ECON 121
Principles of Macroeconomics

Problem Set 2
Solutions

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Name:

General Instructions

1. Due: Wednesday 1\textsuperscript{st} July 2015 by 2:30 p.m.

2. Read and follow all instructions/directions carefully. An inability to follow instructions/directions will result in points being deducted.

3. All problems sets submitted must be stapled, handwritten, and include the cover page.

4. Only problem sets submitted in person and/or in class will be accepted.

5. Answer all questions in blue or black ink only; i.e., no pencils or colored inks. The only exception: graphs may be drawn in pencil. Note: use a guide of some sort (e.g. a ruler) for all graphs. Do not use white out or similar products, but neatly cross/scratch out any mistakes.

6. Write, mark, and draw your answers neatly and clearly. If your answer is illegible (i.e. difficult to read in the least), then it will not be graded. It is your job to clearly communicate.

7. Label all graphs fully and completely; i.e., axes, intersections, curves, etc.

8. Support your answers as thoroughly as possible. State and define any concept utilized and list and name any equation used. In other words, show all of your work.

9. Do not copy from another student or source.

10. Note: only use materials from this class, listed textbooks, and suggested resources to help answer questions. The Google can be quite useful and tempting, but very often a question has been constructed in a very specific manner; i.e., using a certain set of assumptions. Another source may have a very similar problem, but with slightly different underlying assumptions that change the answer completely. This is typically not obvious and will likely leave you very confused.

11. For the True/False/Uncertain questions clearly indicate your choice by writing either “True”, “False”, or “Uncertain” underneath the respective question.

12. Unless explicitly instructed otherwise, a justification is required to receive credit.

<table>
<thead>
<tr>
<th>Original Score (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment (%)</td>
<td></td>
</tr>
<tr>
<td>Actual Score (%)</td>
<td></td>
</tr>
</tbody>
</table>
1. An article in *The Huffington Post*\(^1\) stated that “[c]ollege textbook prices are 812 percent higher than they were a little more than three decades ago, the American Enterprise Institute, a think tank, reports. Textbook costs have well outpaced the 559 percent increase in tuition and fees over roughly the same period.”

As a result of the relatively large increase in new textbook prices students are purchasing more textbooks online, particularly used textbooks.

(a) True, False, or Uncertain: buying used textbooks through a U.S. seller online (e.g., through Half.com or Amazon.com Marketplace) does not affect U.S. GDP. Explain.

- [5 points] False.
- [5 points]
  - The sale of the used textbook itself would not count toward GDP. The textbook would have already been counted when it was newly sold. Being counted again as a used textbook would result in it being double-counted, at least partially. The problem is that nothing new has been produced. Further, countries would have an incentive to artificially inflate their GDP by simply selling and re-selling goods *ad infinitum*.
  - However, the commission received from companies such as Half.com (or eBay or Amazon Marketplace) would count toward GDP, particularly consumption under services. Also, the used textbook would need to be shipped through, for example, the USPS, FedEx, UPS, DHL, etc. Using any of these companies’ services would also contribute to GDP consumption.

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\(^1\) *The Huffington Post* “College Textbook Prices Increasing Faster Than Tuition And Inflation” 4\(^{th}\) January 2013 by Tyler Kingkade [http://www.huffingtonpost.com/2013/01/04/college-textbook-prices-increase_n_2409153.html](http://www.huffingtonpost.com/2013/01/04/college-textbook-prices-increase_n_2409153.html)
2. The table below reports the consumer price index (CPI) and the average nominal U.S. retail price for unleaded regular gasoline for four different periods since 1976. Note that the gasoline prices are in cents per gallon.²

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Average Retail Price (cents per gallon)</th>
<th>CPI (1982 – 1984 = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>June</td>
<td>59.2</td>
<td>56.8</td>
</tr>
<tr>
<td>1981</td>
<td>September</td>
<td>137.6</td>
<td>93.2</td>
</tr>
<tr>
<td>1994</td>
<td>December</td>
<td>114.3</td>
<td>149.7</td>
</tr>
<tr>
<td>2011</td>
<td>October</td>
<td>340.0</td>
<td>226.9</td>
</tr>
</tbody>
</table>

(a) [5 points] Calculate the real average retail price of unleaded regular gasoline in 1982-1984 dollars. In which period were gasoline prices the highest in real terms?

