Problem Set 1 (ungraded)

The problem set is “not graded.” We will look it over to make sure you did the problems adequately, but they will not be corrected. The answers will be given on a posted answer sheet. The problem set is primarily designed to ensure that you keep up with the work and understand the major concepts. *Each test will definitely use one of the problems from either graded or non-graded problem sets.*

Please read the rules on “Rules on problem set joint work” in the folder “Problems.”

1. There are three major statistical agencies of the US government: the Bureau of Economic Analysis, the Bureau of Labor Statistics, and the Census Bureau. This question is designed to help familiarize you with some of these data sources.

   a. Go to the BEA website (www.bea.gov), and click the following links: “Gross Domestic Product,” “Interactive Tables: GDP and the National Income and Product Account (NIPA) Historical Tables,” and “Begin using the data...” Take a moment to examine the data that are available through this page. Use table 1.1.1 to get data on quarters since 2007 (use “options” to change the date range). In which quarters did the US experience a decline in Real GDP? In which quarter was this decline the greatest?

   b. According to the NBER definition, a recession begins at the peak of the business cycle and ends at the trough. Using table 1.1.3., which quarters (since 2000) had the highest Real GDP levels? Which had the lowest levels? That is, identify the local peaks and troughs since 2000 (Hint: there are two local peaks and two local troughs). Go to the NBER business cycle website (www.nber.org/cycles/cyclesmain.html). Do your peak and trough dates correspond to those of the NBER? (Extra Credit: Any guesses as to why they might differ?)

   c. Go to the BLS website (www.bls.gov), and click “Subject Areas.” Take a moment to look at the data available from this page. Click “Consumer Price Index,” and under “CPI databases,” click the “Top Picks” of “All Urban Consumers.” First, retrieve data from “U.S. All items,” and format the data to be shown as monthly percent changes. In which months since 2007 did the US economy experience deflation, according to the CPI?

   d. One criticism of the CPI is that it includes items with very volatile prices, such as food and energy items, and including such items produces a volatile inflation rate. Therefore, economists also look at “All items less food and energy,” which is also known as “Core CPI.” In which months since 2007 did the US economy experience deflation according to this measure?
e. (Extra Credit) In determining monetary policy, the Federal Reserve focuses on “core” measures of inflation. Why do you think this is? [We have not discussed this, so use your judgment.]

2. Consider the following actual data on computer and non-computer prices and quantities:

<table>
<thead>
<tr>
<th>Sector</th>
<th>Output (billions 2005$)</th>
<th>Price (2005 = 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1958</td>
<td>2010</td>
</tr>
<tr>
<td>Computers</td>
<td>0.00000153</td>
<td>179.46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>745479.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>62.17</td>
</tr>
<tr>
<td>Non-computers</td>
<td>2,575.4</td>
<td>12,908.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.181</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.118</td>
</tr>
</tbody>
</table>

a. Calculate the Laspeyres and Paasche quantity indexes for GDP in each period. Calculate the Fisher index for output growth between the two periods.

b. In part (a) you used indexes to calculate the overall level of output. How would you define Laspeyres and Paasche price indexes for the overall price level?

c. Calculate the Laspeyres and Paasche price indexes for each period from the same data above. Calculate the Fisher index for inflation between the two periods.

3. Suppose output in the Japanese economy is given by a Cobb-Douglas production function with three inputs: K is capital (number of machines), L is labor (number of workers), and T is land or “terra.” The production function is:

\[
Y = T^{-1} K^2 L^7
\]

Assume that initially the levels of T, K, and L are fixed and that wages, capital rentals, and land rents are determined competitively.

a. Derive expressions for competitive wages, capital rentals, and land rents.

b. What share of total income is paid to workers? What is the share paid to capital owners? What is the share paid to land owners? Derive one of these using the appropriate math.

c. Suppose a terrible tsunami destroys ½ of Japan’s land. How does this affect wages, capital rentals, and land rents? How does this affect income shares of each factor?

d. Suppose the Japanese government decided to invest in capital infrastructure to bring output back to the pre-tsunami level. How much capital would be needed? Calculate the new shares of the three factors. Calculate the relative changes in the factor prices.