

MSc International Business Economics 2003-4

Econometric Theory and Methods

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Time Series Econometrics

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Part 1: Internet Resources

Course Website

Resources for this course have been placed on the course website:

<http://carecon.org.uk/Users/paul/etm.htm>

provides useful info and some of the datasets used in the exercises –use the Econometrics link.

Suggestions for Improvement

Suggestions for improvement of any aspect of the course or documentation are welcome and can be made via the website or by emailing the individual lecturers at the addresses given above.

Part 2: General Reading List and Advice

There are many textbooks, which can be used to follow the course. It is worth having a look at them and finding the one that best suits your individual requirements. You should still keep to hand the books you were referred to in the previous session, but you will need to move on to the more advanced ones as well.

Basic texts:

Gujarati, D. N. (1995) 'Basic Econometrics', McGraw Hill.

A useful introductory text with a detailed discussion.

R Carter Hill, William E Griffiths, George G Judge (2001) 'Undergraduate Econometrics', Second edition, John Wiley and Sons. Very good introduction and good discussion.

Kennedy, P. (1998) 'A Guide to Econometrics', Blackwell.

Is still very useful. It lacks notation and technical detail but explains concepts well and is a useful accompaniment to a more formal text

A bit more advanced:

Maddala, G. S. (2000) 'Introduction to Econometrics', Third Edition, Prentice-Hall.

This is more up to date than most texts only uses matrix algebra in appendices don't go straight to this book if you have not done econometrics before .

Pindyck, R. S. and Rubinfeld, D. L. (1998), 'Econometric Models and Economic Forecasts', McGraw Hill. Very good coverage of time series, cointegration, and simultaneous equation models.

Other useful texts are:

Ghosh, S. K. (1991) 'Econometrics: Theory and Applications', Prentice Hall.
A useful text with references to applied studies.

Johnston, J and J DiNardo (1997) "Econometric Methods", McGraw-Hill

Judge, G. G., Hill, R. C., Griffiths, W. E., Lutkepohl, H., and T-C Lee (1988) 'Introduction to the Theory and Practice of Econometrics', John Wiley. 2nd edition.

Harris, R. (1995) 'Using Cointegration Analysis in Econometric Modelling', Harvester Wheatsheaf .
A very good introduction to cointegration

Stewart, J and L Gill (1998) 'Econometrics', Prentice Hall.

Stewart, M. and Wallis, K. (1981) 'Introductory Econometrics', Basil Blackwell.
Useful on identification in particular.

Applied texts

Berndt, E. R. (1991) 'The Practice of Econometrics' Addison Wesley.
A very good new text which comes with data to allow actual examples to be followed. it will also allow those who have already done an introductory course to move on to the more advanced chapters.

Thomas, R. L. (1997) 'Modern Econometrics, an introduction", Addison-Wesley.
A good applied econometrics text with detailed introduction.

Software Manuals

Pesaran, M. H. and Pesaran, B. "MICROFIT 4.0, Windows version", 1997, Oxford University Press, ISBN 0-19-268531-7. This is the manual for the MICROFIT package that you will be using. It is denoted as MICROFIT MANUAL (MM) hereafter.

More advanced texts

Davidson, R. and MacKinnon, J. G. (1993), 'Estimation and Inference in Econometrics', Oxford University Press.
Very comprehensive

Greene, W. H. (1997) 'Econometric Analysis', Macmillan.
Comprehensive

Hendry, D. F. (1995), 'Dynamic Econometrics', Oxford University Press.

Intriligator M, R Bodkin, C Hsaio (1996) “Econometric Models, Techniques and Applications”, Prentice Hall.

Judge, G. G., Griffiths, W. E., Hill, R. C., Lutkepohl, H., and Lee, T. C. (1985) ‘The Theory and Practice of Econometrics’, Second Edition, Wiley.

Maddala, G. S. (1977) ‘Econometrics’, McGraw Hill.
A popular reference text for researchers

Maddala, G S and Kim (1999) “Unit Roots, Cointegration and Structural Change”, Cambridge University Press.

Mills T (1999) “The Econometric Modelling of Financial Time Series”, Cambridge University Press.

Patterson, K (2000) “An Introduction to Applied Econometrics”, Palgrave.

If you already have a textbook that is not on this list and you are happy with it then carry on and use it to follow the course. All texts follow roughly the same material.

Part 3. Lecture and Workshop Outlines

Lecture 1: Research and econometric methodology

Lecture: 1

Introduction in De Marchi and Gilbert (eds) (1989)'History and Methodology of Econometrics' Clarendon Press, Oxford.

Granger C (1990) 'Where are the Controversies in Econometric Methodology' Introduction to Granger CWJ (ed) (1990)'Modelling Economic Time Series', Oxford University Press. p1-23.

Pesaran MH (1990) 'Econometrics', in Eatwell et al (eds)'The New Palgrave'.

Smith RP (1992) 'Econometrics' in M Sawyer (ed) 'The Handbook of Radical Political Economy' Edward Elgar.

