DSC5211C QUANTITATIVE RISK MANAGEMENT

Workshop 3

Fernando Oliveira
bizfmdo@nus.edu.sg

Regression Analysis and Stationarity

EViews Student Version: http://www.eviews.com/download/student10/

Objectives:

(a) Introduction to EViews
   a. Importing Data
   b. Plotting the Data
   c. Regression Analysis

1. Introduction to EViews

The EViews main menu bar has nine commands

File Edit Objects View Proc Quick Options Window Help

File, **Edit**, **Window** and **Help** are standard on most Windows software. The Help facility in EViews is very useful for understanding both the software and the statistical analysis used; it contains almost all of the contents of the EViews User's Guide.

The **Options** command is not very interesting. The Options drop-down menu allows you to make changes to the overall operation of EViews such as graphics defaults and how error messages should be displayed.

EViews is built around the concept of an *object*. Objects include series, equations, models, coefficients and metrics. We will meet several of these without being aware that they are objects. The Objects command on the main menu bar allows you to manipulate objects; for example, saving, naming and deleting. We will not be concerned with the **Objects** command.

The remaining three commands, **View**, **Proc** and **Quick**, are important and will be introduced in detail as they are required this term. The command Quick will be used

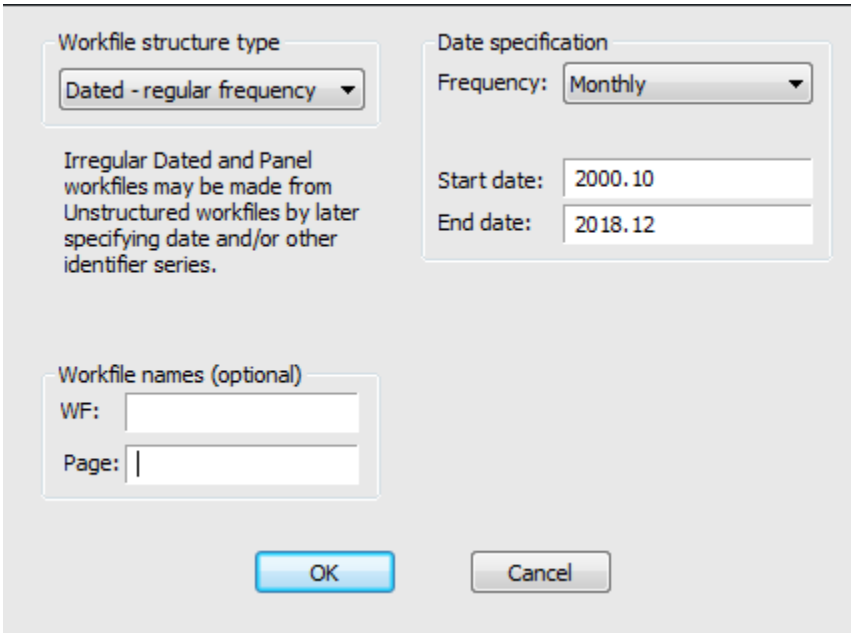
extensively as it provides the simplest way to carry out any sort of analysis - exponential smoothing, regression, unit root tests, ARIMA, etc., etc.

As we do not have any data in the package, most of the commands on the main menu bar are unavailable. Once you have opened a dataset, do not be afraid to wander around the package, trying out different commands.

1.a) Importing Data

On the whole, during this term, EViews data files will be given to you. However, it seems useful to quickly tell you how to import data from an Excel spreadsheet. The Excel file **session3.xlsx** contains monthly observations from October 2000 to December 2018 for two exchange rates. The variable SGD is the Singapore Dollar exchange rate to the Euro and the variable USD represents the exchange rate of the US Dollar to the euro (both in dollars per Euro).

EViews datasets are called workfiles. If we wish to import data from an Excel spreadsheet into EViews, we must first set up a workfile of appropriate size and type.



