THE PRICE LEVEL

PLEASE HELP!
(NO U.S. CURRENCY PLEASE)
Price level

Price Level

– A macroeconomic indicator describing the average prices of goods & services in the economy.

Common Measurements

– Consumer Price Index (CPI)
  • Average price level for a basket of goods & services purchased by US households.

– Producer Price Index (PPI)
  • Average price level for goods purchased at all stages of production.

– GDP Deflator
  • Average price level for all goods & services purchased in the US economy.
Measuring the Price Level

Consumer Price Index (CPI)

- Bureau of Labor Statistics (BLS)
- “Cost of Living Index”
- Compiled monthly
- “Market Basket”
- Surveys 14,000 households
- 8 Categories
- > 200 Goods & Services
- Visits > 23,000 stores in 87 cities
- 1982-1984 base year

Core CPI
Excludes volatile Food & energy prices

- Housing 41.5%
- Food and beverages 14.8%
- Transportation 17.3%
- Apparel 3.6%
- Medical care 6.6%
- Recreation 6.3%
- Education and communication 6.4%
- Other goods and services 3.5%
Measuring the Price Level

Calculating a Price Index (e.g. CPI)

Step 1: Calculate expenditures for market basket for each period.

Step 2: Establish “Base Period”. *(Benchmark for inter-temporal comparison purposes).*

Step 3: Calculate index for each period using the formula:

\[ \text{CPI} = \left( \frac{\text{Expenditures in the current period}}{\text{Expenditures in the base period}} \right) \times 100 \]

Assume a Typical household buys

- 24 loaves of bread per month
- 12 gallons of milk per month

<table>
<thead>
<tr>
<th>Period</th>
<th>Price of Bread</th>
<th>Price of Milk</th>
<th>Expenditures for market basket</th>
<th>CPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>1.00</td>
<td>2.00</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Feb</td>
<td>1.15</td>
<td>2.10</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Mar</td>
<td>1.40</td>
<td>2.20</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>
Producet Price Index (PPI)

- Bureau of Labor Statistics (BLS)
- Compiled monthly
- Market Basket of final and intermediate goods
- Can function as a leading indicator of changes in the CPI
- Same formula as CPI:

$$\text{PPI} = \frac{\text{Expenditures in the current period}}{\text{Expenditures in the base period}} \times 100$$
Measuring the Price Level

**GDP Deflator**
- Bureau of Economic Analysis (BEA)
- Compiled Quarterly
- Base year: 2005
- Same formula as CPI & PPI

\[
\text{GDP Deflator} = \frac{\text{Expenditures in the current period}}{\text{Expenditures in the base period}} \times 100
\]

<table>
<thead>
<tr>
<th>Period</th>
<th>Real GDP</th>
<th>Nominal GDP</th>
<th>GDP Deflator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base year prices</td>
<td>Current year prices</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>15,000</td>
<td>15,000</td>
<td>?</td>
</tr>
<tr>
<td>2006</td>
<td>15,000</td>
<td>16,000</td>
<td>?</td>
</tr>
<tr>
<td>2007</td>
<td>15,000</td>
<td>17,000</td>
<td>?</td>
</tr>
<tr>
<td>2008</td>
<td>15,000</td>
<td>18,000</td>
<td>?</td>
</tr>
</tbody>
</table>

**Side Note:**
*Personal Consumption Expenditures (PCE): Similar to CPI but uses consumption portion of GDP as market basket.*
Issues with CPI Calculations

• **Substitution Bias**
  – “Market basket” stays fixed.
  – Households substitute cheaper goods for more expensive ones in their own baskets.
  – Overstates true inflation.
  – BLS also compiles a chain-weighted index that adjusts market basket every month to account for this issue.

• **Quality Bias**
  – May inaccurately record price increases or decreases when quality of product has changed.
  – BLS uses quality adjustments (hedonics) to mitigate problem.

• **New Product Bias**
  – New and cheaper goods may not be included yet may be widely used by households.
  – BLS now updates basket every 2 years.

• **Outlet Bias**
  – BLS considers prices at retail stores only.
  – BLS now use a point-of-purchase survey to track preferred location of consumer purchases.

