

Economics 671: Econometrics  
Department of Economics, Finance and Legal Studies  
University of Alabama  
Fall 2015

Midterm

1. Consider the following CES production function with strictly exogenous inputs as

$$y_i = (\beta_1 x_{1i}^\rho + \beta_2 x_{2i}^\rho)^{1/\rho} + u_i, \quad i = 1, 2, \dots, n.$$

Without altering the function, specify the objective function, take the first-order conditions (with respect to  $\beta_1$  and  $\beta_2$ ) and give the general form (not specific to this function) of the asymptotic variance formula in the following frameworks:

- (a) OLS
- (b) NLS
- (c) MLE
- (d) GMM

2. The density for the Weibull distribution is

$$f(y) = \gamma \alpha y^{\alpha-1} \exp(-\gamma y^\alpha)$$

where  $y > 0$ , and the parameters  $\alpha > 0$  and  $\gamma > 0$ . The standard Weibull regression model is obtained by specifying  $\gamma = \exp(x\beta)$ . Given independence over  $i$  ( $i = 1, 2, \dots, n$ ), show the following:

- (a) Can this be written as a linear exponential family density? If so, give that form.
- (b) Derive the log-likelihood function.
- (c) Take the first order conditions with respect to  $\alpha$  and  $\beta$ .

3. Answer these questions about the assigned paper from class (MacKinlay and Richardson – *Journal of Finance*).
- (a) List the system of excess return market model regression equations.
  - (b) List the moment conditions in the unrestricted model. When estimating the system this way, what is the estimation equivalent to?
  - (c) List the moment conditions in the restricted model. When estimating the system this way, what is the estimation method called?
  - (d) Briefly discuss why estimation *and* testing via maximum likelihood is inappropriate in this setting?