

# 18

## PRICE INDEXES

### OVERVIEW

1. Because gross domestic product changes when prices change, the effectiveness of GDP as a measure of output is reduced. We can make an adjustment to GDP to overcome this problem. The adjustment uses a price index.
2. A price index records the percentage change in the price of a selected market basket of goods compared to the base year. In the calculation of the price index, only the prices, the cost of the goods in the market basket, change.
3. The consumer price index is calculated by taking the base year cost of a selected market basket of consumer goods and dividing this cost into the current year cost of those goods.
4. The CPI may not accurately measure the price level. If the market basket does not reflect what the average consumer buys, the CPI will not measure the prices that the average consumer faces.
5. The market basket and base year are adjusted from time to time. The market basket is adjusted to reflect changes in consumer buying patterns. The base year should be one of full employment and stable prices.
6. The GDP price deflator is a price index based on all final goods and services produced in the economy. Real GDP is money GDP divided by the GDP price deflator. Real GDP is a measure of the output produced, and does not change as prices change.

### MATCHING

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|-------|----|----------------------|----|--|
| _____ | 1. | price index number   | a. | is a measure of the prices of goods sold to consumers  |
| _____ | 2. | producer price index | b. | a special price index used to convert money GDP into real GDP  |
| _____ | 3. | consumer price index | c. | a continued rise in the price level  |
| _____ | 4. | inflation            | d. | the price of currently produced final output times the quantity of that output added up for the year |
| _____ | 5. | deflation            | e. | measures the output produced by the economy, money GDP divided by the GDP price deflator             |
| _____ | 6. | GDP price deflator   | f. | records the percentage change in the price of a combination of goods compared to the base year       |
| _____ | 7. | money or current GDP | g. | a continued fall in the price level  |
| _____ | 8. | real GDP             | h. | is a measure of prices of goods sold at wholesale  |

### TRUE-FALSE

- \_\_\_\_\_ 1. If the CPI goes up, then all the price of all good rises.
- \_\_\_\_\_ 2. If GDP rises, then real GDP must also rise.
- \_\_\_\_\_ 3. If real GDP rises, then GDP must also rise.
- \_\_\_\_\_ 4. GDP is a good measure of output.
- \_\_\_\_\_ 5. Real GDP is a better measure of output than GDP.

## PROBLEMS

1. Suppose that we have the following information about the ingredients of a peanut butter and jelly sandwich.

Year	Price of a jar of jelly	Price of a jar of peanut butter	Value of market basket	Price index
1	\$2.00	\$2.50		
2	2.50	2.50		
3	2.00	3.50		
4	2.25	3.75		
5	2.00	3.50		

- a. Suppose that a market basket consists of one jar of peanut butter and one jar of jelly. Find the value of the market basket in year 1 by adding the price of a jar of jelly to the price of a jar of peanut butter. Continue finding the value of the market basket for each year.
  - b. Suppose that year 2 is the base year. Find the price index number in each year by dividing the value of the market basket in each year by the value of the market basket in the base year and multiplying by 100.
  - c. What is the meaning of the year 5 index number? \_\_\_\_\_
2. a. Suppose that you are a consumer of the Triple Jelly which requires a market basket of three jars of jelly and one jar of peanut butter. Now find the value of the market basket in each year by multiplying the price of jelly by three and adding the result to the price of a jar of peanut butter. In year 1, it would be  $(3 \times \$2.00) + \$2.50 = \$8.50$ . Continue for all years.

Year	Price of a jar of jelly	Price of a jar of peanut butter	Value of market basket	Price index
1	\$2.00	\$2.50		
2	2.50	2.50		
3	2.00	3.50		
4	2.25	3.75		
5	2.00	3.50		

- b. If year 2 is the base year, what are the price index numbers?
- c. If the problem 2 price index measures the change in your spending, and the index in problem 1 measures the change in your wage, are you better off in year 4 than year 2? Why? \_\_\_\_\_

3.a. Suppose that we have the following GDP and price data. Find real GDP by dividing GDP by the GDP price deflator and multiplying by 100.

