

Chapter 2 GDP Accounting Cheat Sheet

$$GDP = GNP - NFP$$

Gross Domestic Product and Gross National Product
Expenditure Approach to GDP

$$Y = C + I + G + NX$$

$$Y_{pvt} = Y + NFP + TR + INT - T$$

Private Disposable Income

$$Y_{govt} = T - TR - INT$$

Net Government Income

$$S_{pvt} = (Y + NFP + TR + INT - T) - C$$

Private Saving (Private Disposable Income less Consumption)

$$S_{govt} = (T - TR - INT) - G$$

Government Saving (Net Government Income less Government Spending)

$$S = S_{pvt} + S_{govt}$$

National Saving

$$S = Y + NFP - C - G$$

$$S = (C + I + G + NX) + NFP - C - G$$

$$S = I + NX + NFP$$

$$S = I + CA$$

Special Cases for the Closed Economy:

$$Y = C + I + G$$

$$S = Y - C - G$$

$$S = I$$

Common Calculations

Growth Rates as Differences in Logs

$$\frac{d \ln x(t)}{dt} = \frac{1}{x} \frac{dx}{dt}$$

Approximation:

$$\frac{\Delta \ln x_t}{\Delta t} \approx \frac{1}{x} \frac{\Delta x}{\Delta t}$$

For $\Delta t = 1$:

$$\Delta \ln x_t = \ln x_t - \ln x_{t-1} \approx \frac{\Delta x}{x}$$

For an annualized growth rate based on quarterly data ($\Delta t = 1/4$):

$$4 \cdot \Delta \ln x_t \approx \frac{\Delta x}{x}$$

Examples using Differences in Logs

In 2009, second quarter real GDP was 12901.5

In 2009, third quarter real GDP was 12990.3

$$\ln(12901.5) = 9.465098863$$

$$\ln(12990.3) = 9.471958204$$

$$\ln(12990.3) - \ln(12901.5) = 0.006859341 \text{ (Quarterly Growth Rate)}$$

The annualized growth rate is 0.0274 or 2.74% (Multiply Quarterly Growth Rate by 4)

Compare:

$$\frac{x_t - x_{t-1}}{x_{t-1}} = \frac{12990.3 - 12901.5}{12901.5} = 0.006882921$$

To get an annualized growth rate:

$$(1 + 0.006882921)^4 - 1 = 0.0274, \text{ again } 2.74\%$$

Converting Nominal Magnitudes to Real Magnitudes (and vice versa) using Price Indices

Recall:

$$\text{Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

Rearranging:

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{Deflator}} \times 100$$

Generalizing:

$$\text{Real Magnitude} = \frac{\text{Nominal Magnitude}}{\text{Deflator}} \times 100$$

Example:

Suppose that in 1979, a college professor earned \$19,500.

Also, suppose that the Deflator (Base year 2005) had a value of 45.136.

In terms of real (2005) prices, what is the value of the 1979 salary?

$$\text{Real Magnitude} = \frac{\text{Nominal Magnitude}}{\text{Deflator}} \times 100$$

$$\text{Real Magnitude} = \frac{19500}{45.136} \times 100$$

$$\text{Real Magnitude} = \frac{19500}{45.136} \times 100 = 43202.76$$

In 2009, the Deflator is 109.801. Can you convert the real (2005) level of the salary to 2009 prices?

$$\text{Real Magnitude} = \frac{\text{Nominal Magnitude}}{\text{Deflator}} \times 100$$

$$43202.76 = \frac{\text{Nominal Magnitude}}{109.801} \times 100 = 47437.06$$

Can you figure out a more direct way to convert the 1979 nominal salary to 2009 prices?

Hint: Interpret this expression:

$$\frac{\text{Deflator}_{2009}}{\text{Deflator}_{1979}}$$

In government statistics, a price index has a value of 100 in the base year.

When we do theory, the price level normally is assumed to have a value of 1 in the base year.

How does this affect conversion of a nominal magnitude to a real magnitude?

$$\text{Real Magnitude} = \frac{\text{Nominal Magnitude}}{P}$$

Example:

In our earlier example, the deflator in 1979 was 45.136 given that the base year deflator was 100.

In theory, we would make the base year price level 1, so the 1979 price level would be scaled down to 0.45136.

$$\text{Real Magnitude} = \frac{19500}{0.45136} = 43202.76$$

Calculate!

In the second quarter of 1984, the annualized level of real GDP was \$6.5596 (trillions of 2005 dollars). In the third quarter, the annualized level was \$6.6233 (same units). What was the annualized percentage rate of growth of real GDP from the second to third quarters?

In 1972 an 18 ounce box of Kellogg's Cornflakes had a price of \$0.37. The consumer price index in 1972 was 41.8. In 2008 the consumer price index had risen to 218.6. If the price of cornflakes had risen at the same rate as prices in general, what would the price of cornflakes have been in 2008? (The actual price was \$2.99.)