

44-6873-00L- Econometrics for Business and Economics	Dr Amr Algarhi (Miro)
Exercise sheet 11. Non-stationary TS and Unit Root Tests	Department of Management
Week 33	Sheffield Hallam University

Question 1 (Stata). Spurious regression

The purpose of this question is to explore the empirical relationship between unrelated series. Download the data set "*spurious.dta*". This data set contains two series, *rw1* and *rw2*, that are generated as independent random walks.

$$rw1: \quad y_t = y_{t-1} + \varepsilon_{1t}$$

$$rw2: \quad x_t = x_{t-1} + \varepsilon_{2t}$$

The errors, ε_{1t} and ε_{2t} , are independent standard normal random deviates generated using a pseudo-random number generator. y_t and x_t are not related in any way.

- (a) Create a column for the time variable, and declare the data to be time series.

Hint:

```
gen time = _n
tsset time
```

- (b) Plot the two series. Then, produce a scatter plot of *rw1* and *rw2*.

Hint:

```
tsline rw1 rw2
scatter rw1 rw2
```

- (c) Estimate the following regression model and comment on the results

$$y_t = \beta_1 + \beta_2 x_t + u_t$$

Hint:

```
reg rw1 rw2
```

Question 2 (Stata). Unit root tests for stationarity

Download the data set "*usa.dta*". This data set contains four variables (gdp, inf, f, b) but no time variables. The data are quarterly, begin in the first quarter of 1984 (1984q1), and end in the fourth quarter of 2009 (2009q4).

- (a) Create a column for the relevant dates in the data set, and then declare the data to be time series.

Hint:

```
gen date = tq(1984q1) +_n-1
format %tq date
tsset date
```

- (b) Plot the GDP series and its difference in one graph.

Hint:

```
tsline gdp
```

```

tsline D.gdp
tsline gdp, name(gdp, replace)
tsline D.gdp, name(dgdp, replace)
graph combine gdp dgdp

```

- (c) Plot a set of graphs for the inflation rate, the Fed funds rate and the 3-year bond rate along-side their changes.

Hint:

```

tsline inf, name(inf, replace)
tsline D.inf, name(dinf, replace) yline(0)
tsline f, name(f, replace)
tsline D.f, name(df, replace) yline(0)
tsline b, name(b, replace)
tsline D.b, name(db, replace) yline(0)

graph combine inf dinf f df b db, cols(2)

```

- (d) Create a set of summary statistics for all the variables and its first differences from the second quarter of 1984 to the fourth quarter of 1996.

Hint:

```

summarize gdp inf b f D.gdp D.inf D.b D.f if
tin(1984q2,1996q4)

```

- (e) Test the stationarity of the data using the Dickey Fuller tests.

Hint:

```

reg D.f L.f
ac D.f
reg D.f L.f L(1/2).D.f
reg L(0/2).D.f L.f

dfuller f, reg lags(2)

dfuller D.f, noconstant lags(0)

```

(END)