

CHUKA



UNIVERSITY

## UNIVERSITY EXAMINATIONS

### EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN ECONOMICS AND STATISTICS AND BACHELOR OF ARTS ECONOMICS AND SOCIOLOGY

**ECON 332: ECONOMETRICS II**

**STREAMS:**

**TIME: 2 HOURS**

**DAY/DATE: TUESDAY 10/04/2018**

**2.30 P.M – 4.30 P.M**

**INSTRUCTION:**

- **Answer question one and any other two questions from the remaining**

1. (a) (i) State five consequences of violating the assumption of homoscedasticity.

[5marks]

(ii) Outline and discuss briefly the tests used by econometricians to establish the presence of heteroscedasticity.

[5marks]

(b) The following data shows annual consumption expenditure and disposable income in kenya for a period of 12 years (1997 - 2008) the values are measured in billions of kshs and residuals are shown in column four in the table below:

Year (t)	97	98	99	00	01	02	03	04	05	06	07	08
Consumption exp ( $c_t$ )	297	303	308	325	339	338	358	358	378	591	413	432
Disposable income ( $y_t$ )	331	333	338	360	378	375	398	410	417	445	462	486
Stochastic term ( $e_t$ )	-3	1.94	2.12	0.46	0.08	0.98	1.62	-8.64	5.75	-4.97	2.29	1.71

A sample regression model was estimated using this data and the consumption function for the economy was found to be:

$$\hat{c}_t = 21.5 + 0.84 y_t, \quad R^2 = 0.992$$

- (i) Test for heteroscedasticity using spearman's rank correlation co-efficient. [8marks]
- (ii) Conduct the same test using the goldfeld and quandt test. (omit 2 observations for 2001 and 2003) . [10marks]
- (iii) Comment on the two results. [2marks]

2. (a) (i) State the assumptions of a sample regression model presented in matrix form. [2marks]
- (ii) Explain the main steps in the estimation of the above model and discuss its properties in matrix notation. [2marks]

(b) (i) Given sample data in matrix/ vector form as follows;

$$Y = X\beta + e_i$$

$$(n \times 1) \quad (n \times k) \quad (k \times 1) \quad (k \times 1)$$

- (i) Derive the normal equation in matrix form. [2marks]
- (ii) Determine the expectation of Y (n x 1) [2marks]
- (iii) Determine the covariance of Y (n x 1) [2marks]
- (iv) Derive the covariance of  $e_i$  (n x 1) [2marks]

(c) A household survey is conducted by a group of economics students in Ndagani to establish the relationship between disposable income ( $x_3$ ) the prices of a basket of goods ( $x_2$ ) and house total expenditure (Y) . The observations of this cross section data is presented in the table below in ksh thousands.

Household	Total expenditure	Price of a basket of goods	Disposable income
(i)	Y	( $X_2$ )	( $X_3$ )
1	3	3	5
2	1	1	4
3	8	5	6
4	3	2	4
5	5	4	6

- (i) Use matrix algebra to obtain the relationship between  $Y_1, X_2$  and  $X_3$ . [6marks]
  - (ii) Estimated  $R^2$  for this data. [2marks]
3. Consider the infinite distributed lag model given below:

$$Y_t = \alpha + \beta_0 x_t + \beta_1 x_{t-1} + \beta_2 x_{t-2} + \dots + \beta_2 x_{t-2} + e_i$$

Where y and x denote consumption and disposable income respectively.

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Consumption (y)	325	335	355	375	401	433	466	492	537	576
Income (x)	350	364	383	405	438	473	512	547	590	630

- (i) Transform the model in accordance with Koyek’s scheme. [5marks]
- (b) Use Koyek’s scheme transformation to obtain estimates of the parameters of the model using the above data. [10marks]
- (c) Use the estimated co-efficient in part (b) to estimate the impact multiplier, total multiplier and mean lag. [5marks]

4. Consider the following two simultaneous equations :

$$R_t = \alpha_0 + \alpha_1 m_t + \alpha_2 y_t + e_i$$

$$Y_t = \beta_0 + \beta_1 R_t + \beta_2 I_t + e_i$$

Where

$M_t$  - money supply

$Y_t$  = Income

$R_t$  = Interest rates

$T_t$  = Investment

- (i) Identify the current endogenous variables, current exogenous variables, lagged endogenous variables. Hence identify predetermined variables. [5marks]
- (ii) Write the model in reduced form. [10marks]
- (iii) What is simultaneous equation bias? Briefly explain using the above equations. [5marks]

5. (a) Consider the following estimated model :

$$Y_t = 1.03 + 4.45 X_{1t} + 0.68 X_{2t} + 1.25 Y_{t-1}$$

$$T = (2.77) \quad (8.32) \quad (-1.10) \quad (0.83)$$

$$R^2 = 0.87 \quad n = 20 \quad d = 2.25$$

Determine whether or not there is autocorrelation in the above model. [8marks]

(b) The stochastic term in a regression model follows first order autocorrelation relationship.

(i) Write out this autocorrelation relationship . [3marks]

(ii) State the assumption governing the variables in the relationship. [3marks]

(iii) Specify the magnitude of the autocorrelation co-efficient, explaining the implications of that order of magnitude. [3marks]

(iv) What are the main features of the relationship? [3marks]

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