Course ID Number: ADC6565

Course Title:  Econometric Modelling and Forecasting with Time Series Data

No. of Credits: 2

Graduate School of International Relations
International University of Japan

Term: Spring 2013

Instructor: Cooray, Nawalage S.

Course Introduction

Econometric modelling and forecasting have become one of the most important tools for policy makers of the day in quantifying the impacts of various policies on their economies. To tackle practical problems policy makers and business managers need to build empirical models. In developing countries, however, when applying those models for various analyses they have to overcome various problems that do not exist in developed economies. One of the frequently observed problems is the lack of data. This fact not only restricts the scope of econometric analysis but also requires highly developed skills for extracting meaningful quantitative information from the limited available data. The objectives of the course are to explore various econometric methods to overcome the above-mentioned problems and construct various econometric models for students’ own economies. These models will be useful for policy makers in their deliberation to achieve high standards of living for their citizens.
International University of Japan

The Course Syllabus for Econometric Modelling and Forecasting with Time Series Data

<table>
<thead>
<tr>
<th>Title of the course:</th>
<th>ADC 6565  Econometric Modelling and Forecasting with Time Series Data</th>
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<tbody>
<tr>
<td>Course instructor:</td>
<td>N. S. Cooray</td>
</tr>
<tr>
<td>Office Room 332, Office Tel: 428 and Email:</td>
<td><a href="mailto:cooray@iu.j.ac.jp">cooray@iu.j.ac.jp</a></td>
</tr>
<tr>
<td>Class schedule:</td>
<td>Monday 16:20-17:50 and 18:00-19:30</td>
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<tr>
<td>Term:</td>
<td>Spring 2013</td>
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<td>2 Credits</td>
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<td>(Classes are in PC Room 120)</td>
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1. Course description and objectives:
Econometric modelling and forecasting have become one of the most important tools for policy makers of the day in quantifying the impacts of various policies on their economies. To tackle practical problems policy makers and business managers need to build empirical models. In developing countries, however, when applying those models for various analyses they have to overcome various problems that do not exist in developed economies. One of the frequently observed problems is the lack of data. This fact not only restricts the scope of econometric analysis but also requires highly developed skills for extracting meaningful quantitative information from the limited available data. The objectives of the course are to explore various econometric methods to overcome the above-mentioned problems and construct various econometric models for students’ own economies. These models will be useful for policy makers in their deliberation to achieve high standards of living for their citizens.

This course is also designed to provide the practical illustration of techniques used in applied macroeconometric and a clear understanding of the salient features, challenges and opportunities of the participants’ own economies. This course is highly recommended for students who intend to do quantitative analysis (using time series data in particular) in their thesis writing.

2. Learning outcomes for participants:
At the end or during the course participants will be able:
(a) To conceptualise the vital concepts and issues of econometric analysis and modelling;
(b) To apply the econometric concepts and tools to understand and analyse their countries’ economic behaviour;
(c) To understand the complex nature and inter-linkages among sectors and markets of their economies;
(d) To acquire skills and knowledge of econometric modelling for strategic thinking and understanding;
(e) To acquire methodological foundation necessary for future studies; and
(f) To synthesis of ideas, views and evidence.

3. Career relevance:
The knowledge and skills obtained from the course will be useful for business managers and development practitioners in analysing and maximising the effectiveness of policies and business decisions. Aware of econometric tools are necessary for effective decision making in business and policy administration/management.

4. Course context and rationalisation:
This course is quite similar to Business Forecasting. Those who have taken Macroeconomics, Applied Econometrics, and Statistics for Business and Economics will find it easy to follow the course. MBA students who are interested in business forecasting may wish to register this course.

5. Pedagogical techniques:
(a) Class room lectures;
(b) Computer workshops and in class discussion;
(c) Reading assignments from Internet, books and journals; and
(d) Homework assignments and group discussion.

6. Assessment:
Assessment will depend on the performance of the followings:

(a) Class participation/commitment/contribution etc. 10%
(b) Homework assignments (3-5) 30%
(c) Final paper 60%

The term paper should be an econometric model using student’s own country data. Some home assignments are given in such a way that they can be linked to the term paper. (Details of term paper will be given in the class).

