

# UNIVERSITY OF COLOMBO, SRI LANKA

## FACULTY OF MANAGEMENT AND FINANCE

Bachelor of Business Administration in Finance (Level II-Semester VI)

Examination, December- 2017

### FIN 2202 – Financial Econometrics

Two (2) Hours

Answer any four (04) questions.

Use of calculators is allowed.

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1. i. Explain, with the use of equations, the difference between the sample regression function and the population regression function. (05 Marks)

ii. Explain the steps that you would follow when building up an econometric model. (05 Marks)

iii. Explain why do we study Financial Econometrics. (05 Marks)

iv. The variable *RD* is expenditures on research and development as a percentage of sales. *Sales* are measured in millions of rupees. The variable *profit* is as a percentage of sales. Using the data for 32 firms in the garment industry, the following equation is estimated. Standard errors are in parentheses.

$$RD = 0.472 + 0.321 \log(\text{sales}) + 0.050 \text{profit}$$

$$(1.369) \quad (0.216) \quad (0.046)$$

$$N=32, \quad R^2 = .099$$

a. Interpret the coefficient on  $\log(\text{sales})$ . In particular, if sales increases by 10%, what is the estimated percentage point change in *RD*? (03 Marks)

b. Test the hypothesis that research and development intensity does not change with sales against the alternative that it does increase with sales. Do the test at the 5% and 10% levels. (04 Marks)

c. Interpret the coefficient on *profit*. Does *profit* have a statistically significant effect on *RD*? (03 Marks)

(Total 25 marks)

2. i. An econometrician suspects that the residuals of her model might be auto-correlated.

What are the consequences of ignoring autocorrelation? Explain the remedies.

(06 Marks)

ii. What are the conditions that must be fulfilled for Durbin- Watson test to be a valid test?

(05 Marks)

iii. Suppose a researcher wants to test whether the returns on a company stock ( $y$ ) show unit sensitivity to two factors (factor  $x_2$  and factor  $x_3$ ) among three considered. The regression is carried out on 124 monthly observations.

$$\text{The regression is } y_t = \beta_1 + \beta_2 x_{2t} + \beta_3 x_{3t} + \beta_4 x_{4t} + u_t$$

If the restricted and unrestricted RSS are 403.4 and 364.5, respectively, perform the hypothesis test for the restricted and unrestricted regressions at 1% significance level?

(07 Marks)

iv. Consider the following model estimated for the CAPM  $\beta$  on Silva stock for the periods:

2005M1-2016M12

$$R_{it} = 0.39 + 1.37R_{Mt} \quad T = 144 \quad RSS = 0.0434$$

2005M1-2014M12

$$R_{it} = 0.32 + 1.31R_{Mt} \quad T = 120 \quad RSS = 0.0420$$

Can this regression adequately “forecast” the values for the last two years at 5% significance level? Show your workings.

(07 Marks)

(Total 25 mMarks)

3. i. Explain the assumption about the classical linear regression model’s disturbance that is referred to by the term “Homoscedasticity”?

(04 Marks)

ii. Explain how fixed effects models are equivalent to an ordinary least squares regression with dummy variables.

(04 Marks)

iii. A researcher estimates a model with the daily returns on a given share traded on the Colombo stock exchange as the dependent variable, and various macroeconomic variables and accounting ratios as independent variables. He attempts to estimate this model, together with five daily dummy variables (one for each day of the week), and a

constant term, using EViews. EViews then tells him that it cannot estimate the parameters of the model. Explain what has probably happened, and how he can fix it.

(05 Marks)

iv. A colleague estimated a model using 500 observations to test the day of the week effect on Colombo Stock Exchange. He obtained the following estimates for the model

(standard errors are in parentheses)

$$R_t = 0.0034 - 0.0183 D_M + 0.0155 D_{Tu} - 0.0007 D_W - 0.0272 D_{Th} + \text{other variables}$$

(0.0146) (0.0068) (0.0231) (0.0179) (0.0193) (9.34)

where:  $R_t$  = Daily returns,  $D_M, \dots, D_{Th}$  = dummy variables from Monday to Thursday

- a. Calculate the mean returns for Monday to Friday. (05 Marks)
- b. Test the individual significance of the coefficients at 5% significance level. Is there significant evidence of any 'day-of-the-week effects' after controlling for the effects of the other variables? (07 Marks)

(Total 25 Marks)

4. i. Explain how a fixed effects model differs from an error components model and how would you choose them for application to a particular problem?

(06 Marks)

ii. Differentiate between Weakly-stationary and Non-stationary time series?

(05 Marks)

iii. A researcher wants to test the order of integration of some time series data. He decides to use the Dicky Fuller test and estimates a regression of the form

$$\Delta y_t = \mu + \psi y_{t-1} + u_t$$

and obtains the estimate  $\psi = -0.02$  with standard error 0.31.

- a. What are the null and alternative hypotheses for this test?
- b. Given the data, and a critical value of -2.28, perform the test.
- c. What is the conclusion from test result and what should be the next step?

(07 Marks)

- iv. Suppose that one of your colleagues would like to study the relationship between dividends and profits using the time series data for the period 1990 to 2016. Since dividends depend on profits, he has formulated the following simple model:

$$Dividends_t = \beta_1 + \beta_2 Profits_t + u_t$$

He has obtained the following Eviews output that show the result of the Augmented Dickey-Fuller test for unit root in levels and first differences for dividends and profits.

**Results for unit root in levels for Profits**

Null Hypothesis: Profits has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic based on SIC, MAXLAG=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.803244	0.3716
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

\*MacKinnon (1996) one-sided p-values.

**Results for unit root in levels for Dividends**

Null Hypothesis: Dividends has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	7.723144	0.0000
Test critical values: 1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

\*MacKinnon (1996) one-sided p-values.

**Results for unit root in first differences for Profits**

Null Hypothesis: D(Profits) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.59406	0.0000
Test critical values: 1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

\*MacKinnon (1996) one-sided p-values.

**Results for unit root in first differences for Dividends**

Null Hypothesis: D(Dividends) has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic based on SIC, MAXLAG=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.440769	0.0001
Test critical values: 1% level	-3.711457	
5% level	-2.981038	
10% level	-2.629906	

\*MacKinnon (1996) one-sided p-values.

Your colleague expects your help to interpret the unit root results and to run the above econometric model to study the relationship between the two variables.

- a. Interpret the results. (04 Marks)
- b. Advice him whether he should estimate the model in level or first difference based on the unit root results. (03 Marks)

**(Total 25 Marks)**

5. Explain briefly the following concepts:

- i. Multicollinearity
- ii. Error correction models
- iii. Parameter stability tests
- iv. Hausman Test
- v. Cross- sectional and Panel data

(Each carries 05 marks)

**(Total 25 Marks)**

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