



MACHAKOS UNIVERSITY

UNIVERSITY EXAMINATIONS 2018/2019

**END OF SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF
BACHELOR OF SCIENCE IN STATISTICS AND PROGRAMMING**

SST 405: ECONOMETRICS III

DATE

TIME: 2 Hours

INSTRUCTIONS

- i) Answer question ONE and any other TWO questions. Question one carries 30 marks and the other questions carry 20 marks each.
- ii) Do not write on the question paper

QUESTION ONE (Compulsory)

(30 MARKS)

a) Explain the term non-linear model using examples. **(4 Marks)**

b) You are given the following Stata output (Table 1) of probit model on the determinants of technology adoption in agriculture for Uganda and Tanzania.

Table 1: Determinants of technology adoption (improved seeds) in Tanzania and Uganda

Variables	Adoption decision (o/1)		Adoption decision (o/1)	
	Improved Seeds in TZ		Improved Seeds in UG	
	Coefficients	P-Value	P-value	P-Value
Age of household head	-.0027(0 .0033)	0.3440	-.0179(0 .002)	0.000
Age of household head square	-.000012(0 .00004)	0.2345	.00019(0.00003)	0.000
Family size in AEU	.0246(0 .0091)	0.003	.0452(0 .007)	0.000
Gender of household head	.0045(0 .0383)	0.1234	-.326(0 .024)	0.000
Farm size per AEU	2.270(0 .308)	0.000	.283(0 .016)	0.000

Farm equipment per AEU	.475(0 .0393)	0.000	-0.000(0. 000)	0.235
Distance to the market	.0151(0 .0023)	0.000	.0054 (0 .0013)	0.000
Contact with Government extension agents	.727(0 .149)	0.000	.200(0 .052)	0.000
Contact with other extension agents	.013(0 .0039)	0.000	.277(0 .052)	0.000
Practice of soil and water conservation	.952(0 .040)	0.0781	.103 (0 .0052)	0.000
Number of improved seed varieties	0.00(0.00)	0.034	.728(0 .034)	0.000
Access to credit	-.187(0 .090)		.176(0 .014)	0.000
Access to off-farm activities	-.029(0 .028)		-.351(0 .025)	0.000
Constant	-1.536(0 .0954)		-6.346(82.91)	
Number of obs	36,588		43,714	
Log likelihood	-2653.8803		-7127.72	
LR chi2(21)	9408.66		7947.89	
Prob > chi2	0.000		0.000	
Pseudo R2	0.6393		0.358	

Note Statistical Significance at 99 (***) , 95% (**) and 90% (*) confidence levels. The number in brackets show standard errors.

Required: Interpret these findings while highlighting similarities and differences regarding determinants of technology adoption in the two countries. **(20 Marks)**

c) Write short notes on the following challenges associated with linear regression:

- i. Endogeneity **(3 Marks)**
- ii. multicollinearity **(3 Marks)**

QUESTION TWO (20 MARKS)

Suppose the value of Y in period t is determined by its own lagged value and by lagged values of other variables X and Z ;

- a) Express Y_t as a function of its lagged value, and lagged values of X and Z **(4 Marks)**
- b) Use the Y_t equation (in a) to form an expectation of Y taking into consideration time t . (hint: use lagged values at $t - 1$). **(10 Marks)**
- c) Differentiate between stationary and non-stationary time series, normal and non-normal distributions. **(6 Marks)**

QUESTION THREE (20 MARKS)

You are given the following 10 values of Y and X depicting the relationship between Y a dependent variable and X an independent variable.

Y	40	80	90	85	70	60	95	100	50	70
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X	80	100	150	110	90	40	120	150	30	70
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Required:

- Estimate: $\hat{\alpha}_1$ and $\hat{\alpha}_0$ **(12Marks)**
- Express the relationship between \hat{y} and x , and interpret the results. **(4 Marks)**
- Calculate the R^2 and interpret the results **(4 Marks)**

QUESTION FOUR

(20 MARKS)

- Explain the role on an error term in econometric models **(4 Marks)**
- Fourth year students of statistics and programming of Machakos University estimated factors explaining student performance at the University using OLS Model (Linear regression). The output of their estimation is as follows:

$$Y = -3.5 + 0.016CA + .86CRC + 0.08LT + 0.02HSG + 27.95LSR$$

Where; Y=Grade in unit X(performance), CA=class attendance, CRC=class room characteristics, LT=Lecturers title, HSP=high school grade and LSR=Lecturer student ratio.

Use this information to questions (i), (ii) and (iii).

- Explain the effect and magnitude of explanatory variables on Y. **(10 Marks)**
- Interpret the value, -3.5 in the equation. **(2 Marks)**
- Discuss any two challenges which could have biased the estimates in the equation. **(4 Marks)**

QUESTION FIVE

(20 MARKS)

Write short notes on the following:

- OLS model
- Tobit model
- Probit Model
- Heteroscedasticity
- Hypothesis testing **(20Marks)**

All the best