**Home Work 4**

2. In the data file **us\_macro\_quarterly**, you will find data on two aggregate price series for the United States: the price index for personal consumption expenditures (PCEP) that you used in Homework 3 Problem 1 and the Consumer Price Index (CPI). These series are alternative measures of consumer prices in the United States. The CPI prices a basket of goods whose composition is updated every 5–10 years. PCEP uses chain weighting to price a basket of goods whose composition changes from month to month. Economists have argued that the CPI will overstate inflation because it does not take into account the substitution that occurs when relative prices change. If this substitution bias is important, then average CPI inflation should be systematically higher than PCEP inflation. Let πtCPI =400 × [ln(*CPIt*) − ln(*CPIt*−1)], and πtPCEP= 400 × [ln(*PCEPt*) − ln(*PCEPt*−1)], and *Yt* = πtCPI −πtPCEP, so πtCPIis the quarterly rate of price inflation (measured in percentage points at an annual rate) based on the CPI, πtPCEPis the quarterly rate of price inflation from the PCEP, and *Yt* is their difference.

Using data from 1963:Q1 through 2012:Q4, carry out the following exercises.

**a.** Compute the sample means of πtCPI and πtPCEP. Are these pointestimates consistent with the presence of economically significantsubstitution bias in the CPI?

**b.** Compute the sample mean of *Yt*. Explain why it is numerically equal to the difference in the means computed in (a).

**c.** Show that the population mean of *Y* is equal to the difference of the population means of the two inflation rates.

**d.** Consider the “constant-term-only” regression: *Yt* = b0 + *ut*. Show that b0 = *E*(*Y*). Do you think that *ut* is serially correlated? Explain.

**e.** Construct a 95% confidence interval for b0. What value of the HAC standard truncation parameter *m* did you choose? Why?

**f.** Is there statistically significant evidence that the mean inflation rate for the CPI is greater than the rate for the PCEP?

**g.** Is there evidence of instability in b0? Carry out a QLR test. (*Hint:* Make sure you use HAC standard errors for the regressions in theQLR procedure.)