produce goods and services.

FYI: The Production Function

- \( Y = A F(L, K, H, N) \)
  - \( Y \) = quantity of output
  - \( A \) = available production technology. More of an amplifier and the reason its outside the function. \( L, K, H, N \) interact with each other.
  - \( L \) = quantity of labor
  - \( K \) = quantity of physical capital
  - \( H \) = quantity of human capital
  - \( N \) = quantity of natural resources
  - \( F() \) is a function that shows how the inputs are combined.
How can government policy get involved to raise productivity and living standards?
• Encourage saving and investment.
• Encourage investment from abroad
• Encourage education and training.
• Establish secure property rights and maintain political stability.
• Promote free trade.
• Promote research and development.
• P. 249-262, more of FYI than anything.

Economic prosperity, as measured by real GDP per person, varies substantially around the world.
The standard of living in an economy depends on the economy’s ability to produce goods and services.

Productivity depends on the amounts of physical capital, human capital, natural resources, and technological knowledge available to workers.
Government policies can influence the economy’s growth rate in many different ways.
Any questions???