# UNIVERSITY OF ESWATINI

## FACULTY OF SOCIAL SCIENCES

## DEPARTMENT OF ECONOMICS

## RE-SIT/ SUPPLEMENTARY EXAMINATION

## JANUARY 2019

| | |
|---|---|
| **TITLE OF PAPER:** | **ECONOMETRIC METHODS I** |
| **COURSE CODE:** | **ECO 419** |
| **TIME ALLOWED:** | **2 HOURS** |
| **INSTRUCTIONS:** | **ANSWER QUESTION ONE (1) AND ANY TWO (2) OTHER QUESTIONS**<br>**QUESTION ONE CARRIES 30 MARKS.**<br>**THE REST OF THE QUESTIONS CARRY 25 MARKS EACH** |

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**Question One (Compulsory)** **[30 Marks]**

1. (a) What is the connection between cointegration and spurious regression? [5 marks]

(b) The following regression results were obtained from data for a hypothetical economy for the period 1971Q1 to 1988Q4-:

$$\widehat{lnM_t} = -10.2571 + 1.5975 lnGDP_t \quad (1)$$

t = (-12.9422) (25.8865)

$R^2$= 0.9463 $d$ = 0.3254

$$\widehat{\Delta lnM_t} = 0.0095 + 0.5833 \Delta lnGDP_t \quad (2)$$

t = (2.4957) (1.8958)

$R^2$= 0.0885 $d$ = 1.7399

$$\widehat{\Delta u_t} = -0.1958 \widehat{u_{t-1}} \quad (3)$$

($t = \tau$) (-2.2521)

$R^2$= 0.1118 $d$ = 1.4767

Where M= M1 money supply, GDP= gross domestic product; both measured in billions. *ln* is the natural log, and $\widehat{u_t}$ represents the estimated residuals from regression (1).

(i) Interpret regression 1. [5 marks]

(ii) Do you suspect that regression 1 is spurious? Why? [5 marks]

(iii)Is regression 2 spurious? Why? [5 marks]

(iv)From the results of regression 3, would you change your conclusion in (b)? Why? [5 marks]

(c) Now consider the following regression:

$$\widehat{\Delta lnM_t} = 0.0084 + 0.7340\ \Delta lnGDP_t - 0.0811 u_{t-1} \quad (4)$$

t = (2.0496) (2.0636) (-0.8537)

$R^2$= 0.1066 $d$ = 1.6697

What does this regression tell you? Does this help you decide if regression 1 in (b) above is spurious or not? [5 marks]

**Answer Any Two Questions From The Following:** **[25 Marks Each]**

**Question Two**

2. (a) The following consumption function was estimated by OLS on the basis of 24 sets of observations-:

$$C_t = \beta_0 + \beta_1 Y_t + \varepsilon_t$$

$$\hat{C} = 7860 + 0.85Y$$

t = (72.81) (23.60)

$R^2 = 0.98$ n= 24 $d = 0.955$

Based on the regression results, would you say there is autocorrelation or not? (use the 5% level of significance. Describe the different criteria used to answer the question. [10 marks]

(b) Describe any 5 causes of autocorrelation. [15 marks]

**Question Three**

3. (a) Using appropriate examples, distinguish between structural and reduced form equations. [10 marks]

(b) The following results are a computer output for testing for unit roots in real non-traditional exports of a hypothetical economy in levels (LRNTX) & differenced form (DLRNTX), respectively; where L stands for logarithm & D stands for differenced. Study the results of Test 1 above and then answer the following questions-:

(i) Are real non-traditional exports in levels stationary or nonstationary? [3 marks]

(ii) Are differenced real non-traditional exports stationary or nonstationary? [3 marks]

(iii) What do you think explains the difference between the results in tests 1(a) & 1(b) and those in 1(c) & 1(d)? [4 marks]

*Note: you may use the DF or ADF or both tests.*

The Dickey-Fuller regressions include an intercept but not a trend

19 observations used in the estimation of all ADF regressions.
Sample period from 1978 to 1996

| | Test Statistic | LL | AIC | SBC | HQC |
|---|---|---|---|---|---|
| DF | -.66295 | .12204 | -1.8780 | -2.8224 | -2.0378 |
| ADF(1) | -.52907 | .12993 | -2.8701 | -4.2867 | -3.1098 |
| ADF(2) | -.51075 | .12997 | -3.8700 | -5.7589 | -4.1897 |

