Problem Sets Macroeconomics Week 2
Suggested Solution

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Quick Check Multiple Choice

1. The consumer price index measures approximately the same economic phenomenon as:

   A. nominal GDP

   B. real GDP

   C. the GDP deflator

   D. the unemployment rate
   Answer: C

2. The largest component in the basket of goods and services used to compute the CPI is:

   A. food and beverages

   B. housing

   C. medical care

   D. apparel
   Answer: B

3. If a Pennsylvania gun manufacturer raises the price of rifles it sells to the U.S. Army, its price hikes will increase:

   A. both the CPI and the GDP deflator

   B. neither the CPI nor the GDP deflator

   C. the CPI but not the GDP deflator

   D. the GDP deflator but not the CPI
   Answer: D

4. Because consumers can sometimes substitute cheaper goods for those that have risen in price:

   A. the CPI overstates inflation

   B. the CPI understates inflation

   C. the GDP deflator overstates inflation

   D. the GDP deflator understates inflation
   Answer: A

5. If the consumer price index is 200 in 1980 and 300 today, then \$600 in 1980 has the same purchasing power as:

   A. \$400

   B. \$500

   C. \$700

   D. \$900
   Answer: D

6. You deposit \$2,000 in a savings account, and a year later you have \$2,100. Meanwhile, the CPI rises from 200 to 204. In this case, the nominal interest rate is - percent, and the real interest rate is - percent.

   A. 1, 5

   B. 3, 5

   C. 5, 1

   D. 5, 3
   Answer: D

Problems and Applications

1. The residents of Vegopia spend all their income on cauliflower, broccoli, and carrots. In 2013 and 2014, their spending was as follows:

Year	Cauliflower	Broccoli	Carrots
2013	\$2	\$1.50	\$0.10
2014	\$3	\$1.50	\$0.20

Table 1: Price per unit of vegetables in Vegopia.

   a. Calculate the price of each vegetable in each year.
   Solution: Already shown in the table above.

   b. Using 2013 as the base year, calculate the CPI for each year.
   2013: $100 \times \$2 + 50 \times \$1.50 + 500 \times \$0.10 = \$325$
   2014: $100 \times \$3 + 50 \times \$1.50 + 500 \times \$0.20 = \$475$
   CPI 2013: $\frac{325}{325} \times 100 = 100$
   CPI 2014: $\frac{475}{325} \times 100 = 146$

   c. What is the inflation rate in 2014?
   $\frac{146-100}{100} \times 100 = 46\%$

2. Suppose that people consume only three goods, as shown in this table:

Year	Tennis Balls	Golf Balls	Bottles of Gatorade
2014 Price	\$2	\$4	\$1
2014 Quantity	100	100	200
2015 Price	\$2	\$6	\$2
2015 Quantity	100	100	200

Table 2: Prices and quantities for goods in 2014 and 2015.

a. What is the percentage change in the price of each of the three goods?
Tennis Balls: $\frac{2-2}{2} \times 100 = 0\%$
Golf Balls: $\frac{6-4}{4} \times 100 = 50\%$
Gatorade: $\frac{2-1}{1} \times 100 = 100\%$

b. Using a method similar to the consumer price index, compute the percentage change in the overall price level.
Cost of the market basket in 2014: $100 \times 2 + 100 \times 4 + 200 \times 1 = 800$
Cost of the market basket in 2015: $100 \times 2 + 100 \times 6 + 200 \times 2 = 1,200$
Choose 2014 as base year so $CPI_{2014} = 100$
$CPI_{2015} = \frac{1200}{800} \times 100 = 150$
Percentage change in CPI (or inflation rate) $= \frac{150-100}{100} \times 100 = 50\%$

c. If you learn that a bottle of Gatorade increased in size from 2014 to 2015, should that affect your inflation calculation? If so, how?
Solution: Yes, the increased size represents an improvement in quality. The inflation rate should be adjusted downward to reflect this improvement.

d. If you learn that Gatorade introduced new flavors in 2015, should that affect your inflation calculation? If so, how?
Solution: Yes, the new flavors improve consumer well-being. The inflation rate should be adjusted downward to reflect the added variety.

3. A small nation produces only karaoke machines and CDs, in the following quantities:

Year	Karaoke Machines (Price)	CDs (Price)
2014	10 ($40)	30 ($10)
2015	12 ($60)	50 ($12)

Table 3: Quantities and prices for karaoke machines and CDs.

a. Using a method similar to the consumer price index, compute the percentage change in the overall price level (2014 as base year).
Cost of basket in 2014: $1 \times 40 + 3 \times 10 = 70$
Cost of basket in 2015: $1 \times 60 + 3 \times 12 = 96$
CPI 2014: $\frac{70}{70} \times 100 = 100$
CPI 2015: $\frac{96}{70} \times 100 = 137.14$
Inflation rate: $\frac{137.14-100}{100} \times 100 = 37.14\%$

b. Using a method similar to the GDP deflator, compute the percentage change in the overall price level.
Nominal GDP 2014: $10 \times 40 + 30 \times 10 = 700$
Nominal GDP 2015: $12 \times 60 + 50 \times 12 = 1,320$
Real GDP 2014: $10 \times 40 + 30 \times 10 = 700$
Real GDP 2015: $12 \times 40 + 50 \times 10 = 980$
GDP deflator 2014: $\frac{700}{700} \times 100 = 100$
GDP deflator 2015: $\frac{1320}{980} \times 100 = 134.69$
Inflation rate: $\frac{134.69-100}{100} \times 100 = 34.69\%$

c. Is the inflation rate in 2015 the same using the two methods? Explain why or why not.
Solution: No, the rates differ because the CPI fixes quantities in the basket, while the GDP deflator accounts for changing quantities.

4. Which CPI problems are illustrated in the following cases?

   a. The invention of the cell phone. *(New product bias)*

   b. The introduction of airbags in cars. *(Quality change bias)*

   c. Increased computer purchases due to falling prices. *(Substitution bias)*

   d. More raisins in Raisin Bran packages. *(Quality change bias)*

   e. Greater use of fuel-efficient cars due to higher gas prices. *(Substitution bias)*

5. The New York Times cost \$0.15 in 1970 and \$2.00 in 2011. The average wage was \$3.36/hour in 1970 and \$23.09/hour in 2011.

   a. Percentage increase in newspaper price: $\frac{2-0.15}{0.15} \times 100 = 1233.3\%$

   b. Percentage increase in wages: $\frac{23.09-3.36}{3.36} \times 100 = 587.2\%$

   c. Minutes to earn a newspaper:
   1970: $\frac{0.15}{3.36/60} = 2.68$ minutes
   2011: $\frac{2.00}{23.09/60} = 5.2$ minutes

   d. Did purchasing power rise or fall?
   Solution: Purchasing power fell, as workers need more time to buy the same item.

6. Higher-than-expected inflation impacts borrowers and lenders.

   a. Is the real interest rate higher or lower?
   Solution: Lower, as inflation reduces the real value of repayments.

   b. Who gains and who loses?
   Solution: Borrowers gain; lenders lose.

   c. How did 1970s inflation affect homeowners and banks?
   Solution: Homeowners with fixed-rate mortgages benefited, while banks incurred losses.