

EXAMINATION QUESTION PAPER: Reassessment, 2014

Module code:	EC7054
Module title:	Quantitative Research Methods
Module leader:	Dr. Abay Mulatu

Date:	July/August 2014
Duration:	2 Hours
Exam type:	Part seen / part unseen, closed
Materials supplied:	Pink and Blue statistical tables; Davidson and MacKinnon tables
Materials permitted:	Calculator
Warning:	Candidates are warned that possession of unauthorised materials in an examination is a serious assessment offence.

Instructions to candidates: Candidates will be required to answer Question 1 in Section A and either Question 2 or Question 3 from Section B.

All questions carry equal marks. All questions are marked out of 100.

SECTION A**This section is compulsory**

1. (a) What processes do the following concepts represent: weak stationarity; deterministic trend; and stochastic trend? Provide a careful explanation.

[20 marks]

- (b) Why is a model involving non-stationary variables, which are not cointegrated, undesirable?

[15 marks]

- (c) EViews output relating to the analysis of a UK macroeconomic model is given below. The data is quarterly and covers the period from 1947-I to 2007-IV. The variables are expressed in log terms and are defined as follows:

DPI: disposable personal income (£)

GDP: gross domestic product (£)

CP: corporate profits (£)

Dividends: dividends (£)

Tables 1.1 to 1.8 show EViews output for the ADF test applied to the four variables and their first differences [denoted by $D(X)$, where X is the undifferenced series].

Determine the orders of integration of each variable, when possible. Explain carefully how you draw your inferences.

[20 marks]

- (d) Using the above data, the following model was estimated using Ordinary Least Squares (OLS) regression.

$$Dividend_t = \beta_1 + \beta_2 CP_t + u_t \quad (1)$$

where the variables are defined as above and u_t is the error term for time t . The regression results are given in Table 1.9.

- (i) Is Model 1 subject to spurious regression? Explain. [10 marks]

- (ii) Using the EViews output in Table 1.10 test whether Model 1 is cointegrated. [10 marks]

- (e) Explain the concept of the Error Correction Mechanism and the steps involved in the formulation of an Error Correction Model.

[25 marks]

Table 1.1

Null Hypothesis: LNCP has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 1 (Automatic - based on SIC, maxlag=14)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.143196	0.0988
Test critical values: 1% level	-3.996431	
5% level	-3.428503	
10% level	-3.137665	

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

Table 1.2

Null Hypothesis: D(LNCP) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=14)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-12.40528	0.0000
Test critical values: 1% level	-3.996431	
5% level	-3.428503	
10% level	-3.137665	

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

Table 1.3

Null Hypothesis: LNDIVIDEND has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=14)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.418984	0.8533
Test critical values: 1% level	-3.996271	
5% level	-3.428426	
10% level	-3.137619	

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

Table 1.4

Null Hypothesis: D(LNDIVIDEND) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=14)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-16.71691	0.0000
Test critical values: 1% level	-3.996431	
5% level	-3.428503	
10% level	-3.137665	

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

Table 1.5

Null Hypothesis: LNDPI has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=14)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.287542	0.8885
Test critical values: 1% level	-3.996271	
5% level	-3.428426	
10% level	-3.137619	

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

Table 1.6

Null Hypothesis: D(LNDPI) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=14)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.10205	0.12040
Test critical values: 1% level	-3.996431	
5% level	-3.428503	
10% level	-3.137665	

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

Table 1.7

Null Hypothesis: LNGDP has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 1 (Automatic - based on SIC, maxlag=14)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.671757	0.2494
Test critical values: 1% level	-3.996431	
5% level	-3.428503	
10% level	-3.137665	

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

Table 1.8

Null Hypothesis: D(LNGDP) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 0 (Automatic - based on SIC, maxlag=14)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-11.08504	0.0000
Test critical values: 1% level	-3.996431	
5% level	-3.428503	
10% level	-3.137665	

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

Table 1.9

Dependent Variable: LNDIVIDEND
 Method: Least Squares
 Date: 11/15/13 Time: 15:17
 Sample: 1947Q1 2007Q4
 Included observations: 244

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.333874	0.050331	-26.50206	0.0000
LNCP	1.126890	0.010279	109.6293	0.0000
R-squared	0.980262	Mean dependent var	3.999717	
Adjusted R-squared	0.980180	S.D. dependent var	1.430724	
S.E. of regression	0.201420	Akaike info criterion	-0.358681	
Sum squared resid	9.817989	Schwarz criterion	-0.330016	
Log likelihood	45.75913	Hannan-Quinn criter.	-0.347137	
F-statistic	12018.58	Durbin-Watson stat	0.150898	
Prob(F-statistic)	0.000000			

Table 1.10

Date: 11/15/13 Time: 15:18
 Series: LNDIVIDEND LNCP
 Sample: 1947Q1 2007Q4
 Included observations: 244
 Null hypothesis: Series are not cointegrated
 Cointegrating equation deterministics: C
 Automatic lags specification based on Schwarz criterion (maxlag=14)

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
LNDIVIDEND	-3.263157	0.0635	-19.39533	0.0581
LNCP	-3.199862	0.0736	-19.19841	0.0605

*MacKinnon (1996) p-values.

Intermediate Results:

	LNDIVIDEND	LNCP
Rho - 1	-0.079816	-0.079006
Rho S.E.	0.024460	0.024690
Residual variance	0.005864	0.004604
Long-run residual variance	0.005864	0.004604
Number of lags	0	0
Number of observations	243	243
Number of stochastic trends**	2	2

**Number of stochastic trends in asymptotic distribution