THE UNIVERSITY OF CHICAGO
DEPARTMENT OF ECONOMICS

Economics 209
Honors Econometrics
Problem Set #5

SE1: Identifying restrictions.

Consider the following two equation model:

$$\begin{aligned} y_1 &= \gamma_1 y_2 + \beta_{11} x_1 + \beta_{21} x_2 + \beta_{31} x_3 + \epsilon_1 \\ y_2 &= \gamma_2 y_1 + \beta_{12} x_1 + \beta_{22} x_2 + \beta_{32} x_3 + \epsilon_2 \end{aligned}$$

a. Verify that neither equation is identified.

b. Are the following restrictions sufficient to identify the model?

1. $\beta_{21} = \beta_{32} = 0$
2. $\beta_{12} = \beta_{22} = 0$
3. $\gamma_1 = 0$
4. $\gamma_1 = \gamma_2$ and $\beta_{32} = 0$
5. $\beta_{21} + \beta_{22} = 1$

SE2: Obtaining reduced forms.

Obtain the reduced form for the model in SE1, under each of the assumptions in part b.

SE3: Identification of a simple macroeconometric model.

Consider the following model:

$$\begin{aligned} R_t &= \beta_0 + \beta_1 M_t + \beta_2 Y_t + u_{1t} \\ Y_t &= \alpha_0 + \alpha_1 R_t + u_{2t} \end{aligned}$$

where M_t, the money supply, is considered exogenous, R_t is the interest rate, and Y_t is *GDP*.

a. Are the equations identified?

Suppose we change equation 2 and consider investment, I_t, as exogenous:

$$Y_t = \alpha_0 + \alpha_1 R_t + \alpha_2 I_t + u_{2t}$$

b. Are the equations identified now?

Suppose we now consider M_t as endogenous and we consider the following model:

$$
\begin{aligned}
R_t &= \beta_0 + \beta_1 M_t + \beta_2 Y_t + u_{1t} \\
Y_t &= \alpha_0 + \alpha_1 R_t + \alpha_2 I_t + u_{2t} \\
I_t &= \gamma_0 + \gamma_1 R_t + u_{3t}
\end{aligned}
$$

c. Are the equations identified now?