Econometrics Practical Exercises

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Abstract

These practicals will help you follow the lectures, help with the exam and help you do your project.

1 Introduction

You can use any program to do these exercises. They all have advantages and disadvantages. There are separate instructions for some programs.

Choose a program and download it to your computer or get remote access. Instructions for doing the practicals on a number of different programs are given separately.

Different programs can give different answers because of factors such as using:

- different but equivalent formulae, e.g. for AIC and BIC
- different versions of a test (e.g. Chi-squared or F or W,LR,LM versions);
- different alternative hypotheses for diagnostic tests;
- differences in convergence criteria or algorithms in non-linear models.
- differences in how the standard errors are computed in non-linear models: from the Hessian or outer product gradient, OPG.
- differences in the sample used, always check the number of observations.
- differences in the number of significant figures and rounding.

You may have to use different names for the variables than those given below. For instance, gretl has a way of naming transformed data. Some programs are case sensitive, others are not.

2 week 2

The life expectancy data set has data for 189 countries. It lists their number, life expectancy in years, LE, per capita GDP at PPP constant international dollars PCGDP and country names,. The data are ordered by PCGDP, from lowest to highest.

This data comes from Gapminder. It is the first graph you see if you go to Gapminder. Look at how the life-expectancy income relationship evolved over time, by clicking on the bottom left arrow on Gapminder. Check out how to download the data from Gapminder, it is a good source.

2.1 Practical

Import the life expectancy file: LR&PCGDP17.xlsx, from Moodle.

Generate the log of PCGDP

Plot a scatter diagram (X-Y plot) with LE on the Y axis and log PCGDP on the X axis.

Plot a scatter diagram (X-Y plot) with LE on the Y axis and PCGDP on the X axis.

Which functional form has a more linear relationship.

Regress LE on log PCGDP.

Plot the residuals.

If income increased by 10% how much would life expectancy increase by?

Save your work file.

3 Week 3

The Shiller data set was downloaded fromiRobert J Shiller's webpages some years ago. This is a subset of the data. We will use it to re-examine the hypotheses in a famous paper J Lintner 'Distribution of Income of Corporations among Dividends, Retained Earnings and Taxes', American Economic Review May 1956.

The file contains annual US data from 1871 to 2016 on

NSP: S&P composite stock price index January value.

ND: nominal dividends for the year

NE : nominal earnings for the year

R : average short interest rate for the year

RL: average long interest rate for the year

CPI Consumers Price Index

RR: real interest rate

RC: real consumption in 2005 dollars

Some data is not provided for the whole period.

3.1 Practical

Import the Shiller file: Shiller16.xlsx, from Moodle.

Generate the log of nominal dividends LD=log(ND) and the log of nominal earnings LE=log(NE) and the pay-out ratio PO=ND/NE.

Plot a line graph of ND and NE

Plot a line graph of LD and LE

Plot a line graph of PO

Which functional form is the better way of seeing what is going on in the data.

Plot a histogram of PO. Does it look normally distributed? Get descriptive statistics for PO.

Regress LD on LE.

Plot the residuals for this static model.

What does the Durbin Watson Statistic indicate.

Regress LD, d_t, on lagged LD, d_{t-1}, LE, le_t lagged LE, le_{t-1} and a trend, t, that is estimate

$$d_t = \alpha_0 + \alpha_1 d_{t-1} + \beta_0 e_t + \beta_1 e_{t-1} + \gamma t + u_t \tag{1}$$

What is significant at the 5% level? Test the joint hypothesis $\beta_1 = \gamma = 0$.

Plot the residuals. Do they look better than the static model? Is there serial correlation.

4 Week 4.

Use Shiller and again regress LD, d_t, on lagged LD, d_{t-1}, LE, le_t lagged LE, le_{t-1} and a trend, t, that is estimate (1) again:

$$d_t = \alpha_0 + \alpha_1 d_{t-1} + \beta_0 e_t + \beta_1 e_{t-1} + \gamma t + u_t$$

Test the joint hypotheses: $H_0^1 : \gamma = 0; \alpha_1 + \beta_0 + \beta_1 - 1 = 0$.

Test the joint hypotheses: $H_0^2 : \gamma = 0; (\beta_0 + \beta_1) / (1 - \alpha_1) - 1 = 0$.

Calculate the long run elasticity of dividends with respect to earnings and its standard error. Test if it is significantly different from 1.

Generate a new variable $z_t = e_t - d_t$ and estimate

$$\Delta d_t = a_0 + b_0 \Delta e_t + c_0 (e_{t-1} - d_{t-1}) + v_t \tag{2}$$

Use a Likelihood Ratio test to test (2) against (1).

5 Week 5

Use the life expectancy data and again run LE on log PCGDP. Test this equation for

functional form RESET,

Heteroskedasticity
normality and
serial correlation.

How would you interpret the DW stat here?

Plot the residuals. In this equation there are three large negative residuals, countries whose life expectancy is over ten years less than you would expect given their income. Identify them.

Do the same four tests and plot of the residuals for the regression of LE on PCGDP.