

International Islamic University Chittagong (IIUC)

Department of Economics & Banking

Final Examination, Autumn-2021

Program: BSS(Hons.)

Course Code: ECON 3601
Time: 02Hours 30 Minutes

Course Title: Basic Econometrics
Full Marks: 50

Answer any Five of the following questions. All parts of a question must be answered sequentially. Figures in the right margin indicate full marks.

- 1 (a) Consider the population regression function, $Y = \beta_1 + \beta_2 X + u_i$. 06
 (i) How the estimators $\hat{\beta}_1, \hat{\beta}_2$ are affected by u_i ?
 (ii) Why do normality assumptions become useful? Write down the normality assumption for $u_i, \hat{\beta}_1, \hat{\beta}_2$.
- (b) Distinguish between point and interval estimations. Which one is reliable? Display your argument(s). 04
- 2 (a) Can you explain what Type I error, Type II error, and the confidence coefficient mean? 03
 (b) Consider the following results: $\hat{\beta}_1 = 24.4545, \hat{\beta}_2 = 0.5091, \text{Cov}(\hat{\beta}_1, \hat{\beta}_2) = -0.2172, r^2 = 0.9621, \text{Var}(\hat{\beta}_1) = 41.1370, \text{Var}(\hat{\beta}_2) = 0.0013, \text{df} = 8$. Where, COV, Var and df are the covariance, variance and degrees of freedom respectively. 07
 (i) Construct a 95 % interval estimate for β_1, β_2 and interpret.
 (ii) Testing the significance of regression coefficient β_2 has no effect on the model.
3. From a hypothetical data on earnings and education, the following result has been found 10

$$\text{Meanwage}_i = 0.7437 + 0.6416\text{Education}_i$$

$$se = (0.8355) \quad ()$$

$$t = ()(9.6536), r^2 = 0.8944, n = 13$$

$$\sum \hat{u}_i^2 = 8.8454$$
 (i) Fill in the missing values.
 (ii) How do you interpret the regression?
 (iii) Would you reject the hypothesis that education has no effect whatsoever on wages at 3% level of significance? Which test do you use? And why?
 (iv) Set up the ANOVA table for this example and test the hypothesis that the slope coefficient is zero. Which test do you use and why?
 (v) Interpret the value of coefficient of determination, $r^2 = 0.8944$.
4. (a) Distinguish between an intercept present and an intercept absence regression model with the necessary example. 04
 (b) The following regression results were based on time series data over the period 1971 to December 1980: 06
First Model:

$$\hat{Y}_i = 1.2797 + 1.0691 X_i$$

$$se = (7.6886) (0.2389)$$

$$r^2 = 0.4406$$
Second Model:

$$\hat{Y}_i = 0.1.0899 X_i$$

$$se = (0.1916)$$

$$r^2 = 0.43684$$
 where,
 Y = annual rate of return (%) on A future Fund
 X = annual rate of return (%) on the market portfolio

- (i) What is the difference between the two regression models?
- (ii) Given the preceding results, would you retain the intercept term in the first model? Why or why not?
- (iii) How would you interpret the slope coefficients in the two models?
- (iv) Can you compare the r^2 terms of the two models? Why or why not?

5. (a) Write short notes on: (i) Normality Probability Plot (ii) Jarque –Bera Test of Normality 03
 (b) How can you define semi-log models? How can one show the relationship between slope coefficient and elasticity in semi-log models? 07

6. (a) Mention a three-variable population regression model and put your opinion regarding the following aspects: 04

- (i) Write down interpretation of the coefficients of the model.
- (ii) The multiple coefficient of determination R^2
- (iii) The multiple coefficient of correlation R

- (b) Define the concept of adjusted R^2 with the necessary formula. Why do we need to use adjusted R^2 along with regular R^2 ? Show the relationship between R^2 and adjusted R^2 . 04

- (c) Consider the Cobb–Douglas production function, in its stochastic form, may be expressed as, 02

$$Y_i = \beta_1 X_{2i}^{\beta_2} X_{3i}^{\beta_3} e^{u_i}$$

- (i) Transform the function into a linear regression model.
- (ii) Interpret coefficients of the functions.

7. Consider the following multiple regression of Child Mortality (CM) in relation to Per Capita GNP (PGNP) and Female Literacy Rate (FLR): 10

$$CM_i = 263.6416 - 0.0056 PGNP_i - 2.2316 FLR_i$$

$$se = (11.5932)(0.0019) \quad (0.2099)$$

$$R^2 = 0.7077, \bar{R}^2 = 0.6981, n = 64$$

$$ESS = 257362.4, RSS = 106315.6, TSS = 363678$$

- (i) Interpret the partial regression coefficients, intercept and coefficient of determination.
- (ii) Are the estimated coefficients individually significant? Check at 5% level of significance.
- (iii) Test the overall significance of the regression model.
- (iv) How can you interpret the value of $R^2 = 0.7077$ and $\bar{R}^2 = 0.6981$?