Year	1	2	3	4
GDP (\$ billions)	1800	2200	2420	3000
GDP price deflator	90	100	110	120
Real GDP (\$ billions)	_____	_____	_____	_____

- b. Which year is the base year? \_\_\_\_\_
- c. How much did output change from year 2 to year 3? \_\_\_\_\_
- d. How much did output change from year 1 to year 4? \_\_\_\_\_

### IN THE NEWS

- Many unions have a clause in their contract that ties the wage to the consumer price index. As the CPI goes up, so does the wage. Employers have argued that the consumer price index goes up faster than the worker's expenses and so wages should only go up by a fraction of the consumer price index.
  - Are the employers right or just trying to cut costs? Explain. \_\_\_\_\_
  - Suppose that when the CPI goes down, wages go down too. Will labor be hurt by this reduction in wages? \_\_\_\_\_
- We can compare living costs in various U.S. cities by using a price index (base period is 1982-1984). Use the following information to answer the questions.

City	Year	1975	1980	1985	1987
Anchorage, AK		57.1	85.5	105.8	108.2
Atlanta, GA		53.6	80.3	108.9	116.5
Chicago, IL		52.8	82.2	107.7	114.5
Dallas, TX		50.4	81.5	108.2	112.9
Honolulu, HI		56.3	83.0	106.8	114.9
New York, NY		57.6	82.1	108.7	118.0
San Francisco, CA		51.8	80.4	108.4	115.4

- Suppose that the combination of goods is the same for all cities. Can we compare the price index across cities in a given year to find out which city is the most expensive to live in? Why or why not? \_\_\_\_\_
- Calculate the rate of inflation between 1975 and 1980 for all cities. Which city had the highest rate of inflation for that period? What city had the lowest rate of inflation for that period? \_\_\_\_\_

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- c. Calculate the rate of inflation between 1980 and 1985 for all cities. Which city had the highest rate of inflation for that period? What city had the lowest rate of inflation for that period? \_\_\_\_\_
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- d. If you were about to get a job in one of these cities, would you expect to get the same wages for the same job? \_\_\_\_\_
3. The government is considering funding a space station. The agency in charge of space says that the space station will cost \$10 billion. This is an increase in cost from \$5 billion two years ago. The agency also estimates the cost to be \$20 billion if we wait three years.
- a. Does this reading provide enough information to calculate a price index for space stations? What information do we need? \_\_\_\_\_
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- b. If the base year is two years ago, what is the price index for a space station 3 years from now? \_\_\_\_\_
4. It is speculated that when the Titanic sunk, there was a fortune in jewels in the safe. The jewels belonged to the very wealthy. You can imagine what they are worth today.
- a. The value of the jewels was very great. No doubt their dollar value is even larger now. Why? \_\_\_\_\_
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- b. If we knew that the jewels were worth \$7 million when the ship sunk, how could we use a price index to determine what they are worth now? \_\_\_\_\_
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5. If you thought that the price of health care was going up fast, wait until you see the increase in the cost of college. Even in state-supported institutions, the tuition cost has gone up faster than the consumer price index and faster than the cost of health care. In fact, college tuition has increased more than double the rate of the consumer price index for the fourth consecutive year.<sup>1</sup>
- a. What effect does this increase in cost have on families with students in college? \_\_\_\_\_
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- b. For state supported schools, does the increase in tuition accurately reflect the increase in cost of providing an education? \_\_\_\_\_
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## PRACTICE TEST

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<sup>1</sup> Adapted from "College costs rising faster than health care cost." United Press International, *The Bowling Green Daily Sentinel-Tribune*, Bowling Green, Ohio, Sept. 17, 1985.

Circle the correct answer.

1. When the GDP of a country triples, the correct conclusion is that:
  - a. output has tripled.
  - b. output has increased.
  - c. output is unchanged.
  - d. impossible to say.
  
2. If prices increase 50 percent from the base year, the new index number is:
  - a. 50.
  - b. 100.
  - c. 150.
  - d. 200.
  
3. Real GDP is money GDP divided by:
  - a. the producer price index.
  - b. the GDP price deflator.
  - c. the consumer price index.
  - d. the real price index.
  
4. If output falls:
  - a. real GDP increases.
  - b. real GDP falls.
  - c. real GDP stays the same.
  - d. prices fall.
  
