DO NOT REMOVE THE QUESTION PAPER FROM THE EXAMINATION HALL

UNIVERSITY OF LONDON

CENTRE FOR FINANCIAL AND MANAGEMENT STUDIES

MSc Examination
Postgraduate Diploma Examination
Postgraduate Certificate Examination
for External Students

15DFMM430

FINANCE (BANKING)
FINANCE (ECONOMIC POLICY)
FINANCE (FINANCIAL SECTOR MANAGEMENT)
FINANCE (QUANTITATIVE FINANCE)

Econometric Principles and Data Analysis

Specimen Examination

This is a specimen examination paper designed to show you the type of examination you will have at the end of this module. The number of questions and the structure of the examination will be the same, but the wording and requirements of each question will be different.

The examination must be completed in three hours. Answer **FOUR** questions – **Question One** and then **THREE** other questions.

The examiners give equal weight to each question; therefore, you are advised to distribute your time approximately equally over four questions.

Candidates may use their own electronic calculators in this examination provided they cannot store text. The make and type of calculator **MUST BE STATED CLEARLY** on the front of the answer book.

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You must answer **Question One** and then any other **THREE** questions. All candidates must attempt **Question One**.

1. The output from estimating a single-index model for Microsoft Corporation using weekly data for the period from 1 September 2009 to 27 August 2012 is provided below. MSFT is the price of Microsoft Corporation stock, and SP is the Standard & Poor's 500 index.

Table OLS estimation, sample (adjusted) 8 September 2009 to 27 August 2012

	Dependent variable:
	d(log(MSFT))
Constant	0.000090
	(0.001650)
	t = 0.054359
	p = 0.956720
d(log(SP))	0.867121
	(0.067407)
	t = 12.863910
	p = 0.000000
Observations	156
R^2	0.517967
Adjusted R^2	0.514837
Residual Std. Error	0.020539 (df = 154)
F Statistic	165.4801 (df = 1; 154) (p = 0.000000)

Durbin-Watson test
DW = 2.1772, p-value = 0.8691
data: dlmsft_c_dlsp
alternative hypothesis: true autocorrelation is greater than 0

Breusch-Godfrey test for serial correlation of order up to 2
data: dlmsft_c_dlsp
LM test = 1.6686, df = 2, p-value = 0.4342

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Ramsey RESET test
t test = 2.2191, df = 153, p-value = 0.0280

studentized Breusch–Pagan test
data: dlmsft_c_dlsp
BP = 0.19081, df = 1, p-value = 0.6622

Jarque – Bera Test
Test Results:
STATISTIC:
X-squared: 6.4102
P VALUE:
Asymptotic p Value: 0.04056

a) Explain the economic rationale underlying the regression equation.

b) Interpret the estimated coefficients.

c) Discuss the adequacy of the model with respect to:

i) R^2

ii) Serial correlation

iii) Functional form

iv) Normality

v) Heteroscedasticity.

d) Predict the value of the return on Microsoft stock if the market return is 2% (or 0.02). Is this forecast likely to be accurate?

2. Explain **four** of the following:

a) Linear in parameters, and linear in variables

b) The method of ordinary least squares (OLS)

c) The confidence interval for a slope coefficient

d) R^2

e) A consistent estimator

f) Under the assumptions of the CLRM, OLS estimators are BLUE.

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3. Answer **all** parts of this question. Using daily data for the period 1 March 2010 to 5 April 2012 (532 observations after adjustments), the following multi-index model was estimated by ordinary least squares

$$\hat{R}_t = -0.002 + 0.902R_{M,t} + 0.103R_{O,t} + 0.001TS_t + 0.002RP_t \quad (3.1)$$
$$(0.012)\quad (0.031)\quad (0.024)\quad (0.002)\quad (0.003)$$

$R^2 = 0.704$ and standard errors are in parentheses.

where R_t is the daily log return on the stock of the American energy multinational ConocoPhillips, $R_{M,t}$ is the daily log return on the NYSE Composite Index, $R_{O,t}$ is the daily log return of the Brent crude oil price, TS_t is a term structure variable, and RP_t is a risk premium variable.

Test the following null hypotheses, explaining carefully in each case the null and alternative hypotheses, the test statistic, degrees of freedom and the critical value of the test statistic.

a) the intercept is zero

b) R_t is independent of $R_{O,t}$

c) the coefficient on $R_{M,t}$ is less than one

d) Test the hypothesis that the coefficients on TS_t and RP_t are both zero. For your information, the following equation was also estimated using the same data and OLS

$$\hat{R}_t = -0.0006 + 0.902R_{M,t} + 0.104R_{O,t} \qquad R^2 = 0.703 \quad (3.2)$$
$$(0.0004)\quad (0.030)\quad (0.024)$$

(Standard errors are in parenthesis.)

4. *Answer **BOTH** parts of this question.*

a) What is 'imperfect multicollinearity' and how might it be detected?

b) 'The theoretical consequences of imperfect multicollinearity are relatively unimportant but the practical consequences are potentially serious'. Explain and discuss this statement.

PLEASE TURN OVER

5. *Answer **ALL** parts of this question.*

a) How might heteroscedasticity arise?

b) Explain why heteroscedastic disturbances have consequences for the validity of t tests and F tests.

c) Explain the Park test of heteroscedasticity.

d) Given

$$Y_i = \beta_0 + \beta_1 X_i + u_i$$

where $\text{var}(u_i) = \sigma^2 X_i^2$

show how this model can be transformed so that the disturbances have constant variance.

6. *Answer **ALL** parts of this question.*

a) What is autocorrelation?

b) Why does it matter?

c) Explain how the Durbin–Watson test can be used for detecting autocorrelation.

d) For the model

$$Y_t = \alpha + \beta X_t + u_t$$

$$u_t = \rho u_{t-1} + v_t \qquad |\rho| < 1 \qquad v_t \sim \text{IID}(0, \sigma^2)$$

explain the steps involved in obtaining Cochrane–Orcutt estimates of the unknown parameters.

7. *Answer **ALL** parts of this question.*

a) What is nonnormality?

b) What are the consequences for the properties of the OLS estimators if the disturbance terms are not distributed normally?

c) How would you examine whether the disturbance terms are distributed normally?

d) If there is evidence that the disturbance terms are not distributed normally, what would you do?

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8. *Answer **ALL** parts of this question.*

a) Explain the characteristics of a 'good' econometric model.

b) What are the consequences of:

i) including an irrelevant variable, and

ii) using an incorrect functional form?

c) How might:

i) the presence of unnecessary variables, and

ii) an incorrect functional form

be detected?

END OF EXAMINATION