95% critical value for the augmented Dickey-Fuller statistic = -3.0294

**Test 1(b) Unit root tests for variable LRNTX**

The Dickey-Fuller regressions include an intercept and a linear trend

19 observations used in the estimation of all ADF regressions.
Sample period from 1978 to 1996

| | Test Statistic | LL | AIC | SBC | HQC |
|---|---|---|---|---|---|
| DF | -2.0697 | 2.1712 | -.82878 | -2.2454 | -1.0685 |
| ADF(1) | -2.2994 | 2.8943 | -1.1057 | -2.9946 | -1.4254 |
| ADF(2) | -2.6726 | 3.9422 | -1.0578 | -3.4189 | -1.4573 |

95% critical value for the augmented Dickey-Fuller statistic = -3.6746

**Test 1(c) Unit root tests for variable DLRNTX**

The Dickey-Fuller regressions include an intercept but not a trend

18 observations used in the estimation of all ADF regressions.
Sample period from 1979 to 1996

| | Test Statistic | LL | AIC | SBC | HQC |
|---|---|---|---|---|---|
| DF | -4.2613 | .089228 | -1.9108 | -2.8011 | -2.0335 |
| ADF(1) | -3.1113 | .22791 | -2.7721 | -4.1076 | -2.9562 |
| ADF(2) | -2.7677 | .53275 | -3.4673 | -5.2480 | -3.7128 |

95% critical value for the augmented Dickey-Fuller statistic = -3.0401

**Test 1(d) Unit root tests for variable DLRNTX**

The Dickey-Fuller regressions include an intercept and a linear trend

18 observations used in the estimation of all ADF regressions.
Sample period from 1979 to 1996

| | Test Statistic | LL | AIC | SBC | HQC |
|---|---|---|---|---|---|
| DF | -4.2450 | .42549 | -2.5745 | -3.9101 | -2.7587 |
| ADF(1) | -3.1145 | .58851 | -3.4115 | -5.1922 | -3.6570 |
| ADF(2) | -2.6384 | .77953 | -4.2205 | -6.4464 | -4.5274 |

95% critical value for the augmented Dickey-Fuller statistic = -3.6921
LL = Maximized log-likelihood AIC = Akaike Information Criterion
SBC = Schwarz Bayesian Criterion HQC = Hannan-Quinn Criterion

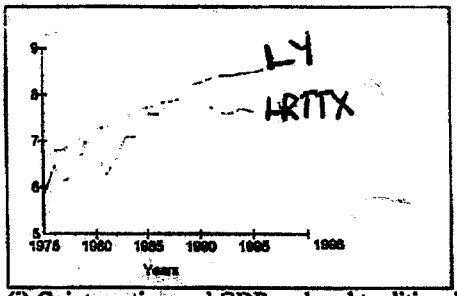
(c) Using appropriate examples, distinguish between an exactly identified and over-identified equation. [5 marks]

**Question Four**

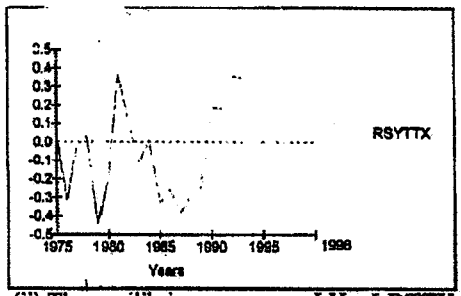
4. (a) Explain the graphical method of testing for cointegration and then indicate whether Figure 1 below, suggests that real GDP (LY) and real traditional exports (LRTTX) are cointegrated. [8 marks]

**Figure 1**

***Cointegrating variables and their respective equilibrium errors***




(i) Cointegrating real GDP and real traditional exports




(ii) The equilibrium error: $\varepsilon_t = LY_t - LRTTX_t$

(b) Distinguish between a trend-stationary process and a difference stationary process.[4 marks]

(c) Using appropriate examples, distinguish between endogenous and predetermined variables. [7 marks]

(d) What are the main differences between simultaneous-equation and Box-Jenkins approaches to economic forecasting? [6 marks]