

1. Consider the following data from the town of Vikingville:

Table 1: Quantity and Price of Goods Produced in Vikingville						
	2003		2004		2005	
Product	Price (\$)	Quantity	Price (\$)	Quantity	Price (\$)	Quantity
Horned Helmets	10.00	20	14.00	18	15.00	22
Spears	5.00	80	7.00	75	8.00	100
Long Boats	100.00	4	120.00	3	125.00	5
Shields	20.00	50	30.00	50	35.00	55

a. Find Nominal GDP for each of the three years.

2003:  $10 \times 20 + 5 \times 80 + 100 \times 4 + 20 \times 50 = 2000$ .

2004:  $14 \times 18 + 7 \times 75 + 120 \times 3 + 30 \times 50 = 2637$ .

2005:  $15 \times 22 + 8 \times 100 + 125 \times 5 + 35 \times 55 = 3680$ .

b. Find Real GDP for each of the three years using 2004 as the base year.

2003:  $14 \times 20 + 7 \times 80 + 120 \times 4 + 30 \times 50 = 2820$ .

2004:  $14 \times 18 + 7 \times 75 + 120 \times 3 + 30 \times 50 = 2637$ .

2005:  $14 \times 22 + 7 \times 100 + 120 \times 5 + 30 \times 55 = 3258$

c. What is the GDP deflator (2004 as base year) for each of the three years given?

2003:  $100 \times 2000 / 2820 = 70.92$

2004:  $100 \times 2637 / 2637 = 100$

2005:  $100 \times 3680 / 3258 = 112.95$ .

d. Clearly, when one chooses a base year other than 2004, the answers to parts b and c change. Does this represent a real change or an illusory one? Consider especially the case of the inflation rate.

Changing the base year certainly does change the values of Real GDP—measuring in terms of the value of a dollar in a year other than 1999 necessarily gives different values of RGDP. Changing the base year also changes the values of the GDP deflator (using base year greater than 1999 lowers all values of the deflator if inflation was occurring over those time periods). What is most important though is that the relationship between years as measured by RGDP and the GDP deflator does not change regardless of which base year is used. In other words, if the GDP deflator indicates a 10% inflation rate using the base year as 1999 then using a base year other than 1999 will continue to give an inflation rate of 10%.

e. Were there any recessions in Vikingville over the time studied?

For a long while, the NBER (National Bureau of Economic Research—a group of academic economists) defined a recession as three consecutive quarters of declining Real GDP. The NBER seemed to abandon this in the 2001 recession (they declared a recession occurred between March and November of that year—a period slightly shy of three quarters). In any case, the above data does demonstrate a declining Real GDP in 2004—a close enough finding for us to declare a recession in that year.

2. Consider the following information regarding the country of Vikingland. In 2001 Vikingland produced a nominal GDP of \$100 and a real GDP of \$125. The following year (2002) Vikingland produced a nominal GDP of \$120 and a real GDP of \$140. How much larger (in percentage terms) is the price level in 2002 relative to the price level in 2001?

2001 GDP deflator was  $100 \times 100 / 125 = 80$ . 2002 GDP deflator was  $100 \times 120 / 140 = 85.71$ . The percentage change in prices was  $(85.71 - 80) / 80 = 7.13\%$ . If you pay attention to this problem, you will learn a skill that will be handy in days to come. In this case, nominal GDP rose by 20% (from 100 to 120) and real GDP rose by 12% (from 125 to 140). It turns out that in a multiplied problem ( $P \times Q = \text{nominal GDP}$ ) that percent changes to each term are (approximately) additive. Thus if prices rose by 7.13% and quantities rose by 12%, then nominal GDP must have risen close to 19.13%.

3. The following is a table of CPI figures for Vikingtown between 2000 and 2004. The base year for these figures is 2001.

Year	CPI
2000	91
2001	100
2002	105
2003	109
2004	115

The mayor of Vikingtown is having trouble interpreting these numbers because it is the year 2005. Help him out by revising this table such that the base year is 2004 rather than 2001.

Prices rose by  $100 \times (115 - 91) / 91 = 26.37\%$  between 2000 and 2004. If the base year is 2004 then the value for the CPI that year is 100. Since prices rose by 26.37% between 2000 and 2004 and the CPI equaled 100 in 2004, then the CPI in 2000 must equal  $100 \times (100 - x) / x = 26.37\%$  so  $x = 79.13$ . Using this same technique for the other years gives a table:

Year	CPI
2000	79.13
2001	86.95
2002	91.30
2003	94.78
2004	100

4. Consider the following data on American price indexes:

Year	Price Level
1997	159.1
1998	161.8
1999	168.8
2000	174.5

At the beginning of 1997, I purchased 100 shares of IBM for \$103 per share. At the end of 2000, IBM was selling for \$112 per share. Was this a good deal for me? Why or why not?

Between 2000 and 1997 the price level increased by  $100 \times (174.5 - 159.1) / 159.1 = 9.67\%$ . At the same time the price of IBM shares rose by 8.73%. Hence, owning IBM shares was not a good deal for me—I could have purchased more with my \$103 in 1997 than I could with the \$112 in 2000.

5. Vikingburg has a population of 1,000,000. Of these people, 120,000 are children, 20,000 are full time students, 300,000 work part-time, 11,000 are unemployed, 150,000 are retired, and the rest work at full time jobs. What is the unemployment rate in Vikingburg?

The number of full time workers is given by:  $1,000,000 - 120,000 - 20,000 - 300,000 - 11,000 - 150,000 = 399,000$ .

The labor force includes full time workers, part time workers, and the unemployed:  $399,000 + 300,000 + 11,000 = 710,000$ .

The unemployment rate is  $11,000 / 710,000 = 1.54\%$ .