BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
SECOND SEMESTER 2020-2021
ECON F241 ECONOMETRIC METHODS
CLASS TEST OPEN BOOK 15 April 2021

TOTAL MARKS: 10 Name: ID:

Q1. The Sports Finance Committee (SFC) was calculating the sponsorship amount collected for BOSM 2019. They made 2 regression models based on the average sponsorship from each company, *MONEY* (**measured in '000 Rs.**) and the number of companies who gave sponsorship, *N* on a random sample of 30 companies. They plan on using this to forecast future sponsorship for budgeting.

Equation 1:

$$\widehat{MONEY} = 7.5 + 0.009\text{N}$$

t = n.a. (16.10) R^2=0.90

Equation 2:

$$\widehat{MONEY}/N = 0.008 + 7.81(1/N)$$

t = (14.43) (76.58) R^2=0.99

a) How do you interpret the two regressions? **(1)**
b) Why do you think SFC went from Equation 1 to Equation 2? What must have they been worried about? What assumption did they make? How do you know? **(2)**
c) What is the relation between the slopes and intercepts of Equation 1 with those of Equation 2? What is the relation between the R^2 of Equation 1 and R^2 of Equation 2? **(1)**

Q2. In general,

$$\text{var}\left(\widehat{\beta_2}\right) = \frac{\sum x_i^2 \sigma_i^2}{\left(\sum x_i^2\right)^2} \text{ ......Eq.(3.1)}$$

Assume that $\sigma_i^2 = k_i^2\sigma^2$ where σ^2 is constant and k_i are known weights. How will Eq. (3.1) change? What will happen with respect to the homoscedastic variance, t and F statistics if:

i. $k_i > 1$ for all i
ii. $k_i < 1$ for all i **(2)**

Q3. a) A researcher investigating whether government expenditure tends to crowd out investment fits the regression (standard errors in parentheses) is given below. The notations are government recurrent expenditure **G**, investment **I**, gross domestic product **Y**, and population **P**, for **30 countries** in 1997. G, I, and Y are measured in US$ billion and P in million.

$$\hat{I} = 18.10 - 1.07\text{G} + 0.36\text{Y} \qquad \text{R}^2 = 0.99$$

(7.79) (0.14) 0.02

She arranges the observations by size of *Y* and runs the regression again for the 11 countries with smallest *Y* and the 11 countries with largest *Y*. *RSS* for these regressions is 321 and 28101, respectively. Perform a Goldfeld–Quandt test for heteroscedasticity. **(1)**

b) The researcher again runs the following regressions as alternative specifications of the model (standard errors in parantheses):

$$\hat{I}/P = -0.03(1/P) - 0.69(G/P) + 0.34(Y/P) \qquad R^2 = 0.97 \text{ ....}(1)$$

(0.28) (0.16) (0.03)

$$\hat{I}/Y = 0.39 + 0.03(1/Y) - 0.93(G/Y) \qquad R^2 = 0.78\text{...........}(2)$$

(0.04) (0.42) (0.22)

$$\widehat{log(I)} = -2.44 - 0.63log(G) - 1.60log(Y) \qquad R^2 = 0.98 \ldots\ldots\ldots\ldots.(3)$$
$$(0.26) \quad (0.12) \quad (0.12)$$

In each case the regression is run again for the subsamples of observations with the 11 smallest and 11 greatest values of the sorting variable, after sorting by Y/P, G/Y, and log Y, respectively. The residual sums of squares are as shown in the following table.

	11 smallest	**11 largest**
1	1.43	12.63
2	0.0223	0.0155
3	0.573	0.155

Perform a Goldfeld – Quandt test for each model specification and discuss the merits of each specification. Is there evidence that investment is an inverse function of government expenditure? **(3)**