

AEB 6571 - Econometric Methods II

Midterm Examination

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I. Theory Questions (Closed Book, Closed Computer)

- A. Prove that ordinary least squares estimates are best linear unbiased. [**25 Points**]
- B. I have been examining the dispersion of lending between private lenders (banks, insurance companies, and the Farm Credit System) and public lenders (the Farm Services Agency). In my analysis I have generated an entropy measure

$$I_t = -p_{1t} \ln(p_{1t}) - p_{2t} \ln(p_{2t}) \quad (1)$$

where p_{1t} is the share of lending by private sector lenders and p_{2t} is the share of lending by public sector lenders. The measure increases as the two sets of lenders become more equal and decline if one lender dominates the other. The data indicate that public sector lenders became more involved in agricultural lending the 1980s as the farm sector entered financial crisis. To test the effect of financial crisis on lender dominance, I proposed estimating the regression

$$I_t = \alpha_0 + \alpha_1 x_{1t} + \alpha_2 x_{2t} + \alpha_3 x_{3t} + \alpha_4 x_{4t} + \epsilon_t \quad (2)$$

where x_{1t} is the sector's debt-to-asset ratio, x_{2t} is the ratio of farmland values to total agricultural assets, x_{3t} is the return on agricultural assets, and x_{4t} is the ratio of interest paid to farm income. My data is for 1960 through 2009. Given that I_t is more

likely distributed Gamma than normal, should I apply standard ordinary least squares procedures to estimate the effect of these variables? Why? [**20 Points**]

II. Empirical Questions (Open Computer, Closed Book) - Do not rely on "canned computer codes," supply the intermediate matrices.

- A. Using the data from Moss, Erickson, Ball, and Mishra (2003) estimate the share equation for purchased inputs

$$s_{1t} = \alpha_0 + \alpha_1 \ln[w_{1t}] + \alpha_2 \ln[w_{2t}] + \alpha_3 \ln[w_{3t}] + \alpha_4 \ln[y_{1t}] + \alpha_5 \ln[y_{2t}] + \epsilon_t \quad (3)$$

where s_{1t} is the share of cost spent on purchased inputs, w_{1t} is the price of purchased inputs, w_{2t} is the price of labor, w_{3t} is the price of capital, y_{1t} is the level of livestock output, and y_{2t} is the level of crop output. Estimate the variance matrix and construct a t-Test for each parameter. What kind of test is a t-Test (Lagrange Multiplier, Likelihood Ratio, or Wald)? **[20 Points]**

- B. Using the specifications from Problem II.A, estimate the restricted least squares specification imposing homogeneity

$$\alpha_1 + \alpha_2 + \alpha_3 = 0. \quad (4)$$

Present these results in a table including the standard errors of the estimates. **[20 Points]**

- C. Estimate the parameters for Question I.B above given the data in AgCredit.xls. Present a table of estimated parameters, standard errors, and the appropriate test of significance of each parameter. Test for

$$\alpha_1 = \alpha_2 = 0. \quad (5)$$

[15 Points]