BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

AGM 213

Department of Agricultural Economics, Education and Extension
BSc Agricultural Science (Honours) Part I1 Examination
ECONOMETRICS 1

3 HOURS (100 Marks)

MAR 2023

INSTRUCTIONS

Answer any *FOUR* questions. Each question carries **25 marks.**

Marking guide: exam 2

1. Consider a regression model of relating Y (the dependent variable) to X (the independent variable) $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$ where ε_i is the stochastic or error term. Suppose that the estimated regression equation is stated as $Y_i = \beta_0 + \beta_1 X_i$ and e_i is the residual error term.

    a) Define e_i .   **[2 marks]**

    b) Explain how e_i is related to ε_i.   **[5 marks]**

    c) Explain four reasons for the inclusion of e_i in the population regression model.

                                                                            [18 marks]

2. In a study of fertility patterns a random sample of ten cows (X) was selected. Ten years later calves from each cow (Y) were counted. The following table contains the data for X and Y.

Table 1: Actual and Desired Number of calves of ten randomly selected cows

Cows	Actual(Y)	Desired(X)
1	0	0
2	2	1
3	1	2
4	3	1
5	1	0
6	3	3
7	4	4
8	2	2
9	1	2
10	2	1
SUM	19	16

a) Using data from Table 1:
   Calculate the i)   covariance   **[5marks]**
   ii) β_0 **[5marks]**
   iii) β_1 **[5marks]**
   iv)   Interpret the economic meaning of the estimated coefficients for
        β_0 and β_1.   **[10 marks]**

3. Explain seven underlying assumptions for the classical linear regression model stated
   below:

   $$Y_i = \beta_0 + B_1 X_i + \beta_2 Z_i + \varepsilon_I$$ **[25 marks]**

4. Consider the following model

   $$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \varepsilon_t$$

   Where Y_t = actual rate of inflation (%) at time t, X_{2t} =unemployment rate (%) at time t, and
   X_{3t} = expected inflation rate (%) at time t. This model is known as the *expectations-
   augmented Phillips curve.*

   As a test of this model, we obtained the data and the OLS method gave the following
   results.

   $$Y_t = 7.1933 - 1.3925 X_{2t} + 1.4700 X_{3t}$$

   $$R^2 = 0.50$$

   a) Carefully state the meaning of the coefficients −1.3925 and 1.4700 in the equation in
      terms of the impact of X_{2t} and X_{3t} on Y.   **[5*2 marks]**

b) i) Interpret R^2 bar= 0.50. **[5 marks]**

ii) Explain why does one prefer to use R^2 bar rather than R^2. **[5 marks]**

c) Suppose that you were told that the true value of β_1 is -1.20. Explain if this shows whether the estimate is biased or not. **[5 marks]**

5. a) Explain the consequences of heteroscedasticity. **[16 marks]**

b) Explain two methods that are used for the detection of heteroscedasticity

[9 marks]

6. Consider the following model

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \varepsilon_t,$$

Explain,

i) how a dummy variable is included in the above equation

[15 marks]

ii) how to interpret a coefficient on a dummy variable **[10 marks]**

End of Paper