Financial Econometrics Workshop 3

Binzhi Chen

July 1, 2020

1 Introduction

In this workshop we will use two time series (the US GDP deflator and the number of passenger car registrations in New Zealand) from FRED and examine their stationarity. We will also consider the problem of a spurious regression in STATA.

2 Input Data and Date Transformation

The first step in STATA is input data, make sure your .dta file is in the right working directory. In this workshop we will use the dataset: the US GDP deflator and the number of passenger car registrations in New Zealand from 2000m1-2014m12

Menu:

File → Change Working Directory → STATA Workshop

Command:

```
g datem = monthly(date,"YM")
format datem %tm # %tm encoded monthly date (months since 1960m1)
tsset datem
```

Note:

`tsset` declares data to be time-series data.

3 Unit Root Test

In this section, you will learn how to code three types of unit root test.

Command:

```
#DF test for original time series
dfuller gdpdef

#ADF test for original time series
display 12 * (180/100)^(1/4) #Schwert Maximum lag order method

dfuller gdpdef,lags(12) reg # continue this regression till the
    longest lag length is significant at p value
# ......
dfuller gdpdef,lags(9) reg # p value for L9D is 0.026

#KPSS test
ssc install KPSS # STATA does not have the KPSS package
kpss  gdpdefauto # Compare the test statistics with C.V.

g log_gdpdef = log(gdpdef)
g dlog_gdpdef = d.log_gdpdef #dlog time series

#DF test for dlog time series
dfuller dlog_gdpdef

#ADF test for dlog time series
dfuller dlog_gdpdef,lags(12) reg # Continue this regression till the
     longest lag length is significant at p value
# ......
dfuller dlog_gdpdef,lags(8) reg

#KPSS test
kpss dlog_gdpdef,auto # Compare the test statistics with C.V.
```

Note:

We will only present gdpdef seires, nzcarreg series is for practice.

Question:

What is the null hypothesis of ADF test? What is the decision criteria for ADF test? Should we reject the null by looking at t-Statistics? What can we conclude from the p values?

Question:

What is the null hypothesis of this test? Why is the KPSS a suitable alternative? How do we interpret the results? What if it is inconsistent with ADF test?

4 Spurious Regression

Spurious regression means regression that does not make any sense.

The typical features of it would be "High R^2, t-values, F-value, but low D/W. For example: Egyptian infant mortality rate (Y), 1971-1990, annual data, on Gross aggregate income of American farmers (I) and Total Honduran money supply (M):

$$Y = 179.9 - 0.2952I - 0.0439M$$

Where $R^2 = .918$, D/W $= .4752$, $F = 95.17$

Command:

```
g log_nzcarreg = log(nzcarreg) #Log time series

g trend = _n # Creat time trend

reg log_gdpdef log_nzcarreg trend # Regression with a constant and a
    trend

estat dwatson #DW test
```

Note:

Look at the R^2, t-values, F-value, and DW statistic.