MID SEMESTER EXAMINATION SEMESTER II 2022-23

ECONOMETRIC METHODS [ECON F241]

TOTAL TIME: 90 MIN TOTAL MARKS: 30

Attempt all FIVE questions (Question Paper is printed on both sides)

1. The following regression equation represents a production function for Q.

$$\log Q = 1.37 + 0.632 \log L + 0.452 \log K$$
$$(0.357) \qquad (0.319)$$

$R^2 = 0.98 \qquad \text{Cov}(\beta_K, \beta_L) = 0.045$

The sample size is 33 and the standard errors are given in parentheses. Examine the null hypothesis that the capital (K) and labour (L) elasticities of output are identical.
(Some selected t-values for 30 degrees of freedom are: $t_{0.005}$=2.750; $t_{0.025}$=2.042; $t_{0.05}$=1.697; $t_{0.10}$=1.310). (6)

2. Show that the disturbance term of the Linear Probability Model suffers from the problem of heteroskedasticity. (6)

3. For a no intercept model, the value of r^2 is always zero. **True or False**? Explain your answer using a hypothetical dataset of consumption and income (illustrating a positive marginal effect of income on consumption) with 10 observations. Interpret r^2. (6)

4. Suppose our three variable multiple regression model is:

$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \varepsilon_i$ (the complete model). Assume X_{1i} and X_{2i} are highly correlated (correlation coefficient between X_1 and X_2 is 0.825) and we drop X_{2i} to avoid multicollinearity. Our omitted variable model becomes $Y_i = \beta_0 + \beta_1 X_{1i} + \mu_i$. Let the OLS estimate of β_1 from the omitted variable model be $\tilde{\beta}_1$.

Is the variance of $\tilde{\beta}_1$ greater or smaller than the variance of $\hat{\beta}_1$ (where $\hat{\beta}_1$ is the OLS estimate of β_1 from the complete model)? Verify your claim **numerically** using the following data: (6)

Y	X_1	X_2
1	2	4
2	4	2
3	6	12
4	5	14
5	8	16

FOR EASE OF COMPUTATION ANOVA TABLE FOR THE COMPLETE MODEL IS GIVEN BELOW:

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	9.203239	4.601619	11.55081	0.079676
Residual	2	0.796761	0.398381		
Total	4	10			

5. I)Consider the model: $Income = \beta_1 + \beta_2 Experience + level\ of\ education + \mu_i$. The data on education might consist of the highest level of education attained, such as less than high school (LTHS), high school (HS), College (C), post graduate (PG). One of the ways to proceed is to use a variable Z, that is 0 for the first group, 1 for the second, 2 for the third, and 3 for the fourth. That would be $Income = \beta_1 + \beta_2 Experience + \beta_3 Z + \mu_i$. **This approach assumes that the increment in income at each threshold is the same**. **True or False**? Verify your claim algebraically. (3)

II) Suppose that the risk of catching the flu is high for young children and the elderly but low for teenagers and younger adults. Which functional forms would be the best choice for modeling the relationship between flu risk (R) and age (A)? Write the model specification. (3)