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ST JOSEPH'S COLLEGE (AUTONOMOUS),BANGALORE - 27

SEMESTER EXAMINATION- OCTOBER-2019

B.Sc. ECONOMICS-VSEMESTER

ECS 5118: BASIC ECONOMETRICS

Duration: 2.5 Hrs **Max Marks: 70**

This question paper has TWO printed pages and THREE parts

PART A: Answer any TEN of the following questions 10x3=30

1. What is the difference between error term and residual? Use simple regression framework to give an example.
2. Can the adjusted- R^2 be greater thanR^2 ? Explain.
3. Consider the following regression line: $\widehat{Grades}$= 698.9 – 2.28 *STR where STR is the Student-Teacher Ratio. The t-statistic of the slope coefficient is 4.38. What is the standard error of the slope coefficient?
4. Re-formulate the following equation to be linear in parameters: $y = Ax^{\beta}e^{u}$.
5. What is dummy variable trap?
6. Give the interpretation of $\beta_1$in this model: $\ln(Y_i) = \beta_0 + \beta_1 X_i + u_i$
7. Assume that the true model includes variables X_1 and X_2 along with the constant term. What is the impact of including X_3 which is an irrelevant variable on the coefficient of X_2 ?
8. A researcher wants to understand the impact of experience *(Exp)* on skillfulness (*Skill*) and constructs this model: $ill = \beta_0 + \beta_1 \log(Exp) + \beta_2 \log(Exp^2) + u$. Why can't both coefficients β_1 and β_2 be estimated?
9. A popular test for auto-correlation is the Durbin Watson (DW) test. The DW statistic is given by $d = \frac{\sum(\widehat{e_t} - \widehat{e_{t-1}})^2}{\sum \widehat{e_t}^2}$. Why does d=2 implies no auto-correlation?
10. What is the difference between an estimator and an estimate? Explain these in the context of simple linear regression model
11. If we expect heteroscedasticity,when would we use heteroskedastic-robust (white) standard errors?
12. Define auto-correlation.

PART B: Answer any TWO of the following questions 2x5=10

13. What is multicollinearity? What are the problems associated with multicollinearity?

14. Your data has weight and height from 29 female and 81 male students at your university. You also know the number of siblings they have.You consider a new

theory that children who have more siblings come from poorer families and will have to share the food on the table. You decide to hypothesize that peers with many siblings will weigh less, on average, for a given height. You get the following regression:

$\widehat{Studentw}$ = - 229.92 – 6.52 *Female + 0.51 *Sibs+ 5.58 *Height, R^2=0.50

where Studentw is in pounds, Height is in inches, Female takes a value of 1 for females and is 0 otherwise, Sibs is the number of siblings.

a. Does the intercept make sense?
b. Interpret the coefficients and the R^2

15. If a variable should be included in the model but is not, there is omitted variable bias. Consider the true model which includes X_1 and X_2 but the estimated model excludes one of these variables. Derive the Omitted Variable.

PART C: Answer any TWO of the following questions **2x15=30**

16. Give assumptions under which the OLS estimator is unbiased. What do we mean by 'OLS estimator is BLUE'?

17. What is dummy variable? Graphically show the difference between the following models (X is a continuous variable and D a dummy variable):
    a. $Y = \beta_0 + \beta_1 X + \beta_2 D + u$
    b. $Y = \beta_0 + \beta_1 X + \beta_2 D + \beta_3 (X * D) + u$
    c. $Y = \beta_0 + \beta_1 X + \beta_2 (X * D) + u$
18. In a regression of the rate of growth of employment on the rate of growth ofreal GDP using a sample of 31 OECD countries,R^2= 0.2837. The F-test of the goodness of fit can be calculated as $F = \frac{ESS/k-1}{RSS/n-k-1}$where n is the number of observations and k the number of parameters excluding the intercept term. ESS stands for Explanatory Sum of Squares and RSS for Residual Sum of Squares.
    a. Write the F statistic in terms of R^2.
    b. Calculatethe corresponding F statistic.

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