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Average Retail Price (cents per gallon)</th>
<th>CPI (1982 – 1984 = 100)</th>
<th>Real 1982–1984 $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>June</td>
<td>59.2</td>
<td>56.8</td>
<td>$104.23</td>
</tr>
<tr>
<td>1981</td>
<td>September</td>
<td>137.6</td>
<td>93.2</td>
<td>$147.64</td>
</tr>
<tr>
<td>1994</td>
<td>December</td>
<td>114.3</td>
<td>149.7</td>
<td>$76.35</td>
</tr>
<tr>
<td>2011</td>
<td>October</td>
<td>340.0</td>
<td>226.9</td>
<td>$149.85</td>
</tr>
</tbody>
</table>

real price of gasoline in period \( t \) = gasoline price in period \( t \) \( \left( \frac{\text{CPI}_{1982-1984}}{\text{CPI}_{\text{period } t}} \right) \)

real price of gasoline in period 1976 = gasoline price in period 1976 \( \left( \frac{\text{CPI}_{1982-1984}}{\text{CPI}_{\text{period } 1976}} \right) \)

real price of gasoline in period 1976 = 59.2 \( \left( \frac{100}{56.8} \right) \)

real price of gasoline in period 1976 = $104.23

real price of gasoline in period 1981 = gasoline price in period 1981 \( \left( \frac{\text{CPI}_{1982-1984}}{\text{CPI}_{\text{period } 1981}} \right) \)

real price of gasoline in period 1981 = 137.6 \( \left( \frac{100}{93.2} \right) \)

real price of gasoline in period 1981 = $147.64

• Real gasoline prices are highest in October 2011.

²ECON 121 Summer 2013 Exam I
(b) [5 points] Calculate the real average retail price of unleaded regular gasoline in 2011 dollars. In which period were gasoline prices the highest in real terms? Is this the same period from part (a)?

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Average Retail Price (cents per gallon)</th>
<th>CPI (1982 – 1984 = 100)</th>
<th>Real 2011 $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>June</td>
<td>59.2</td>
<td>56.8</td>
<td>$236.49</td>
</tr>
<tr>
<td>1981</td>
<td>September</td>
<td>137.6</td>
<td>93.2</td>
<td>$334.99</td>
</tr>
<tr>
<td>1994</td>
<td>December</td>
<td>114.3</td>
<td>149.7</td>
<td>$173.24</td>
</tr>
<tr>
<td>2011</td>
<td>October</td>
<td>340.0</td>
<td>226.9</td>
<td>$340.0</td>
</tr>
</tbody>
</table>

real price of gasoline in period \( t \) = gasoline price in period \( t \) \( \left( \frac{\text{CPI}_{2011}}{\text{CPI}_{\text{period } t}} \right) \)

real price of gasoline in period 1976 = gasoline price in period 1976 \( \left( \frac{\text{CPI}_{1982–1984}}{\text{CPI}_{\text{period } 1976}} \right) \)

real price of gasoline in period 1976 = 59.2 \( \left( \frac{226.9}{56.8} \right) \)
real price of gasoline in period 1976 = $236.49

real price of gasoline in period 1981 = gasoline price in period 1981 \( \left( \frac{\text{CPI}_{1982–1984}}{\text{CPI}_{\text{period } 1981}} \right) \)

real price of gasoline in period 1981 = 137.6 \( \left( \frac{226.9}{93.2} \right) \)
real price of gasoline in period 1981 = $334.99

- Real gasoline prices are highest in October 2011.
- Yes, this is the same ranking from part (a).

(c) [5 points] In 2011 dollars, what was the total growth rate in real average retail unleaded gasoline prices between June 1976 and October 2011?

\[
\% \Delta \text{Real Gas}_{1976–2011} = \frac{\text{Real Gas}_{2011} - \text{Real Gas}_{1976}}{\text{Real Gas}_{1976}} \times 100\%
\]

\[
\% \Delta \text{Real Gas}_{1976–2011} = \frac{340.0 - 236.49}{236.49} \times 100\% \approx 43.77\%
\]
3. According to the International Monetary Fund (IMF) Luxembourg’s real GDP per capita is approximately double that of Austria. True or False: Citizens of Luxembourg must enjoy a higher standard of economic welfare than people in Austria. Explain.

- [5 points] False.
- [5 points] Factors other than (real) GDP per person affect economic welfare. For instance, factors such as household production, underground production, leisure time, and environmental quality all affect economic welfare and all are omitted from real GDP per person. In addition, economic welfare is influenced by health and life expectancy as well as by the nation’s political freedom and social justice, none of which is measured by real GDP per person. Although real GDP per person is an important factor in determining a country’s economic welfare, it is not the only factor.

4. [15 points] Fill in the missing values in the table of data collected in the household survey for November, 2009. The working-age population, employment, unemployment, and labor force are measured in thousands. As always, show your work.

