

UNIT 2 – SUPPLEMENT 1c:  
 ADJUSTING NIA MEASUREMENTS SO AS TO ELIMINATE THE EFFECTS OF INFLATION

Suppose that you want to answer the question, how does national output in UWLand for year 1, compare to national output in UWLand for year 0. You are aware of the fact that prices of many products in year 1 are significantly higher than they were in year 0. You want to eliminate the effect that inflation has on this comparison.

(I) Ideal Method

You can use this method only if you have complete information on all prices and quantities for both years; a table for a hypothetical small economy is listed below.

column	1	2	3	4	5	6	7	8
product	P <sub>0</sub>	Q <sub>0</sub>	P <sub>0</sub> x Q <sub>0</sub>	P <sub>1</sub> x Q <sub>0</sub>	P <sub>1</sub>	Q <sub>1</sub>	P <sub>1</sub> x Q <sub>1</sub>	P <sub>0</sub> x Q <sub>1</sub>
beef jerky	\$5	200	\$1,000	\$1,600	\$8	100	\$800	\$500
skateboards	\$30	40	\$1,200	\$1,400	\$35	60	\$2,100	\$1,800
shorts	\$18	100	\$1,800	\$2,200	\$22	120	\$2,640	\$2,160
totals			\$4,000	\$5,200			\$5,540	\$4,460

For year 0, use the sum of the numbers in column 3. This is \$4,000. For year 1, we could use the sum of the numbers in column 7: \$5,540 and compare it to the \$4,000 number in column 3. This is done in part (a) below.

(a) Nominal National Output in year 0 = \$4,000  
 Nominal National Output in year 1 = \$5,540  
 Percent Change in Nominal National Output =  $(5540 - 4000) / 4000 = .385 = 38.5\%$

Unfortunately, the 38.5% growth rate is an exaggeration of the growth in the economy because it includes the effects of inflation. Instead, use the sum of the numbers in column 8: \$4,460 and compare this to the \$4,000 number in column 3. This is done in part (b) below. With this comparison, year 0's prices are being used to measure both years' output, thereby eliminating the effect of inflation.

(b) Real National Output in year 0 (base year = 0) = \$4,000 (same as Nominal National Output in year 0)  
 Real National Output in year 1 (base year = 0) = \$4,460  
 Percent Change in Real National Output (base year = 0) =  $(4460 - 4000) / 4000 = .115 = 11.5\%$

As an alternative, use the sum of the numbers in column 7: \$5,540 and compare this to the \$5,200 number in column 4. This is done in part (c) below. With this comparison, year 1's prices are being used to measure both years' output, thereby eliminating the effect of inflation. Notice that the calculated growth rate is smaller than in part (b).

(c) Real National Output in year 0 (base year = 1) = \$5,200  
 Real National Output in year 1 (base year = 1) = \$5,540 (same as Nominal National Output in year 1)  
 Percent Change in Real National Output (base year = 1) =  $(5540 - 5200) / 5200 = .065 = 6.5\%$

(II) Alternative Method 1

When you lack detailed data on prices and quantities for each good, but you have some aggregate numbers, then the following formulas are useful:

- (d)  $\text{Real GDP} = [(\text{Nominal GDP}) / (\text{Price Index})] \times 100$
- (e)  $\text{Price Index} = [(\text{Nominal GDP}) / (\text{Real GDP})] \times 100$
- (f)  $\text{Nominal GDP} = [(\text{Price Index}) \times (\text{Real GDP})] / 100$

(II) Alternative Method 2

When you only have growth rate data on the aggregate numbers, the following formulas are approximately correct for small changes:

- (g)  $\text{Percent Change in Real GDP} = \text{Percent Change in Nominal GDP} - \text{Percent Change in Price Index}$
- (h)  $\text{Percent Change in Price Index} = \text{Percent Change in Nominal GDP} - \text{Percent Change in Real GDP}$
- (i)  $\text{Percent Change in Nominal GDP} = \text{Percent Change in Price Index} + \text{Percent Change in Real GDP}$