BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

PROGRAMMES: BSc HONOURS DEGREE IN ECONOMICS

EC 206: INTRODUCTION TO ECONOMETRICS

DURATION: 3 HOURS

APR 2025

INSTRUCTIONS:

1. Answer all questions
2. NO CELLPHONES ALLOWED IN THE EXAMINATION ROOM.

Question 1

a. Using any practical economic problem of your choice, explain the conventional methodology of econometrics highlighting the importance of each of stages and also the challenges that a researcher might face at each of the stages. **(15 marks)**

b. In light of the conventional methodology of econometrics, explain how an econometrician can choose between competing models and hypotheses. **(5 marks)**

c. Briefly explain the importance of accurate data in conducting the methodology of econometrics. **(5 marks)**

Question 2

Consider the standard simple regression model: $Y = \alpha + \beta X + \mu$ under the Classical Linear Regression Model Assumptions. Let $\hat{\alpha}$ and $\hat{\beta}$ be the estimator of α and β respectively.

i. Derive the variance of $\hat{\beta}$. **(5 marks)**

ii. Prove that the variance of OLS estimator for β is efficient. **(6 marks)**

iii. Show that $\hat{\alpha}$ is an unbiased estimator of α. **(8 marks)**

iv. Distinguish between regression and correlation. **(10 marks)**

Question 3

a. A joint log-linear model is given as:

$$\log L = -n\log\delta_{\mu}^{2} - \frac{n}{2}\log 2\Pi - \frac{1}{2\delta_{\mu}^{2}}\sum(Y-\alpha-\beta X)^{2}$$

i. Derive the normal equations under the maximum likelihood estimation. **(5 marks)**

ii. Derive the variance of the residuals under MLE and show that it is biased for small samples. **(10 marks)**

b. Consider the standard simple regression model; $Y = \alpha + \beta X + \mu$ under the Classical Linear Regression Model Assumptions. Calculate the variance of the error term σ_{μ}^{2}. **(11 marks)**

Question 4

Consider the following savings model:

$\ln S = \alpha + \beta \ln Y + \rho D + \mu$

where ln is the natural logarithm, S is household savings in dollars per month, Y is household monthly income, α, β and ρ are parameters and μ is the error term. D takes the value of 0 for period under which covid 19 restrictions apply and zero otherwise.

a. Explain the rationale using natural logarithms in the model. **(5 marks)**

b. What is the rationale behind using and assigning dummy values as suggested? **(5 marks)**

c. Given the manner in which the dummy is assigned, justify the expected sign of ρ. **(5 marks)**

d. How does one interpret the intercept values of the savings function in the two sub-periods? **(5 marks)**

e. Briefly explain what is meant by the dummy variable trap. **(5 marks)**

END OF PAPER