

AEB 6572 Three Stage Least Squares Review Assignment

Charles B. Moss

March 28, 2012

1. Data in columns AC through AN can be used to estimate a model of the corn market

$$\begin{aligned}q_t^S &= \alpha_{10} + \alpha_{11}p_{ct} + \alpha_{12}w_{st} + \alpha_{13}w_{ft} + \alpha_{14}w_{dt} + \epsilon_{1t} \\q_t^{FSI} &= \alpha_{20} + \alpha_{21}p_{ct} + \alpha_{25}p_{ft} + \alpha_{26}y_t + \epsilon_{2t} \\q_t^{Feed} &= \alpha_{30} + \alpha_{31}p_{ct} + \alpha_{37}p_{lt} + \epsilon_{3t} \\q_t^{Export} &= \alpha_{40} + \alpha_{41}p_{ct} + \alpha_{48}r_t + \epsilon_{4t} \\q_t^S &= q_t^{FSI} + q_t^{Feed} + q_t^{Export}\end{aligned}\tag{1}$$

where q_t^S is the quantity of corn supplied, p_{ct} is the market price for corn, w_{st} is the price of seed, w_{ft} is the price of fertilizer, w_{dt} is the price of fuel (diesel), q_t^{FSI} is the quantity of corn used for food, industry, and seed, p_{ft} is the price of food products, y_t is the level of consumer income, q_t^{Feed} is the quantity of corn used in livestock feed, p_{lt} is the price of livestock, q_t^{Export} is the quantity of corn exported, and r_t is the real exchange rate.

- a. Estimate the corn price in each year as a function of exogenous variables.
- b. Estimate the parameters of each equation as a function of first stage estimates of the corn price.
- c. Use the estimated errors from (b.) to estimate the covariance matrix for equations.
- d. Set up the system of equations in a series of stacked independent variables and vectorized dependent variables.

- e. Estimate the Generalized Least Squares formulation based on these stacked variables.

$$x_t = \begin{bmatrix} 1 & p_{c1} & w_{s1} & w_{f1} & w_{d1} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & p_{c1} & p_{ft} & y_t & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & p_{c1} & p_{lt} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & p_{ct} & r_t \end{bmatrix} \begin{bmatrix} \alpha_{10} \\ \alpha_{11} \\ \alpha_{12} \\ \alpha_{13} \\ \alpha_{14} \\ \alpha_{20} \\ \alpha_{21} \\ \alpha_{25} \\ \alpha_{26} \\ \alpha_{30} \\ \alpha_{31} \\ \alpha_{37} \\ \alpha_{40} \\ \alpha_{41} \\ \alpha_{48} \end{bmatrix} \quad (2)$$