5. Which is more beneficial, an increase in money salary or real salary?
  - a. Money salary
  - b. Real salary
  - c. Both, since they are equal
  - d. Neither, since purchasing power will fall

### ANSWERS

#### Answers – Price Indexes

##### Matching

1. f
2. h
3. a
4. c
5. g
6. b
7. d
8. e

True-False

1. F
2. F
3. F
4. F
5. T

Problems

1.a. and b.

Year	Price of a jar of jelly	Price of a jar of peanut butter	Value of market basket	Price index
1	\$2.00	\$2.50	\$4.50	90
2	2.50	2.50	5.00	100
3	2.00	3.50	5.50	110
4	2.25	3.75	6.00	120
5	2.00	3.50	5.50	110

c. An index number of 110 means that prices have increased by 10 percent since the base year.

2.a. and b.

Year	Price of a jar of jelly	Price of a jar of peanut butter	Value of market basket	Price index
1	\$2.00	\$2.50	\$ 8.50	85
2	2.50	2.50	10.00	100
3	2.00	3.50	9.50	95
4	2.25	3.75	10.50	105
5	2.00	3.50	9.50	95

2. c. If your wages go up at the same rate as the peanut butter and jelly sandwich, then in year 4 your wages have gone up 20 percent since the base year. Your spending has gone up only 5 percent. Since your spending has gone up less than your income, your real income has increased.

3. a.

Year	1	2	3	4
GDP (\$ billions)	1800	2200	2420	3000
GDP price deflator	90	100	110	120
Real GDP (\$ billions)	2000	2200	2200	2500

- b. The year with the index number of 100 is the base year, year 2.
- c. Output did not change from year 2 to year 3 as real GDP is unchanged.
- d. Output increased 25 percent from year 1 to year 4 as real GDP increased from 2000 to 2500.

In the News

- 1. a. There may be some truth to the employers' charge. If individual workers are buying goods that do not go up as fast as the CPI, then their wages go up faster than their expenses. However, if they buy goods that go up faster than the CPI, their expenses go up faster than their wages.
- b. Whether or not workers are hurt depends on whether the prices paid go down as fast as the wages go down. Those whose wages go down faster than their expenses will be hurt and those whose expenses go down faster than their wages are helped. If the CPI is representative for workers, then as wages fall with the CPI, real income is constant.
- 2. a. We cannot tell which city is the most expensive because the price index only tells how much price changed since the base year. We cannot tell the level of price in any year, only the change in the price level since the base year, 1982-84. For example, it is widely believed that because of the cost of transporting goods to Anchorage, Anchorage is the most expensive city to live in in the U.S. But you cannot tell that by looking at the price index numbers.

b.

Year	1975-80	1980-85
City		
Anchorage, AK	49.74	23.74
Atlanta, GA	49.81	35.62
Chicago, IL	55.68	31.02
Dallas, TX	61.71	32.76
Honolulu, HI	47.42	28.67
New York, NY	42.53	32.40
San Francisco, CA	55.21	34.83

- c. Atlanta, Anchorage
- d. Since the cost of living is different in different cities, your lifestyle will depend on your income and the prices you face. So if you are offered a job in one city with a low wage and in another city with a higher wage, you may want to compare the cost of a basket of the same goods in each city before you make your choice.
- 3. a. Yes, we can determine the price index for space stations using the information in this piece. All we need is the cost of the same space station at various points in time.
- b. The price index is 400, \$20 billion divided by \$5 billion times 100.
- 4. a. The jewels are worth more due to inflation, provided that the value of jewels has kept pace with inflation.

- b. If we had a price index for jewels, we could multiply the value of the jewels in 1912, when the Titanic sunk, by the current price index number and divide by 100. If the index number is 900,  $900 \times \$7 \text{ million}$  divided by 100 means the jewels would be worth \$63 million.
- 5. a. Since a college education is bound to be a large expense for a family, the rapid increase in the cost will make a college education even more difficult to obtain for individuals whose income is not rising at least as fast as the consumer price index.
- b. Since part of the expenses of state-supported schools are paid by the state, it may be true that costs are going up even faster than the increase in tuition indicates. If the state's contribution is going up faster than the tuition, then the tuition does not reflect the true increase in college cost. If the state's contribution is not going up as fast as tuition, then the tuition overstates the increase in college cost.

Practice Test

1.d., 2.c., 3.b., 4.b., 5.b.