Workshops: Using Microfit 4.0. MM Ch 1 – 3, 8 - 9. Microfit Exercises.

Lectures 2-4: Dynamic Models; stochastic processes and cointegration

Lectures: Dynamic Models; Time Series Analysis; Testing for unit roots; Trends and Random Walks; Cointegration; Engle-Granger.

Maddala Ch 6,13,14; Gujarati Ch 14; Kennedy Ch 9; Hill 15-17.

Workshops: Microfit exercises; MM Ch 6,10,11, 16; Lessons and exercises 11.1, 11.3, 16.1, 16.2; data gdp95.fit, phil.fit.

Lectures 5-6: Identification and Simultaneous Equations

Identification; Indirect Least Squares; Instrumental variables; Two stage least squares.
Stewart (1) Ch 6; Maddala Ch 9; Gujarati Ch 18-20; Kennedy Ch 10.

Workshops: Microfit Exercises. MM Ch 17.

Lecture 7-11: Topics in Econometrics

Lecture 7: Demand Analysis

Workshop:

Lecture 8: Production Functions

Workshop:

Lecture 9: Macromodelling and VARS

Workshop:

Lecture 10: Cointegrating VARS

Workshop:

Lecture 11: Consolidation/Revision.

Workshop:

Part 4: Microfit Exercise

This exercise uses data in a Microfit file named CONS95.FIT

Run Microfit and access this Microfit file.

The data consist of:

CE: Consumers Expenditure in current prices

RCE: Consumers Expenditure in 1985 prices

RDE: Expenditure on Durables in 1985 prices

PDI: Personal Disposable Income in current prices

RPDI: Real Personal Disposable Income in 1985 prices

C: A variable with the value one for each observation

When you have read in the data, check the data definitions using TITLE.

Then:

Explain what RPDI measures and how it differs from personal income.

Plot RCE and RPDI and comment on the main features

Generate:

$S = \log((PDI - CE) / PDI)$

$RS = \log((RPDI - RCE) / RPDI)$

Plot these two series and comment on their meaning and the difference between them.

Generate:

$LC = \log(RCE - RDE)$

$GC = LC - LC(-1)$

$LY = \log(RPDI)$

$GY = LY - LY(-1)$

$LP = \log(CE / RCE)$

$GP = LP - LP(-1)$

$Z = LC - LY$

What do these series measure?

Use the following commands and explain the output you get:

PLOT LC LY

PLOT GC GY

COR LC

COR LC LY GC GY

LIST C LC LY GC GY

XPLOT LC LY

Run a regression with RCE as the dependent variable and C and RPDI as the independent variables, using sample 50 to 80. Note and interpret the regression results.

Save your dataset in a special Microfit file with a different name to the original (eg consnew.fit). Use

this file from now on.

Run the following regressions using OLS, on sample 50 80, the first variable is the dependent variable, the rest the independent ones. In each case interpret and comment on the main features of the regression results, diagnostic tests A to D, the plot of actual and predicted values and the plot of the residuals.

1. LC C LY

Test whether the coefficient of LY is significantly different from zero and then from one, at the 5% level.

2. GC C GY

After estimating the equation go to the hypothesis testing menu and conduct a variable addition test to see whether LC(-1) and LY(-1) are jointly significant using the F statistic and individually significant using the t statistics

3. GC C GY GP

Repeat as for 2 and comment on the significance of the lagged values.

4. LC C LY LY(-1) LC(-1)

5. GC C GY LY(-1) LC(-1)

Compare the results for 4 and 5 in terms of coefficients, standard errors, log-likelihoods, and the sum of squared residuals. What is the relationship between them.

6. GC C GY LY LY(-1) LC(-1)

Explain what happens when LY is added to 5

7. GC C GY LY(-1) GP LP(-1) LC(-1)

Calculate the long run elasticities of consumption with respect to the price level and income. What does economic theory predict about the coefficient of LP(-1). Test this prediction.

8. GC C GY GP Z(-1)

Test 8 against 7. Is this a well specified equation. Explain the economic interpretation of 8. What is the long run elasticity of consumption with respect to prices and incomes in this model.

9. GC C

Interpret this model and carry out a variable addition test for the significance of LY(-1) and GY(-1).

Interpret the result.

Using DF and ADF tests investigate the time series properties of the series and whether they are cointegrated.

If you find sensible cointegrating relations estimate bivariate error correction models using the Engle-Granger two stage procedure.

- Using the **whole sample** run the following regression using OLS:

$$LC = a + b LY + c LY(-1) + d LC(-1) + e$$

(Note that a, b, c and d are constants and e is the error term) What type of model is this?

- Now test the following restrictions and explain what model results in each case if the restrictions are accepted:

(1) $c = d = 0$

(2) $b = c = 0$

(3) $c = 0$

(4) $d = 0$

(5) $d = 1$ and $c = -b$ (Note: this is a joint test)

- Estimate the error correction model and consider the results. Write down and test the implied restrictions on the general dynamic model.
- Using DF and ADF tests investigate the time series properties of the series and whether they are cointegrated.
- If you find sensible cointegrating relations estimate bivariate error correction models using the Engle-Granger two stage procedure.
- Consider the differences between the results for the two samples and what they imply.