• Accounting for all issues and BLS adjustments 0.5%-1% annual error is estimated.
### Measuring & Identifying Price Level Changes Across Time

\[
\text{% Change in Price Level} = \frac{\text{Later Year Index} - \text{Earlier Year Index}}{\text{Earlier Year Index}} \times 100
\]

<table>
<thead>
<tr>
<th>Period</th>
<th>CPI, PPI, or GDP Deflator</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>100</td>
</tr>
<tr>
<td>2003</td>
<td>110</td>
</tr>
<tr>
<td>2004</td>
<td>125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Periods</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-2003</td>
<td>?</td>
</tr>
<tr>
<td>2002-2004</td>
<td>?</td>
</tr>
<tr>
<td>2003-2004</td>
<td>?</td>
</tr>
</tbody>
</table>

- **Inflation**
  - An increase in the average price level.

- **Deflation**
  - A decrease in the average price level.

- **Disinflation**
  - A decrease in the rate of inflation.

- **Stagflation**
  - Inflation coupled with a contraction in GDP.

- **Hyperinflation**
  - Uncontrollably high inflation rate. Sometimes exceeding 100% per year.
The Standard & Poor’s/Case-Schiller Home Price Index is one of the leading indicators of housing price trends in the United States. The base year for the index is January 2000. The following table lists index numbers for December 2007 and December 2008 for five cities.

<table>
<thead>
<tr>
<th>City</th>
<th>December 2007</th>
<th>December 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>202.1</td>
<td>183.6</td>
</tr>
<tr>
<td>Miami</td>
<td>231.7</td>
<td>165.0</td>
</tr>
<tr>
<td>Phoenix</td>
<td>187.7</td>
<td>123.9</td>
</tr>
<tr>
<td>Dallas</td>
<td>120.8</td>
<td>115.6</td>
</tr>
<tr>
<td>San Diego</td>
<td>202.5</td>
<td>152.2</td>
</tr>
</tbody>
</table>

Application

Consider a simple economy that produces only three products: Haircuts, Hamburgers, and DVDs. Use the information in the following table to calculate the CPI for each year and then determine the percentage changes in the price level for 2009-2010.

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
<th>1999 (Base Year)</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haircuts</td>
<td>2</td>
<td>10.00</td>
<td>11.00</td>
<td>16.20</td>
</tr>
<tr>
<td>Hamburgers</td>
<td>10</td>
<td>2.00</td>
<td>2.45</td>
<td>2.40</td>
</tr>
<tr>
<td>DVDs</td>
<td>6</td>
<td>15.00</td>
<td>15.00</td>
<td>14.00</td>
</tr>
</tbody>
</table>

The Standard & Poor’s/Case-Schiller Home Price Index is one of the leading indicators of housing price trends in the United States. The base year for the index is January 2000. The following table lists index numbers for December 2007 and December 2008 for five cities.

- Calculate the percentage change in housing prices from December 2007 to December 2008 for San Diego & New York
- Can you determine on the basis of these numbers which city had the most expensive homes in December 2008?
1. What is the base year for the CPI?
2. What is the base year for the GDP D.?
3. What was the change in the PL from 1983-2010 based on the CPI?
4. What was the change in the PL from 1994-2010 based on the GDP deflator?
5. What type of PL change is most common across time?

April 2014 annualized CPI increase = 3.6%
Inflationary Trends
Inflation Across Economies: 2006-2012

- For Canada, Germany, Switzerland, and the U.S. the annual inflation rates were below 4% -and- variations (year to year) were no more than 1 or 2%.
- In contrast, both the annual inflation rate and the change between years was much greater for Bolivia, Iceland, Russia, and Venezuela.
- High rates of inflation are almost always associated with substantial year-to-year swings in the inflation rate.