From the main menu select

File **New** **Workfile**

In the ensuing dialog box, specify:

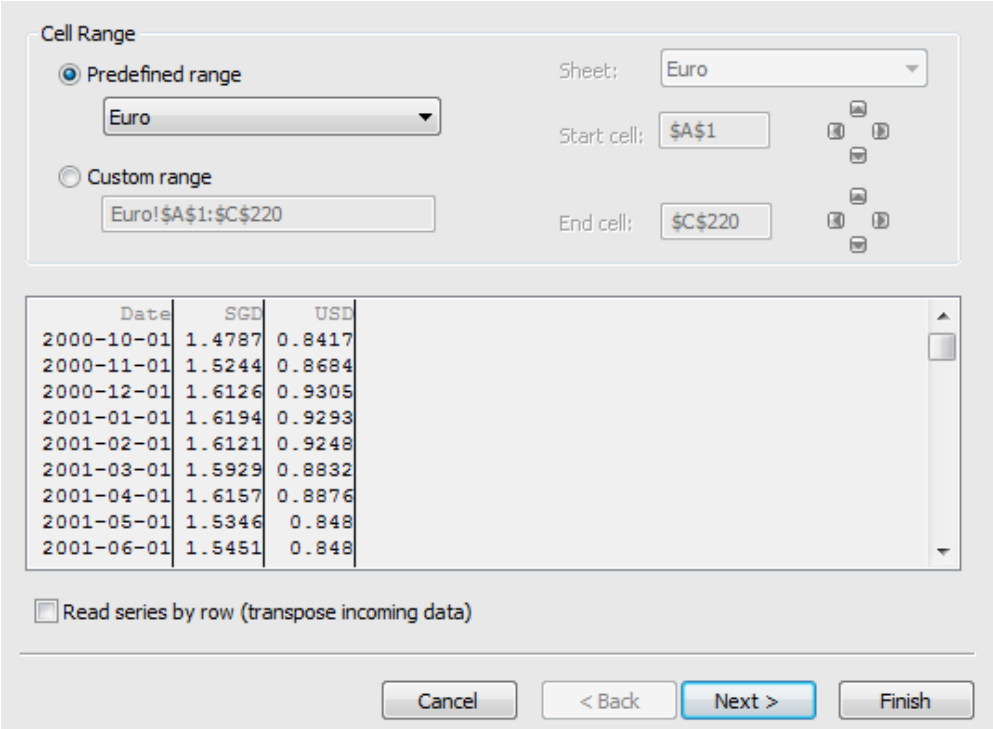
Workfile frequency as **Monthly**
Start date as **2000.10**

End date as **2018.12**
Click **OK**

The workfile has been created so we can now import the data.

From either the main menu bar or the workfile's menu bar, select:
Proc **Import** **Import From File**

In the **Open** dialog box, specify
Go to your directory
List files of type as **Excel**
File name as **session3.xlsx**
Click **Open**



Click **Next**.

The importing is now complete. The workfile window contains its own menu bar and four *objects* named **c**, **sgd**, **usd** and **resid**. c and resid are empty at the moment; c can be used as a regression constant and resid will contain residuals if we should estimate a model of some sort.

Double-click on the object **sgd** and verify that the time series has been imported.

Save the new workfile on your own network directory by selecting from the main Eviews' menu bar

File Save As

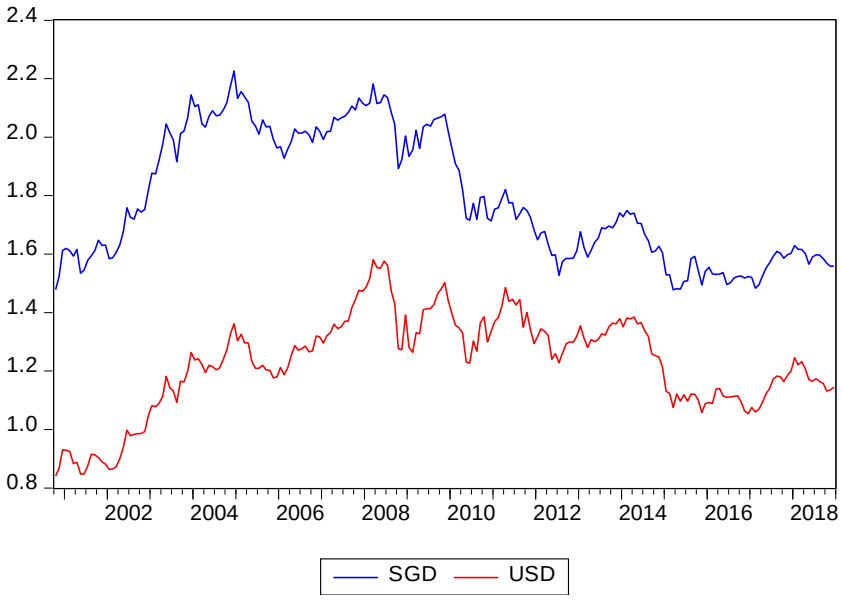
1.b) Plotting Data

It's always a good idea to have a look at the time series before we start any form of analysis.

