

Homework 1 - Measurement of Output and Prices

1. Consider a two country world. There is one firm in each country. The firm in country 1 produces 100 apples using labor from country 1. The firm in country 2 produces 100 oranges using labor from country 2. The price of an orange is .5 apples in country 1 (i.e .5 apples/orange), whereas the price of an orange is 2.0 apples in country 2 (i.e 2.0 apples/orange).

(a) What is the GDP in each country? Be sure to state the units that GDP is measured in.

(b) If the net payment between the two countries for factors of production is 50 apples to residents of country 2 (suppose for example that the residents of country 2 own the firm in country 1), then what is GNP in each country?

2. Consider a closed economy in which there is one firm which uses two inputs to produce the one final good in the economy. The firm uses its capital (100 units) and rents labor to produce 35 units of output. The firm pays out 25 units of this output in wages. The rest of the output is kept by the firm to offset the 10 units of its capital stock that depreciated. Since depreciation equals the firm's revenue after payments to labor the firm reports an accounting profit of zero. The consumers in the economy use their wages to consume 25 units of output.

Find the GDP for this economy using (a) the value added approach, (b) the income approach and (c) the expenditure approach.

3. Hamburgers and beer are the sole goods in a simple economy. In year 1 a hamburger costs \$5.0 and a beer \$2.0, whereas in year 2 a hamburger costs \$10.0 and a beer \$2.0. The basket of goods defining the Consumer Price Index (CPI) is 10 hamburgers and 10 beers.

(a) What is the CPI in year 1 and year 2, when year 1 is treated as the base year?

(b) Does the change in the CPI between year 1 and 2 overstate, understate or correctly state the change in the "cost of living"? Explain carefully.

[Hint: Figure out what an economist means by the term the "cost of living" by reading the article on the CPI.]

BONUS QUESTION: Labor's Share of Income in the US

4. Using the data from the file on the website, calculate the fraction of GDP in the US that is paid to labor over the period 1929-2003.¹ Plot this information on a graph where years are on the horizontal axis. Summarize what are the main features of labor's share in the US over this time period.

¹Data were taken from the Bureau of Economic Analysis' NIPA Tables 1.12 and 1.7.5. See <http://www.bea.doc.gov/>.

The calculation of labor's share is not routine. The reason is that there are entries in the relevant tables for the factor income approach to GDP accounting that are not easy to classify as clearly payments to capital or as clearly payments to labor. Three entries with this problem are indirect taxes, statistical discrepancy and proprietor's income. With this problem in mind, I ask you to use the measure of labor's share described below.²

$$\text{Labor's Share} = 1 / [1 + 2 + 3 + 4 + 5]$$

1= Compensation of Employees

2 = Rent

3= Corporate Profit

4= Net Interest

5= Depreciation

²This method can be interpreted as dividing the entries in the factor income approach that are not clearly capital income or clearly labor income (i.e. entries other than 1-5) according to the proportion of the entries which we can clearly assign to capital or labor.