Economics 312 — Spring 2020

Daily Problem #35 — April 17

In our class discussion we will work with a series of examples of simple supply-demand models to illustrate the phenomenon of identification in a simultaneous-equation model. Here, you conduct some exploration of "Model IV" from that analysis.

Suppose that the demand curve for an agricultural product is given by

$$Q = \alpha_0 + \alpha_P P + \alpha_M M + u ,$$

where Q is quantity exchanged, P is price, M is consumer income (assumed to be exogenous), and u is the random disturbance in the demand equation. The supply curve is given by

$$Q = \beta_0 + \beta_P P + \beta_R R + v ,$$

where R is rainfall (exogenous) and v is the random supply disturbance.

1. Solve these two equations for the reduced-form equations for Q and P.

2. Denoting the reduced-form system by

$$P = \pi_{P0} + \pi_{PM} M + \pi_{PR} R + \varepsilon_P$$
$$Q = \pi_{Q0} + \pi_{QM} M + \pi_{QR} R + \varepsilon_Q ,$$

where the π values are coefficients and the ε variables are composite error terms, show how each of the six α and β structural coefficients can be calculated uniquely as a function of the six π coefficients of the reduced form. (Find the formulas, though you may ignore α_0 and β_0 if you want.)

3. What happens to our ability to identify the α and/or β coefficients if $\alpha_M = 0$? If $\beta_R = 0$?