5. Exercise in interpretation

Question 1

Consider the following estimation results from Microfit:

Ordinary Least Squares Estimation

Dependant variable is DMP

100 observations used for estimation from 1964Q3 to 1989Q2

Regressor	Coefficient	Standard Error	T-Ratio [Prob]
C	.023513	.0050612	4.6458 [.000]
DY (-1)	.22990	.097585	2.3559 [.021]
DP	-.70130	.12855	-5.4556 [.000]
DMP	-.28937	.074801	-3.8686 [.000]
RLA	-.62635	.074777	-8.3763 [.000]
RRA	.65421	.072829	8.9828 [.000]
MPY (-2)	-.092817	.0092510	-10.0332 [.000]

R-Squared	.76261	F-statistic F (6, 93)	49.7939 [.000]
R-Bar-Squared	.74730	S.E. of Regression	.013242
Residual Sum of Squared	.016308	Mean of Dependant Variable	.0054268
S.D. of Dependant Variable	.026342	Maximum of Log-likelihood	294.1698
DW-statistic	2.1311	Durbing 's h-statistic	-3.0016 [.003]

Diagnostic Tests

* Test Statistics	* LM Version	* F Version	*
*A : Serial Correlation	*CH-SQ (4) = 8.9617 [.062]	*F (4, 89) = 2.1903 [.076]	*
*B : Functional Form	*CH-SQ (1) = .31572 [.574]	*F (1, 92) = .29138 [.591]	*
*C : Normality	*CH-SQ (2) = 2.2751 [.305]	* Not applicable	*
*D : Heteroscedasticity	* CH-SQ (1) = 2.0057 [.305]	* F (1, 98) = 2.0058 [.160]	*

A: Lagrange multiplier test residual serial correlation

B: Ramsey's RESET test using the square of the fitted values

C: Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values

With variables:

List of Variables and their Descriptions

C	: 1
DMP	: mp-mp (-1)
DMPY	: mpy-mpy (-1)
DP	: p-p (-1)
DY	: y-y (-1)
M	: log of M1
MP	: m-p (-1)

MPY : m-p -y
P : log of price level (1985 p=1)
RLA : R3 3-month local authority interest rat
RNET : R* (rla - rra)
RRA : Rra (R3 - R*)
Y : log of total final expenditure

- Briefly discuss what the results tell us about the determination of the demand for money in the UK.
- Briefly explain what the F statistic (F(6,93)), the DW-statistic, Durbin's h-statistic, R-Bar-Squared are and what they tell us about the regression.
- Briefly explain what the diagnostic test A,B,C,D are and what they tell us about the regression. Explain the difference between the LM Version and the F Version.
- Estimating the results on a subsample of the data gave the following results.

Ordinary Least Squares Estimation

Dependant variable is DMP

84 observations used for estimation from 1964Q3 to 1985Q2

Regressor	Coefficient	Standard Error	T-Ratio [Prob]
C	.022925	.0053635	4.2742 [.000]
DY (-1)	.24934	.10362	2.4063 [.019]
DP	-.69709	.13987	-4.9837 [.000]
DMP	-.29773	.082876	-3.5925 [.000]
RLA	-.62837	.080170	-7.8380 [.000]
RRA	.73752	.32969	2.2370 [.000]
MPY (-2)	-.093780	.010177	-9.2149 [.000]

R-Squared	.69172	F-statistic F (6, 93)	28.7954 [.000]
R-Bar-Squared	.66770	S.E. of Regression	.013739
Residual Sum of Squared	.014535	Mean of Dependant Variable	-.1685E-3
S.D. of Dependant Variable	.023834	Maximum of Log-likelihood	244.6150
DW-statistic	2.1216	Durbin's h-statistic	-1.7787 [.075]

Diagnostic Test

* Test Statistics	* LM Version	* F Version	*
*A : Serial Correlation	*CH-SQ (4) = 7.8121 [.099]	*F (4, 73) = 1.8713 [.125]	*
*B : Functional Form	*CH-SQ (1) = .50059 [.479]	*F (1, 76) = .45563 [.502]	*
*C : Normality	*CH-SQ (2) = 2.1667 [.338]	* Not applicable	*
*D : Heteroscedasticity	* CH-SQ (1) = .94569 [.331]	* F (1, 82) = .93368 [.337]	*
*E : Predictive Failure	* CH-SQ (16) = 9.3950 [.896]	* F (16, 77) = .58719 [.337]	*
*F : Chow Test	* CH-SQ (7) = 5.2468 [.630]	* F (7, 86) = .74955 [.337]	*

- A: Lagrange multiplier test residual serial correlation
B: Ramsey's RESET test using the square of the fitted values
C: Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values

E: A test of adequacy of predictions (Chow's second test)

F: Test of stability of the regression coefficients

- i. Briefly discuss what these new results tell us about the model
- ii. Replicate the Predictive Failure and Chow Test results explaining carefully what they are and what they show.