From the main Eviews menu, select

Quick Graph

Specify **sgd** and **usd** as the series to be graphed (type the two names with a space in between).



1.c) Regression Analysis

Regression is very easily carried out in EViews:

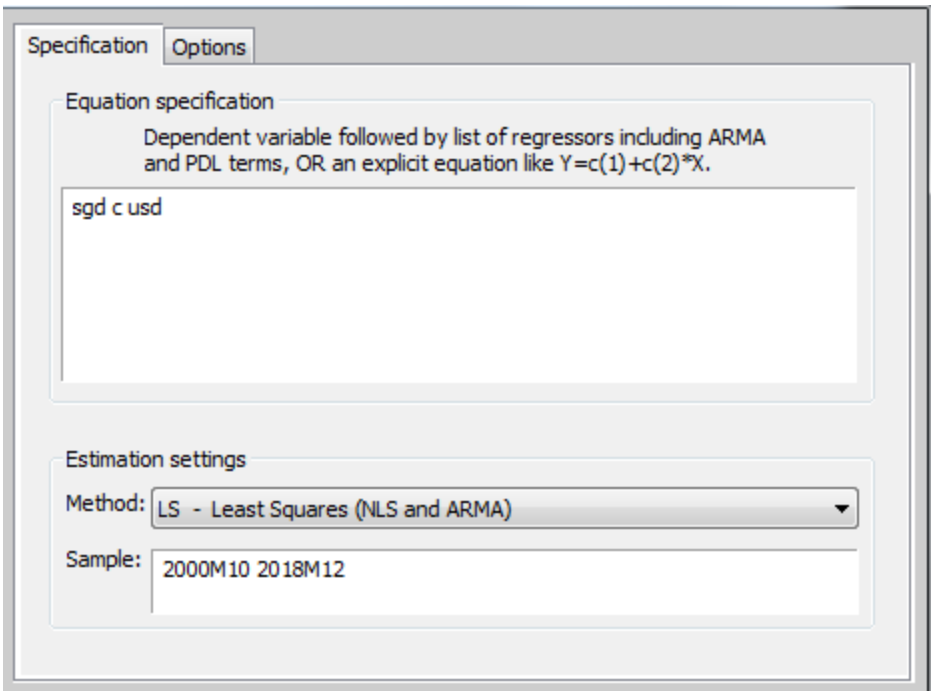
From the main menu select:

Quick Estimate Equation

In the Equation Specification dialog box, you can specify a model by typing the dependent variable first, then a constant and then any explanatory variables.

In the empty box, type

SGD c USD



Leave the **Estimation Settings**, they seem quite reasonable and click **OK**.

Dependent Variable: SGD
Method: Least Squares

Sample: 2000M10 2018M12
Included observations: 219

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.896335	0.093412	9.595450	0.0000
USD	0.729649	0.075465	9.668711	0.0000

R-squared	0.301091	Mean dependent var	1.791516
Adjusted R-squared	0.297870	S.D. dependent var	0.219051
S.E. of regression	0.183550	Akaike info criterion	-0.543571
Sum squared resid	7.310848	Schwarz criterion	-0.512620
Log likelihood	61.52098	Hannan-Quinn criter.	-0.531071
F-statistic	93.48398	Durbin-Watson stat	0.014297
Prob(F-statistic)	0.000000		

Some useful further options are available by selecting View from the menu bar of the current Equation window. Try the following selections:

View	**Representations**	
View	**Estimation Output**	
View	**Actual, Fitted, Residual**	**Actual, Fitted, Residual Graph**
View	**Residual Tests**	**Correlogram**

Overall, does the model look reasonable? Are the residuals OK? If you want to estimate a slightly different model, select **Estimate** from the menu bar of the current Equation window. Note that in EViews the differencing operator is D( ). For example, D(USD) is a new variable which equals the changes in USD. What can you conclude from the relation between the Euro, the SGD and the USD?

2. Case Study: Quality Kitchens

Amalgamated Food Products (AFP) markets a meat loaf mix under the brand name "Quality Kitchens" in far western United States. The mix is packaged in foil packets, and contains cracker crumbs, meal, seasonings and other ingredients. The purchaser mixes the ingredients together with an egg and ground beef to make a meat loaf. The mix has the effect of stretching the meat loaf, as well as seasoning it.

