

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF DOCTOR OF PHILOSOPHY IN
BUSINESS ADMINISTRATION**

DBAM 904: ECONOMETRICS

STREAMS: PhD (BUSINESS ADMINISTRATION)

TIME: 3 HOURS

DAY/DATE: TUESDAY 12/08/2019

8.30 A.M. – 11.30 A.M.

INSTRUCTIONS:

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

QUESTION 1 (30 MARKS)

- (a) The classical linear model is given by . Discuss its assumptions. (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 t is the size of time measured in terms of sales revenue, β_1 is the market to book ratio of the firm, β_2 is the price/earnings (P/E) ratio, β_3 is the stock's capital asset pricing model (CAPM) beta coefficient.

- (i) Calculate the β_1 ratios. (5 marks)
- (ii) What is your conclusion about the effect of each variable on the returns of the security? (10 marks)
- (c) Assume the following data have calculated from a regression on a single variable and a constant over 22 observations.

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

QUESTION 2 (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 l 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:

Where the figures in the parenthesis being the ratios.

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

QUESTION 3 (20 MARKS)

(a) Suppose that a research wants to test whether the returns on a company stock (r) shows unit sensitivity to two factors X_1 and X_2 among the three factors considered. The regression is fitted for 144 monthly observations and is given by

- (i) What are the restricted and unrestricted regressions?
- (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 a 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 4 (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-stationarity in time series data before attempting to build an empirical model. (4 marks)
- (c) How can we determine whether a given time series is stationary? (4 marks)

QUESTION 5 (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 and sketch the autocorrelation function of . (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 upto to time T, write down the set of equations in and and
their lagged values which could be employed to produce one, two and three-step ahead
forecasts for the conditional variable of .
(8 marks)
