



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF ECONOMICS AND STATISTICS

BACHELOR OF ECONOMICS AND FINANCE

BACHELOR OF ECONOMICS

EES 400: FUNDAMENTALS OF ECONOMETRICS I

DATE: 29/11/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS:

Answer Question **ONE** and any other **TWO** questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Consider the demand function for pork.

$$pork = \beta_0 + \beta_1 dispoincome + \beta_2 porkprice + \beta_3 chickenprice + \beta_4 beefprice + \mu$$

Where *pork* is per capita consumption of pork, *dispoincome* is real disposable per capita income, *porkprice* is real retail price of pork per Kg, *chickenprice* is real price per chicken per Kg, *beefprice* is real retail price of beef.

Using time series data for 1960-1992 the following are the OLS estimates

Variable	Coefficient	Standard error
dispoincome	0.685	0.167
porkprice	-1.009	0.2218
cheickenprice	0.297	0.1994
beefprice	0.1822	0.2014
Constant	4.3796	0.3114

- i. According to economic theory, what would be the expected signs of β_1 , β_2 , β_3 and β_4 ? State reason for your answer (8 marks)

- ii. Using t-test, which of the coefficients are individually statistically significant? (5 marks)
- iii. Interpret the magnitude of each coefficient (4 marks)
- b) What is the difference between Pearson product moment correlation and Spearman rank order correlation? (4 marks)
- c) A researcher obtained the following regression results

$$Y = 389.6 + 60.8X_1 - 36.5X_2 + -0.061X_3$$

Se (10.3) (13.2) (0.043)

Where Y is diesel consumption in Machakos County in litres, X_1 is urban highways in the county, X_2 is diesel tax rate in the county and X_3 is diesel motor vehicle registrations in the county in thousands.

- i. Is there multicollinearity in the regression? How do you know? (3 marks)
- ii. Explain how in practice the researcher can test for multicollinearity (3 marks)
- iii. Explain the types of specification errors (3 marks)

QUESTION TWO (20 MARKS)

- a) The data below relates to the savings and incomes (in Kshs.'000s) of households in the year 2015.

Household	A	B	C	D	E
Income	2	5	8	10	15
Savings	1	2	3	4	5

- i. Fit the sample savings function for the 5 households and interpret your results. From the marginal propensity to save, what can you say about the nature of households in the sample? (5 marks)
- ii. Compute the ESS and RSS for this data (4 marks)
- iii. Compute the coefficient of determination for this data and interpret your results (3 marks)
- b) Using example of your choice, explain the methodology in Econometrics (8 marks)

QUESTION THREE (20 MARKS)

- a) Consider the estimated demand for tea in England

$$Y = 9.1 + 7.8P_O + 2.4P_C + 0.0035M$$
$$\text{SE} \quad (15.6) \quad (1.2) \quad (0.001)$$
$$R^2 = 0.60 \quad n=25$$

Where Y is quantity of tea consumed, P_O is price of Kenya tea, P_C is price of coffee and M is income

- Establish the statistical significance of the price and income coefficients (3 marks)
- Interpret the coefficients of P_O , P_C and M. Are the signs consistent with economic theory? (3 marks)
- The researcher suspects the model may be misspecified and she includes the price of Indian tea (P_I) in the equation and obtains

$$Y = 10 + 8P_I - 5.6P_O + 2.4P_C + 0.003M$$
$$\text{SE} \quad (4.0) \quad (2.0) \quad (1.3) \quad (0.001)$$
$$R^2 = 0.65 \quad n=25$$

On the basis of the answers in (iii) would you conclude that the initial estimated model was misspecified? What was the nature of the specification error? (4 marks)

- b) The following data relates to marks awarded by two independent interviewers of for 10 job seekers

Interviewer 1	6	5	8	8	7	6	10	4	9	7
Interviewer 11	8	7	7	10	5	8	10	6	8	6

- Compute the simple linear correlation coefficient between the two interviewers. Can the institutions use these results to hire the job seekers? (6 marks)
- Compute the coefficient of determination for the two sets of prices and interpret your results (4 marks)

QUESTION FOUR (20 MARKS)

A study analyzed the effect of military expenditures (M) and GNP (Y) on aggregate private consumption (C). The estimated equation is:

$$C = 26.19 + 0.6248Y - 0.4398M$$
$$\text{SE} = (2.73) \quad (0.006) \quad (0.0736)$$
$$R^2 = 0.999 \quad n=30$$

- a) If heteroscedasticity is a problem does it affect the coefficients or their variances? What is the consequence? (5 marks)
- b) Explain how in practice the researcher can test for heteroscedasticity using the white test. (5 marks)
- c) Suppose in the current example, the researcher assumes that $\sigma^2 = 6^2 Y^2$ and transforms the model to obtain the estimates as
- $$\frac{C}{Y} = 25.92 \frac{1}{Y} + 0.6246 - 0.4315 \frac{M}{Y}$$
- $$SE = (2.22) \quad (0.0068) \quad (0.0597)$$
- $$R^2 = 0.875 \quad n = 30$$
- i. What assumptions does the researcher make about the nature of heteroscedasticity? (2 marks)
- ii. Compare the results of the two regressions. Has the transformation of the original model improved the results? (2 marks)
- d) Explain the properties of regression coefficients (6 marks)

QUESTION FIVE (20 MARKS)

Sharon has been supplying tomatoes to Le Technische Hotel for several years now. He has commissioned to analyze the supply behaviour, relating sales to prices and costs of production. She has provided the following information:

Source of Variation	Sum of Squares	Degrees of freedom	Mean Sum of Squares
Due to regression (ESS)	23.08	-	-
Due to residual (RSS)	-	-	-
Total Variation (TSS)	23.20	4	

- a) Find the number of years in question (2 marks)
- b) Compute RSS (3 marks)
- c) Find the R² and adjusted R² (4 marks)
- d) Do prices and production costs jointly affect supply? Test at the 5% level of significance. (5 marks)
- e) What is autocorrelation? How can a researcher correct for presence of autocorrelation? (6 marks)