The Quality Kitchen meat loaf mix is an established brand, and although its sales are not large, it is a consistently profitable item. Sally Franklin has just joined AFP as brand manager, and the meat loaf product was assigned to her. Her first task is to prepare a sales forecast, and a budget for promotion and advertising for the next year. She collected the historical data shown in the table below. These data included sales of the meat loaf mix, and also the expenditures for promotion and advertising over the past 24 quarters, all in thousands of dollars. Also included is an index of "general economic conditions" in the meat loaf market area. High values of the index indicate "good" economic times.

The meat loaf mix is sold through food brokers in Seattle, San Francisco, Los Angeles, and Denver. Advertising expenditures are directed at the consumer in magazines such as *Women's Day*, and in newspapers. Promotion expenditures, on the other hand, are directed at the food broker or store manager. These consist of special deals such as getting a fifth case free if four were purchased, short term increases in broker commissions, or sales contests among broker salesmen (with prizes such as trips to Hawaii).

Ms. Franklin was quite puzzled by the great variability in the sales of the meat loaf mix from quarter to quarter, and also at the great variations in past expenditures for promotion and advertising. Upon inquiry, the sales vice president explained that there was a general policy that the company should either promote or advertise in a given quarter, but not both. However, there had been a long-standing dispute in the company about the relative effectiveness of promotion and advertising on meat loaf mix sales. Her predecessors had

tried various different things, but no one had been able to determine what had and what had not been successful. Some sceptics felt that both promotion and advertising expenditure were wasted, since neither seemed to affect sales. Others felt that promotion was effective, but the effect was merely to reduce future sales. That is, they felt that brokers and store managers bought heavily during promotion periods, and then didn't order in subsequent periods until inventories were back to normal. The effect of advertising was equally confusing, since sales seemed to vary greatly even during periods when advertising was relatively constant. For example, in the last two quarters in the data set shown below (quarters 23 and 24), advertising had been about the same (36 and 39 thousand respectively), but sales were $648 thousand in one quarter and only $343 thousand in the other.

If this wasn't confusing enough, the economist in the Economic Analysis Department insisted that the meat loaf mix was a "counter-cyclical" product, meaning that it sold better in bad times than in good. His theory was that meat loaf was a less expensive meal than other meats, and people ate more of it during tough times. Furthermore, he felt that there was a seasonal pattern in sales, with more being sold during colder months that in the summer.

Basic Data for Quality Kitchens Meat Loaf Mix
(session3.xlsx > qkitch)

obs	sales	prom	adv	index
1	504.72	15.6	30	100
2	406.59	22.2	36	102
3	398.55	0.0	45	104
4	587.76	0.0	57	104
5	598.92	0.0	39	104
6	703.62	31.8	21	100
7	387.24	21.3	12	98
8	365.67	3.9	6	96
9	388.71	0.0	6	98
10	372.96	8.4	30	103
11	603.30	45.3	30	105
12	614.73	50.1	33	107
13	484.38	39.6	6	107
14	227.76	4.2	33	107
15	329.13	0.0	6	108
16	308.25	0.0	3	105
17	433.86	0.0	45	103
18	514.98	13.8	48	108
19	404.70	17.7	0	110
20	245.43	0.0	15	112
21	433.20	17.4	9	113
22	627.24	37.8	54	112
23	647.61	42.3	36	113
24	342.81	11.4	39	114
Mean	455.51	16.0	26.6	105.5

sales - quarterly sales of Quality Kitchens meat loaf mix (thousands of dollars)
prom - funds spent on promotion activities in the quarter (thousands of dollars)
adv - funds spent on advertising during the quarter (thousands of dollars)
index - economic index of general economic conditions in Quality Kitchens market area

Questions

1. If Ms. Franklin had one thousand dollars to spend on either advertising or promotion, which should she choose, and why? What is the effect of one thousand dollars spent on each?

2. As described above, the economic analyst thought that the meat loaf mix was a "counter-cyclical" item. Would you agree?

3. As described above, the sales vice-president stated that company policy was that the company should advertise or promote in a given quarter, but not both. Has this policy been followed for meat loaf mix for the past 24 quarters?

4. Do you think there are significant seasonal effects associated with meat loaf mix sales? How do you know?

N.B. You may find the EViews lag operator useful (e.g. advert(-1)), and possibly also the difference operator (e.g. D(advert)).