1 GDP and Income-Expenditure Calculations
Abel, Bernanke, and Croushore (ABC) Ch. 2 NP #3

ABC Computer Company has a $20,000,000 factory in Silicon Valley. During the current year ABC builds $2,000,000 worth of computer components. ABC’s costs are labor, $1,000,000; interest on debt, $100,000; and taxes, $200,000.

ABC sells all its output to XYZ Supercomputer. Using ABC’s components, XYZ builds four supercomputers at a cost of $800,000 each ($500,000 worth of components, $200,000 in labor costs, and $100,000 in taxes per computer). XYZ has a $30,000,000 factory.

XYZ sells three of the supercomputers for $1,000,000 each. At year’s end, it has not sold the fourth. The unsold computer is carried on XYZ’s books as an $800,000 increase in inventory.

a. Calculate the contributions to GDP of these transactions, showing that all three approaches give the same answer.

b. Repeat part (a), but now assume that, in addition to its other costs, ABC paid $500,000 for imported computer chips.

2 Measuring Inflation
ABC Ch. 2 NP #9

The GDP deflator in Econland is 200 on January 1, 2011. The deflator rises to 242 by January 1, 2013, and to 266.2 by January 1, 2014.

a. What is the annual rate of inflation over the two-year period between January 1, 2011, and January 1, 2013? In other words, what constant yearly rate of inflation would lead to the price rise observed over those two years?

b. What is the annual rate of inflation over the three-year period from January 1, 2011 to January 1, 2014?

c. In general, if \( P_0 \) is the price level at the beginning of an \( n \)–year period, and \( P_n \) is the price level at the end of that period, show that the annual rate of inflation \( \pi \) over that period satisfies the equation

\[
(1 + \pi)^n = P_n / P_0
\]
The following data give real GDP, \( Y \), capital, \( K \), and labor, \( N \), for the U.S. economy in various years. Units and sources are the same as in Table 3.1. Assume that the production function is \( Y = AK^{0.3}N^{0.7} \).

<table>
<thead>
<tr>
<th>Year</th>
<th>( Y )</th>
<th>( K )</th>
<th>( N )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>2829</td>
<td>3212</td>
<td>66</td>
</tr>
<tr>
<td>1970</td>
<td>4266</td>
<td>4802</td>
<td>79</td>
</tr>
<tr>
<td>1980</td>
<td>5834</td>
<td>6919</td>
<td>99</td>
</tr>
<tr>
<td>1990</td>
<td>8027</td>
<td>9246</td>
<td>119</td>
</tr>
<tr>
<td>2000</td>
<td>11216</td>
<td>12327</td>
<td>137</td>
</tr>
<tr>
<td>2010</td>
<td>13063</td>
<td>14769</td>
<td>139</td>
</tr>
</tbody>
</table>


b. What happened to the marginal product of labor between 1960 and 2010? Calculate the marginal product numerically as the extra output gained by adding 1 million workers in each of the two years. (The data for employment, \( N \), are measured in millions of workers, so an increase of 1 million workers is an increase of 1.0).

4 GDP Measurement Issues

a. Before the fall of communism, the economies of the Soviet Union were centrally planned. One aspect of central planning is that most prices are set by the government.... What problem does government control over prices create for economists attempting to measure a country’s GDP? Suggest a strategy for dealing with this problem.

b. In very poor, agricultural countries, many people grow their own food, make their own clothes, and provide services for one another within a family or village group. Official GDP estimates for these countries are often very low, perhaps just a few hundred dollars per person. Some economists have argued that the official GDP figures underestimate the nations’ actual GDPs. Why might this be so? Again, can you suggest a strategy for dealing with this measurement problem?