Homework 8

1. Consider the following CPI data for 1990–1999: 103, 104, 106, 106, 108, 111, 120, 135, 139, 140. Calculate the inflation rates over this period. The nominal prices of two-year government bonds delivering $100 at the end of maturity for the period 1990–1997 were 98, 95, 95, 94, 99, 90, 90, 85. The nominal price of a one-year government bond delivering $100 at maturity was 99 in 1990. Compute the real (one-year) interest rates over 1990–1999. Also compute your guesses for what the dollar prices of one-year bonds were over the period 1991–1998.

2. Consider the following (fake) data for PCs: in 2000, the top-of-the-line IBM cost $5000, and in 2001 it cost $4500, whereas in the top-of-the-line Dell cost $4000 in 2000 and $4000 in 2001. Twice as many IBMs as Dells were sold in 2000, and in 2001, the total number of IBMs units sold stayed the same as in 2000 while the number of Dells sold doubled. Compute a price index for top-of-the-line PCs with 2000 as base year. How does the index change if 2001 is used as base year instead? Now consider the following additional information about PCs: in 2001, machines with less than top-of-the-line features were also sold, and it was estimated that the price per 100 units of clock speed (keeping all other features fixed) was $200, the price on RAM memory (keeping all other features fixed) $300 per 50 units of Megabytes, and the price of hard disk memory (keeping all other features fixed) $300 per Gigabyte. The corresponding numbers for 2000 were $175, $250, and $200, respectively. Assuming that these were all the relevant technical features of PCs in these years, discuss the relevance of the first price index computations you computed. How would you compute a price index based on the speed and memory prices? If you think more information is needed to do this, specify what information this would be.

3. Using 1990 as base year, compute real GDP for 1990–1995 based on the following price and quantity information: there are two goods, and good 1 cost 100, 100, 110, 120, 140, and 120 over the period whereas good 2 cost 100, 110, 110, 130, 150, and 160, whereas their corresponding quantities were 20, 22, 24, 22, 24, and 30 for good 1 and 20, 25, 30, 38, 40, and 40 for good 2. Also, compute a chain-weighted index for the period. For each index, compute the GDP deflator.

4. Specify the nominal budget constraints of a generation with labor income both when young and when old and with a physical depreciation rate of 50%. Derive the present-value budget constraint in nominal form as well as in real form and derive the relation between the real and the nominal rates of interest.