



MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

MASTER OF SCIENCE IN AGRIBUSINESS AND INTERNATIONAL TRADE

AGB 808: AGRICULTURAL ECONOMETRICS

DATE: 24/6/2019

TIME: 10:00 – 1:00 PM

INSTRUCTIONS:

- Answer question one (Compulsory) and any other two questions
- Do not write on the question paper
- Show your workings clearly

QUESTION ONE (COMPULSORY)(20 MARKS)

- a) Consider the demand function for chicken.

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu$$

Where y is per capita consumption of chicken, X_1 real disposable per capita income, X_2 is real retail price of chicken per Kg, X_3 is real price per pork per Kg, X_4 is real retail price of beef.

Using time series data for 1960-1982 the following are the OLS estimates

Variable	Coefficient	Standard error
X1	0.3425	0.0833
X2	-0.5046	0.1109
X3	0.1485	0.0997
X4	0.0911	0.1007
Constant	2.1898	0.1557

- Using t-test, which of the coefficients are individually statistically significant at 5 % level? (5 marks)
- Interpret the magnitude of each coefficient (5 marks)
- The R^2 of the estimated equation is 0.9823. Interpret it (2 marks)

- b) What are the advantages of using panel data in estimating regression models (5 marks)
- c) Describe the rationale behind instrumental variable methodology (3 marks)

QUESTION TWO (20 MARKS)

- a) Naliaka and Okiya are researchers from Machakos University. They sought to investigate the effect of education of workers on wages in tea industry. To achieve this a sample 40 workers was obtained and the following was done: They first regressed the control function and the results are as shown

$$\begin{array}{ccccc} \text{Wages} & = & 1.87\text{union} & + & 4.02\text{education} & + & 1.0\text{RES} \\ & & \text{t} & & (0.00) & & (0.00) & & (117.95) \end{array}$$

Where wages is worker's wage in '000 KES, union is dummy variable for being a member of a union, education is worker's number years of schooling and RES is residual. The researchers later performed another regression using the following stata command

`ivregress 2sls wages union (education = meducation feducation)`

Where meducation is mother's years of schooling, feducation is father's years of schooling.

The 2sls results are shown in the table below.

Instrumental	Variables	(2SLS)	Regression	Number of obs	=	1,000
				Wald chi2(2)	=	3738.34
				Prob > chi2	=	0.0000
				R-squared	=	0.8599
				Root MSE	=	1.018
wages	Coefficient.	Standard Error	T	P		
education	0.97	0.0177091	54.78	0.000		
union	1.93	0.0644746	29.94	0.000		
_cons	30.55	0.2882409	106.00	0.000		

- i) Explain the violation of OLS assumption that was expected in this study? (2 marks)
- ii) What was the role of the control function? What did they conclude? Support with evidence (4 marks)
- iii) Explain the role of mother's and father's years of schooling (3 marks)
- iv) Interpret the coefficients, R^2 and Prob > chi2 (5 marks)

- b) Differentiate between heteroscedasticity and autocorrelation (6 marks)

QUESTION THREE (20 MARKS)

- a) A researcher is interested in explaining what factors influence the decision of farmers in Kitale on whether or not to own a tractor. A sample of farmers was randomly selected to undertake the study. The explanatory variables considered were income in million shillings and farmers education level. Suggest with reason the most relevant model to be used in analysis. What does the coefficient of income and education level illustrate? (5 marks)
- b) Using a concrete example explain the steps in an applied econometrics project (10 marks)
- c) A researcher obtained the following regression results

$$\ln Y = 2.81 - 0.53 \ln K + 0.91 \ln L + 0.047t$$

$$n = 23 \quad R^2 = 0.97 \quad \text{Overall } F = 189.8$$

Where Y=real output, K is capital input, L is real labour input and t is time/trend variable, ln is natural logarithm.

- i) Is there multicollinearity in the regression? How do you know? (3 marks)
- ii) Explain why multicollinearity is of concern to a researcher. (2 marks)

QUESTION FOUR (20 MARKS)

- a) From the household budget survey of 2014 of the Kenya National Bureau of Statistics, Verena obtained the following logit model based on a sample of 2820 households. The purpose of the logit model was to determine car ownership as a function of (logarithm of) income. Car ownership was a binary variable: $Y = 1$ if a household owns a car, zero otherwise.

$$L_i = -2.77231 + 0.347583 \ln \text{income}$$

$$t \quad (-3.35) \quad (4.05)$$

$$\text{Chi2 (1df)} = 16.681 \quad (\text{p value}) = 0.0000$$

Where L_i is estimated logit and where $\ln \text{Income}$ is the logarithm of income. The χ^2 measures the goodness of fit of the model.

- i) Interpret the estimated logit model (3 marks)
- ii) Comment on the statistical significance of the estimated logit model (3 marks)

b) Regarding Panel data analysis:

- i) What are the disadvantages of panel data (4 marks)
- ii) Describe a test that could be used to assess the appropriateness of fixed effects and random effects estimation. Clearly state the null hypothesis (5 marks)
- iii) Suppose the test (ii) above indicates that random effects is appropriate. Describe a test that we could use to decide whether to use random effects model or pooled OLS. Clearly state the null hypothesis. Why is this test important? (5 marks)

QUESTION FIVE (20 MARKS)

a) You are given the following estimated linear regression models

$$\ln wage = 1.696 + 0.086EDUC + 0.008EXPER$$

$$wage = -0.211 + 0.965\ln EDUC + 0.244\ln EXPER$$

$$wage = -2.9 + 1.87EDUC + 0.079EXPER$$

$$\ln wage = -38.422 + 20.624\ln EDUC + 0.951\ln EXPER$$

Where WAGE is hourly wage in US dollars, EDUC is years of education, EXPER is years of experience.

Interpret the effect of experience on wages in each of the estimated models. (12 marks)

b) Consider the linear regression model

$$wage = \beta_1 + \beta_2 EDUC + \beta_3 FEMALE + \mu$$

Where wage is hourly wage in US dollars, EDUC is years of education, FEMALE is a dummy variable that assumes the value 1 for observations on females and 0 for observations on non-females and μ is a random error term.

The model is estimated based on a random sample of 160 observations and the following results obtained:

$$wage = -2.841 + 2.456EDUC - 5.021FEMALE$$

Interpret the estimated coefficients on EDUC and FEMALE (4 marks)

c) In simultaneous equations;

- i) What problem is one likely to face when estimating simultaneous equation system using OLS? (2 marks)
- ii) What alternative estimation methods should be used to overcome problems discussed in b (i) above? (2 marks)