UNIVERSITY OF ESWATINI

SECOND SEMESTER MAIN EXAMINATION PAPER, AUGUST 2020

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

COURSE CODE: ECO420

TITLE OF PAPER: ECONOMETRIC METHODS II

TIME ALLOWED: 2 HOURS

Instructions

1. This paper consists of two (2) sections, A and B
2. Section A, is compulsory and carries 40 marks
3. Section B, contains three (3) questions
4. Answer any other two (2) questions in Section B

Special Requirements

Scientific calculator

Additional Material (s)

None

DO NOT turn examination paper over until instructed to do so.

SECTION A

Question 1 - Compulsory [40]

a) What is the difference between an intrinsically linear model and an intrinsically non-linear model? [4]

b) Given the mathematical models below (I and ii) show whether they are intrinsically linear or non-linear. Show working. [4]

    i. $Y_i = e^{\beta_1 + \beta_2 X_1 + U_i}$

    ii. $Y_i = \frac{1}{1 + e^{\beta_1 + \beta_2 X_1 + u_i}}$

c) If you are looking at modelling a categorical variable with more than two response categories, which model or models would you suggest using and why? [2]

d) What are the assumptions of the model you propose specifying in (c) above? [8]

e) What is count data? [2]

f) Suggest an econometric model you would use for modelling count data and why? [3]

g) What are the main assumptions of the model specified in (f) above? [8]

h) What is panel data? [2]

i) Using an appropriate test, how would you test for a structural break in a dataset if you know the period during which the structure is likely to break? [5]

SECTION B

ANSWER ANY TWO QUESTIONS

Question 2

a) Given the following model $Y_i = \beta_1 e^{\beta_2 X_i} + u_i$, What are the normal equations corresponding to this model. [10]

b) Using an appropriate example highlight the trial and error method for solving non-linear models.

[20]

Question 3

a) Suppose that the government is interested in determining the age at which heads of households in Eswatini most likely to find the largest number of people in their household, specify the appropriate Poisson regression model for this problem. [3]

b) The distribution of number of people per household is plotted below, comment on the likely distribution of the number of people per household. [4]

Number in the house excluding head of household
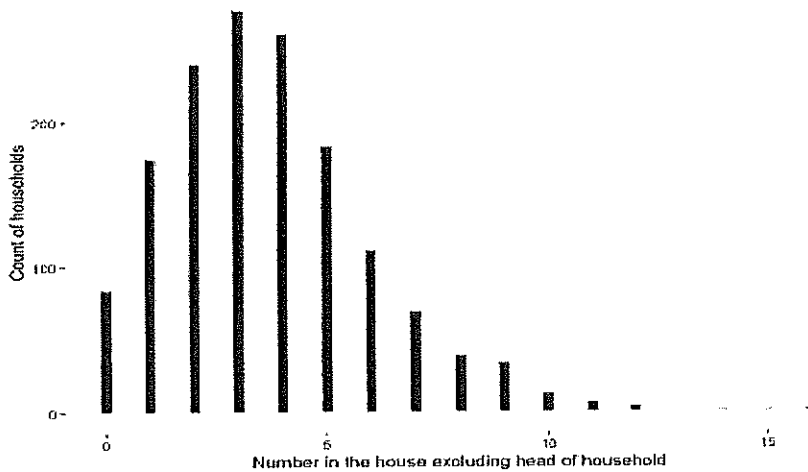
c) Given the following array of means and variances what does the data imply in terms of the assumptions of the Poisson regression model? [6]

Age Groups	Mean	Variance	n
(15,20]	1.666667	0.6666667	6
(20,25]	2.166667	1.5588235	18
(25,30]	2.918367	1.4098639	49
(30,35]	3.444444	2.1931464	108
(35,40]	3.841772	3.5735306	158
(40,45]	4.234286	4.4447947	175
(45,50]	4.489691	6.3962662	194
(50,55]	4.010638	5.2512231	188
(55,60]	3.806897	6.5318966	145
(60,65]	3.705882	6.1958204	153
(65,70]	3.339130	7.9980168	115
NA	2.549738	5.5435657	191

d) The following model was run using R, interpret the results. [7]

$$\widehat{log(\lambda)} = 1.55 - 0.0047(age)$$

```
glm(formula = total ~ age, family = poisson, data = fHH1)

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.5499422  0.0502754  30.829  < 2e-16 ***
age         -0.0047059  0.0009363  -5.026 5.01e-07 ***
---

(Dispersion parameter for poisson family taken to be 1)

    Null deviance: 2362.5  on 1499  degrees of freedom
Residual deviance: 2337.1  on 1498  degrees of freedom
AIC: 6714
```

e) The above model in (d) points into a situation of likely over dispersion in the model, what are the likely causes for over dispersion and what are the likely remedial measures? [5]

f) Using a suitable example explain the recursive least squares method, the procedure and use.

[5]

Question 4

a) Briefly discuss any five (5) advantages of using panel data [10]

b) Using an appropriate example or illustration, differentiate between a balanced panel and an unbalanced panel. [4]

c) What is meant by a fixed effects model (FEM)? Since panel data have both time and space dimensions, how does FEM allow for both dimensions? [10]

d) What is meant by an error components model (ECM)? How does it differ from FEM [6]