

June 9, 2011

Econometrics (ECO 4421)

Class No. 84362

Department of Economics, Florida International University
Fall Semester 2009

Final Examination

[40 percent]

Instructions: There are five questions in all, each having several parts. Answer all parts of all questions.

You will get more credit for precise answers and penalized for vague answers. Answers that do not directly address the question being asked but rather only provide some tangential information will not get any credit.

Be as specific as you can get. As a general rule of thumb providing more details in an answer is better.

Question 1**[5 percent]**

Suppose the true regression model is

$$y = \beta_2 x_2 + \beta_3 x_3 + v$$

and the misspecified model is

$$y = \beta_2 x_2 + u.$$

Assume all variables have mean zero. Show whether or not the OLS estimator of β_2 from the mis-specified model is unbiased.

Question 2**[6 percent]**

In the case of the multiple regression model

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + u,$$

the OLS estimators of the slope coefficients are given by:

$$\hat{\beta}_1 = (S_{22}S_{1y} - S_{12}S_{2y}) / \Delta \text{ and } \hat{\beta}_2 = (S_{11}S_{2y} - S_{12}S_{1y}) / \Delta,$$

where $\Delta = S_{11}S_{22} - S_{12}^2$. If the regressors are perfectly correlated, i.e. if

$x_2 = ax_1 + b$, where a and b are constants, what do the OLS estimators $\hat{\beta}_1$ and $\hat{\beta}_2$ reduce to?

$$\text{Hint: } S_{12} = \sum_i x_{1i} x_{2i} - n\bar{x}_1 \bar{x}_2, \text{ evaluate } \Delta, \text{ and proceed.}$$

Question 3**[5 percent]**

In the linear regression model

$$y = \alpha + \beta x + u,$$

OLS estimation yielded $\hat{\alpha} = 2.5$ and $\hat{\beta} = 2$. Suppose, instead of using x as the regressor, we use $x' = (x-1)/100$. What will be the estimates of the new coefficients, α' and β' , in the regression with x' as the regressor?

Question 4**[9 percent]**

Provide brief, but complete, answers to the following questions.

- (i) OLS estimates of the slope are more precisely estimated if the X-values are closer to their sample means.
- (ii) If X_t and u_t are correlated, OLS estimators are still unbiased.
- (iii) How does one determine whether a group of explanatory variables exerts a significant influence on the dependent variable?

Question 5**[15 percent]**

Suppose that, from a sample of 63 observations, the OLS estimates and the corresponding estimated variances and covariances of the estimators are given by:

$$\hat{\beta}_1 = 2, \hat{\beta}_2 = 3, \text{ and } \hat{\beta}_3 = -1$$

$$\text{vâr}(\hat{\beta}_1) = 3, \text{vâr}(\hat{\beta}_2) = 4, \text{vâr}(\hat{\beta}_3) = 3, \text{covâr}(\hat{\beta}_1, \hat{\beta}_2) = -2, \text{ and } \text{covâr}(\hat{\beta}_3, \hat{\beta}_2) = 0.$$

Test each of the following hypotheses and state the conclusion. Be sure to state the alternative hypothesis, the test statistic, its distribution under the null including d.f., the critical value, and the criterion for rejecting the null as well.

- (i) $\beta_3 = 0$
- (ii) $\beta_1 + 2\beta_2 = 5$
- (iii) $\beta_1 - \beta_2 + \beta_3 = 4$