### Annual Inflation Rates

<table>
<thead>
<tr>
<th>Low Inflation (%)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>2.0</td>
<td>2.1</td>
<td>2.4</td>
<td>0.3</td>
<td>1.8</td>
<td>2.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Germany</td>
<td>1.8</td>
<td>2.3</td>
<td>2.6</td>
<td>0.3</td>
<td>1.1</td>
<td>2.1</td>
<td>2.0</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1.1</td>
<td>0.7</td>
<td>2.4</td>
<td>-0.5</td>
<td>0.7</td>
<td>0.2</td>
<td>-0.7</td>
</tr>
<tr>
<td>United States</td>
<td>3.2</td>
<td>2.9</td>
<td>3.8</td>
<td>-0.4</td>
<td>1.6</td>
<td>3.2</td>
<td>2.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High Inflation (%)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia</td>
<td>6.6</td>
<td>4.8</td>
<td>7.8</td>
<td>5.6</td>
<td>6.1</td>
<td>5.8</td>
<td>3.3</td>
</tr>
<tr>
<td>Iceland</td>
<td>6.7</td>
<td>5.1</td>
<td>12.7</td>
<td>12.0</td>
<td>5.4</td>
<td>4.0</td>
<td>5.2</td>
</tr>
<tr>
<td>Russia</td>
<td>9.7</td>
<td>9.0</td>
<td>14.1</td>
<td>11.7</td>
<td>6.9</td>
<td>8.4</td>
<td>5.0</td>
</tr>
<tr>
<td>Venezuela</td>
<td>13.7</td>
<td>18.7</td>
<td>31.4</td>
<td>28.6</td>
<td>29.1</td>
<td>27.2</td>
<td>21.1</td>
</tr>
</tbody>
</table>

Source: International Monetary Fund; [http://www.IMF.org](http://www.IMF.org)
1. Babe Ruth made $80,000 in 1932, how much would that be equivalent to today? (1932 CPI = 13, 2010 CPI = 216)

2. One dollar today would be worth how much in 1914? (1914 CPI = 9.9, 2010 CPI = 216)

3. Nominal GDP was approximately was $12,638 in 2005, how much would that be equivalent to in 2000? (Deflator 2005 = 92, Deflator in 2000 = 81.9)

CPI Inflation Calculator
Application:

1. In 1924, the famous novelist F. Scott Fitzgerald wrote an article for the Saturday Evening Post entitled “How to live on $36,000 a year”. In it he considered how he and his wife had managed to spend all of that very high income without saving any of it. The CPI in 1924 was 17 and the CPI in 2008 was 215. What income would you have needed in 2008 to have had the same purchasing power that Fitzgerald’s $36,000 had in 1924? Be sure to show your calculation.

2. The following table lists the top five highest grossing films in order of nominal box office receipts. Assuming that each film generated all of its revenue during the year it was released and using the corresponding CPI data, convert the nominal receipts into 2008 dollars and relist the movies in order from highest to lowest grossing films.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Film</th>
<th>Total Box Office Receipts</th>
<th>Year Released</th>
<th>CPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Titanic</td>
<td>$600,779,824</td>
<td>1997</td>
<td>161</td>
</tr>
<tr>
<td>2</td>
<td>The Dark Knight</td>
<td>$533,316,061</td>
<td>2008</td>
<td>215</td>
</tr>
<tr>
<td>3</td>
<td>Star Wars</td>
<td>$460,935,655</td>
<td>1977</td>
<td>61</td>
</tr>
<tr>
<td>4</td>
<td>Shrek 2</td>
<td>$436,471,036</td>
<td>2004</td>
<td>189</td>
</tr>
<tr>
<td>5</td>
<td>E.T.</td>
<td>$431,065,444</td>
<td>1982</td>
<td>97</td>
</tr>
</tbody>
</table>
Nominal vs. Real Interest Rates

- Nominal Interest Rate: stated rate on a loan.
- Real Interest Rate: stated rate adjusted for inflation.
- Nominal Rate – Inflation Rate = Real Rate
Consequences of Inflation

- **Purchasing power of the dollar decreases.**
- **Inflation impacts both product and resource prices.**
  - For the economy as a whole, income increases with the price level; however, for specific individuals, income may change disproportionately to the price level.
- **Anticipated inflation has minimal consequences**
  - Steady and predictable inflation
  - Inflation incorporated into financial decisions.
    - Property owners, workers, lenders, and investors factor in inflation into transactions.
  - Costs
    - **Menu Costs**: costs incurred to update menu and marketing materials.
    - **Shoe-Leather Costs**: costs associated with minimizing dollar holdings.
    - Higher taxes on nominal returns.
- **Unanticipated inflation has large consequences**
  - Erratic and unpredictable
  - Inflation not incorporated into financial decisions.
  - Costs
    - When extreme the pricing system breaks down, reducing GDP and increasing unemployment.