

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF DOCTOR OF PHILOSOPHY IN
AGRICULTURAL ECONOMICS**

AGEC 912: ADVANCED ECO

STREAMS: PhD (AGEC)

TIME: 3 HOURS

DAY/DATE: MONDAY 12/08/2019

8.30 A.M. – 11.30 A.M.

INSTRUCTIONS:

- **Attempt question 1 and any other three**

QUESTION 1 (30 MARKS)

- (a) Discuss the assumptions of the classical linear model is given by . (5 marks)
- (b) A study sought to evaluate the effects of various firm specific factors on returns of a sample of 200 firms. Suppose the estimated regression model for the data is

Where Y is the size of firm measured in terms of sales revenue, X_1 is the market to book ratio of the firm, X_2 is the price/earnings (P/E) ratio, X_3 is the stock's capital asset pricing model (CAPM) beta coefficient.

- (i) Calculate the ratios. (5 marks)
- (ii) What is your conclusion about effect of each variable on the returns of the security? (10 marks)
- (c) The following model with three regressors (including the constant) was estimated over 15 observations.

and the following computed from the original data

Calculate the parameter estimates for the regression models and carry out an hypothesis test for each of the estimates. (10 marks)

Compute the appropriate values of the coefficient estimates and their corresponding standards errors. Interpret the resultant model. (10 marks)

QUESTION 2 (20 MARKS)

(a) Suppose that a researcher wants to test whether the returns on a company stock (r_t) shows unit sensitivity to two factors $F_{1,t}$ and $F_{2,t}$ among the three factors considered. The regression is fitted for 144 monthly observations and is given by

(i) What are the restricted and unrestricted regression?

(ii) If the residual sum of squares (RSS) for the two factors are 246.1 and 207.2 respectively, perform the test. (8 marks)

(b) Discuss the effects of the following:

(i) Excluding from the estimated regression variable that is determinant of the dependent variable.

(ii) Including an irrelevant variable to a regression model, i.e. a variable that is not determinant of the dependent variable. (4 marks)

(c) A researcher estimated the first five autocorrelation coefficients using a series of 150 observations as follows

Lag	1	2	3	4	5
Autocorrelation coefficient	0.614	-0.226	0.372	0.210	-0.244

Test for each of the individual correlation coefficient for significance. Also test all the five jointly using the Box-Pierce and Ljung-Box tests at 5% significance level. (8 marks)

QUESTION 3 (20 MARKS)

- (a) A study involved the determination of the appropriate order of an ARMA model to describe some actual data with 200 observations. The researcher has the following figures for the estimated log residual for various candidate models.

ARMA (p,q)	
(0, 0)	0.932
(1, 0)	0.864
(0, 1)	0.902
(1, 1)	0.836
(2, 1)	0.801
(1, 2)	0.821
(2, 2)	0.789
(3, 2)	0.773
(2, 3)	0.782
(3, 3)	0.764

- (i) Determine the optimal model order. (10 marks)
- (ii) How would you determine whether the order suggested in (i) above was in fact appropriate? (2 marks)
- (b) Explain the importance of testing for non-stationary in time series data before attempting to build an empirical model. (4 marks)
- (c) How can we determine whether a given series is stationary? (4 marks)

QUESTION 4 (20 MARKS)

- (a) Consider the following MA(2) process

Where

- (i) Find an expression for the mean and variance of the model
- (ii) Derive the autocorrelation function for this process.
- (iii) If ρ_1 and ρ_2 , sketch the autocorrelation function of $\hat{\rho}_k$. (12 marks)
- (b) Consider the following GARCH (1, 1) model

Suppose that the above model was estimated and the following estimates were obtained
 If the data available is up to time t write down the set of equations in t and their lagged values which could be employed to produce one, two and three-step ahead forecasts for the conditional variance of \hat{e}_t .
 (8 marks)

QUESTION 5 (20 MARKS)

- (a) Describe four types of data encountered in econometrics. (4 marks)
- (b) Explain the term multicollinearity and discuss its consequences. (6 marks)
- (c) To study the movement in the production workers' share in the value added (that is labour's share), the following models were considered

Model A:

Model B:

Where s_t is labour's share and t is time. Based on the annual data for 2002-2018, the following results were obtained for the primary metal industry:

Model A:

Model B:

Where the figures in the parenthesis being the t ratios.

- (i) Is there serial correlation in the two models?
 - (ii) What accounts for the serial correlation?
 - (iii) How would you distinguish between the "pure" autocorrelation and the specification bias?
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