

Due Tuesday, April 5

This assignment is on multicollinearity problems, specification error and instrumental variables estimation. The necessary data come from two sources: the Excel files *macrodata.xls* and *dat303sb.xls* available at <http://uaeller.eller.arizona.edu/~rlo> under econ 522a. Be sure to attach the supporting computer print out to the completed assignment and make clear where your answers are shown.

1. Consider the following (true) model of the demand for imports:

$$\ln(IMPORTS)_t = \beta_0 + \beta_1 \ln(GDP)_t + \beta_2 \ln(PT)_t + \beta_3 \ln(POP)_t + u_t, t = 1, \dots, 35$$

where *IMPORTS* is the value of imports of goods and services, *GDP* is gross domestic, and *POP* is the U.S. populations (details available Ramanathan, *Introductory Econometrics with Applications*, 5th ed., pp. 558-559).

- a. Evaluate the model for multicollinearity problems using the condition number and the variance inflation factor criteria.
- b. Suppose a researcher estimates the model

$$\ln(IMPORTS)_t = \beta_0 + \beta_2 \ln(PT)_t + \varepsilon_t$$

Assume that $\beta_1 = 2.0$ and $\beta_3 = -1.0$

Calculate the bias for the *OLS* estimators of β_0 and β_2 in the researcher's model.

2. Consider the following simple model of labor supply for a random sample of workers in 1990:

$$\ln(hours_t) = \beta_0 + \beta_1 \ln(wage_t) + \beta_2 \ln(nly_t) + \varepsilon_t, t = 1, \dots, 200$$

where *hours* is annual hours of work, *wage* is the hourly wage rate, and \widetilde{nly} is non labor income. A researcher believes that $\ln(nly_t) = \widetilde{\ln(nly_t)} + v_t$, where $\widetilde{\ln(nly_t)}$ is the correct measure of log (non labor income), and v is an unobserved random error term that is uncorrelated with $\widetilde{\ln(nly_t)}$ and that satisfies all of the standard assumptions.

Estimate the model by *IV* (instrumental variables) using $\ln(fsize)$ as an instrument for $\ln(nly)$, where *fsize* is family size.