

Due Thursday, May 5

This assignment is on seemingly unrelated regressions and simultaneous equations. The data for this assignment come from two sources: the Excel files `dat503sa.xls` and `dat503sb.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 equations for the aggregate labor hours demanded by 3 industries over the period $t = 1963, \dots, 1987$:

$$\ln(h_{1t}) = \beta_{10} + \beta_{11} \ln(wr_{1t}) + \beta_{12} \ln(q_{1t}) + \varepsilon_{1t},$$

$$\ln(h_{2t}) = \beta_{20} + \beta_{21} \ln(wr_{2t}) + \beta_{22} \ln(q_{2t}) + \varepsilon_{2t},$$

$$\ln(h_{3t}) = \beta_{30} + \beta_{31} \ln(wr_{3t}) + \beta_{32} \ln(q_{3t}) + \varepsilon_{3t},$$

where h_i is aggregate industry labor hours, wr_i is a measure of the wage rental ratio, q_i is a measure of gross industry output, and $i = 1, 2, 3$ corresponds to the transportation, communications, and utility industries. The variables were constructed from the National Income and Product Accounts data.

- a. Estimate the above equations by *OLS* and *SUR* (seemingly unrelated regressions).
 - b. Test $H_0: \Sigma$ is diagonal, $H_1: \sim H_0$ at the 5% level. Use the tests given below.
 - (1) the Breusch-Pagan Lagrange multiplier test.
 - (2) the likelihood ratio test.
2. An experimental double auction market demand and supply model is specified as

$$Q_t = \gamma_{10} + \beta_{12} PBAR_t + \gamma_{11} XD_t + \gamma_{13} UD_t + u_{1t}, \quad t = 1, \dots, 300$$
$$PBAR_t = \gamma_{20} + \beta_{22} Q_t + \gamma_{22} XS_t + \gamma_{24} US_t + u_{2t}$$

where Q is quantity transacted, $PBAR$ is the average price, XD and UD are demand shift variables, XS and US are supply shift variables, and u_1 and u_2 are structural demand and supply error terms.

- a. Identify which variables in the model are endogenous and which are predetermined. Explain.
- b. Determine the identification status of each structural equation according to the rank and order conditions.
- c. Estimate the model by *OLS*, *2SLS*, and *3SLS*.
- d. Estimate the *unrestricted* reduced form equations by *OLS*.
- e. Obtain the *derived* reduced form parameters from the *3SLS* estimated structural parameters.