Homework

Econ 5243

October 15, 2007

Problem 1

Consider the following the models based on exercise 2.23 of Davidson and MacKinnon:

$$\Delta r_t = \beta_1 + \beta_2 \pi_{t-1} + \beta_3 y_{t-1} + \beta_4 \Delta r_{t-1} + \beta_5 \Delta r_{t-2} + u_t \quad (1)$$

$$\Delta r_t = \beta_1 + \beta_3 y_{t-1} + \beta_4 \Delta r_{t-1} + \beta_5 \Delta r_{t-2} + u_t \quad (2)$$

$$\Delta r_t = \beta_1 + \beta_3 y_{t-1} + \beta_4 \Delta r_{t-1} + u_t \quad (3)$$

using the `tbrate.dat` data and the model selection rules $\bar{R}^2$, cp, aic, and sc, choose the "best" model using each criterion. What warnings would you give someone based on the outcome of your model selection derby?

Problem 2

Data on gasoline consumption in the United States from years 1960-1995 appear in Greene's Econometric Analysis text (5th edition, Table F2.2). You can find the data on my website. The variables are:

- G = total gasoline consumption
- P_g = the price of gasoline
- Y = per capita disposable income
- P_{nc} = price index of new cars
- P_{uc} = price index of use cars

- P_{pt} = price index of public transportation
- P_d = price index of durable goods
- P_n = aggregate price index of nondurable goods
- P_s = aggregate price index of consumer services

$$\ln G = \beta_1 + \beta_g \ln P_g + \beta_Y \ln Y + \beta_{nc} \ln P_{nc} + \beta_{uc} \ln P_{uc} + \beta_{pt} \ln P_{pt} + \beta_d \ln P_d + \beta_n \ln P_n + \beta_s \ln P_s + e \quad (4)$$

Using the data provided on the website, use GAUSS and STATA to answer the following.

1. Estimate the model using least squares. Compute and report coefficient estimates, their standard errors, t-ratios, and their p-values.
2. Compute R^2.
3. Perform the overall F-test for regression significance.
4. Report your estimate of the scale parameter, σ^2.

Problem 3

Using the same model and data do the following:

1. Test the following hypotheses at the 5% level using a Wald test:
   (a) $\beta_g = -1$ and $\beta_Y = 1$. Own price elasticity of demand is minus one and the income elasticity is one.
   (b) $\beta_{nc} = \beta_{uc}$ and $\beta_Y = 1$.
   (c) $\beta_{nc} = \beta_{uc}$, $\beta_n = \beta_d$, and $\beta_Y = 1$.
2. Find the p-values associated with the Wald tests.
3. Find the 3 sets of restricted estimates using the RLS estimator

$$b^* = b + (X'X)^{-1}R'[R(X'X)^{-1}R']^{-1}(r - Rb) \quad (5)$$

   as discussed in class. Compute and report standard errors, t-ratios, and p-values.

4. Repeat the tests using the other forms of the statistics λ_2 and λ_3 discussed in class.
5. Find the restricted estimates and repeat the hypothesis tests using the test statements in Stata.

Important Note: Whenever you do a hypothesis test, be sure to state the null and alternative hypotheses, the distribution of your test statistic under the null hypothesis, your decision criterion, and your decision.

Problem 4

Write an Gauss module that computes the RESET test. Perform the RESET with powers 2 and 3 on the gasoline demand model above. Based on the outcome of this test, is your model misspecified? If so, reestimate the model in level form and repeat the RESET test. Which functional form is best supported by the data?

Remember: Whenever you do a hypothesis test, be sure to state the null and alternative hypotheses, the distribution of your test statistic under the null hypothesis, your decision criterion, and your decision.

Exercise

Do exercise 3.19 in ETM.