<table>
<thead>
<tr>
<th>Working-Age Population</th>
<th>235,900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>139,991</td>
</tr>
<tr>
<td>Unemployment</td>
<td>14,524</td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>9.4%</td>
</tr>
<tr>
<td>Labor Force</td>
<td>154,515</td>
</tr>
</tbody>
</table>

Labor Force Participation Rate = \( \frac{\text{Labor Force}}{\text{Working-Age Population}} \times 100\% \)

65.5% = \( \frac{\text{Labor Force}}{235,900} \times 100\% \)

\[ \Rightarrow \text{Labor Force} = 154,515 \]

Unemployment Rate = \( \frac{\text{Unemployment}}{\text{Labor Force}} \times 100\% \)

9.4% = \( \frac{\text{Unemployment}}{154,515} \times 0.054 \)

\[ \Rightarrow \text{Unemployment} = 14,524 \]

Labor Force = Unemployment + Employment

154,515 = 14,524 + Employment

\[ \Rightarrow \text{Employment} = 139,991 \]
5. A story in *Time* discussing the 2007 Financial Crisis interviewed Lawrence, a bond trader, after being let go from Lehman Brothers after the firm filed for bankruptcy. Lawrence was not able to find work for several months even though he applied to many open positions where his qualifications matched.

(a) [5 points] How would you classify the type of unemployment Lawrence is experiencing? Explain.

- Lawrence is classified as cyclically unemployed.
- Cyclical Unemployment: The higher than normal unemployment at a business cycle trough and the lower than normal unemployment at a business cycle peak.

(b) [10 points] According to the article, Lawrence currently has a part-time job, although he would prefer to work full-time. The Bureau of Labor Statistics (BLS) counts as employed people who work part-time, but would prefer to work full-time. Suppose the people who had part-time jobs, but wanted full-time jobs, were counted as unemployed. Explain how the unemployment rate and the labor force participation rate would change.

- The unemployment rate would increase and the labor force participation rate would stay the same. The number of unemployed would rise, but the labor force would stay the same. The part-time workers who wanted to be full-time workers would simply go from being employed to unemployed. With no change in the labor force, the labor force participation rate would not change.
6. Reuters\(^3\) reports that demand and subsequently the price of imported (foreign) beer increased in the United States. True, False, or Uncertain: an increase in the price of imported beer, *ceteris paribus*, would result in a greater inflation rate using the GDP deflator compared with the consumer price index (CPI). For simplicity, assume both price level measures are accurate; i.e. ignore any CPI bias. Explain.

- **[5 points]** Uncertain is the most accurate answer, but False is acceptable in this case.
- **[5 points]** The GDP deflator is derived from GDP which excludes foreign goods/services. The inflation rate calculated from the GDP deflator would not change since imported beer would be added to consumption, but subtracted from net exports, particularly imports. However, inflation from CPI would (possibly) increase since it accounts for purchases from both foreign and domestic goods/services (assuming imported beer is a part of the fixed basket a typical urban family of four consumes). This would cause the inflation rate to be greater using CPI compared with the GDP deflator, *ceteris paribus*; therefore, false. However, if imported beer is not part of the CPI’s fixed basket of goods, then both price level measures would be unchanged implying this is uncertain.

7. **[10 points]** A central concept in macroeconomics is the idea of the natural rate of unemployment. Why does it make sense to define full employment to occur when the unemployment rate equals the natural rate of unemployment, instead of when the unemployment rate equals zero? Elaborate and explain carefully.

With a growing, dynamic economy where businesses expand and contract, technological change regularly occurs, and people enter and leave the labor market on a continual basis, zero percent unemployment is not possible nor desirable. Frictional unemployment and structural unemployment are normal parts of a healthy, growing economy. With frictional unemployment, people and firms have to search for one another and that takes time. With structural unemployment, technology changes and international competition cause people to have to retrain to match up with the evolving job requirements. Economists, consequently, consider full-employment to occur when the only unemployment is frictional unemployment and structural unemployment.

\(^3\)Reuters 30\(^{th}\) October 2013
8. During the 1990s, Japan experienced periods of deflation and very low nominal interest rates, approaching zero percent.

(a) [10 points] Why would lenders of money agree to a nominal interest rate of almost zero? Explain.

- Fischer equation: \( i = r + \pi \)
- With the deflation \( (\pi < 0) \), the real interest rate \( (r) \) exceeded the nominal interest rate \( (i) \). Lenders were making their decisions based on the higher real interest rate, not the very low nominal interest rate.

(b) [5 points] During a deflationary period, which would be higher: nominal GDP or real GDP? Why? Assume that the base year of choice is prior to the deflationary period.

Real GDP would be higher, as long as the base year was before the period of deflation. Nominal GDP would be measured using the lower prices that resulted from the deflation. Real GDP would use the higher prices before the deflation, assuming the base year was before the deflation.