7. Text books:


9. References placed on reserve:
Eviews 6 Command and Programming Reference and User’s Guide
Griffiths’ William E; R. Carter Hill, and Guay C. Lim (2008), Using EViews for Principles of Econometrics

10. Hours of consultation: Wednesday from 14:30-16:30
All learning partners are encouraged to share their opinion, suggestion and difficulties in a relaxed atmosphere with course facilitator. Arrangements can also be made to consult on an individual or group basis as needs arise.

11. Detailed course contents and required readings:
Required readings are marked with a star (*), recommended readings are not starred. A course folder has been created on the public folder (Cooray’s course) for recommended readings and for readings that are available online. Other materials are reserved and can be obtained from the MLIC counter.

1. First week: Course Introduction and Time Series Analysis
   (a) Course introduction
   (b) Types of data
   (c) Smoothing and Extrapolation (Seasonality, Decomposition Models, Irregularity of data, trends)
   (c) Understanding of an economy

Required readings
Pindyck, Robert S. and Daniel L. Rubinfeld (1998), (4th edition), pp. 94-95

Recommended readings
2. Second week: Time Series Econometrics: Stationarity and Unit Roots

(a) Estimation of simple models
(b) Stationarity and Unit Roots

Required readings


Pindyck, Robert S. and Daniel L. Rubinfeld (1998), (4th edition), pp. 94-95

Recommended readings


Wooldridge, Jefferey M. (2003), Introductory Econometrics (2nd edition), Chapter 10 and 11

3. Third week: Time Series Econometrics: Cointegration and Error Correction Mechanism

(a) Cointegration
(b) Error Correction Mechanism (use data in CD for Gujarati chapter 21)
(c) Discussion on the application of cointegration and error correction models in inflation analysis

Required readings

Recommended readings

4. Fourth week: Some Essentials Topics in Econometrics
(a) Distributed lag and autoregressive models
(b) Causality in economics
(c) Dealing with missing data
(d) Impulse Response Analysis
(e) Dummy Variable Model

Required readings
Sixth week: Dynamic Simulation of Simultaneous-Equation Models

Up to now we have worked with single equation and from now on we move multi-equations system. Having estimated simultaneous system we then move on to simulation for policy analysis and forecasting. Simulation is simply the mathematical solution of a simultaneous set of difference equations. We discuss ex post simulation or historical simulation and test the reliability of the model before it will be utilised for forecasting and policy analysis. Using data (see file entitled “macro.wf1” in the data folder) given in section 13.3 of Pindyck and Rubinfeld (1998, p. 390), we demonstrate how to estimate and test simultaneous model in EViews.

(a) System estimation methods
(b) Model simulation
(c) Validation of model or model testing
(d) Forecasting

Required readings

Recommended readings


Recommended readings
Econometric models have been used by the private sector, academicians and government sector policy makers to analyze the economy and to evaluate economic policies and also to forecast the future behavior of the economy. This session will give a brief history of modeling activities and an overview of models of developing countries.

We also introduce other macroeconomic models developed for fiscal and monetary policy analysis. International Monetary Fund (IMF) has been using its own prototype econometric model constructed and estimated for 31 developing countries. Since this model has wide and almost universal applicability students are encouraged to estimate IMF-type model using their own country’s data and use it for policy analysis. Having completed estimations of equation we then move to create a system estimation (or simultaneous equations system) in the EViews.

(a) Introduction to macroeconometric modelling and its evolution
(b) Understanding the links among markets and sectors of an economy
(c) New Approach to macroeconometric Modelling
(d) Discussion on IMF-type model
(e) Discussion on IS-LM model

**Required readings**


**Recommended readings**


**7. Eighth week: Policy Analysis with Macroeconometric Models (Multiplier or Scenario Analysis)**
Having estimated different models in previous sessions, here we will intend to do testing of models and to use those models for forecasting and policy analysis. Policy analysis or multiplier analysis will include: fiscal policy, monetary policy, pricing policy, and exchange rate policy.

(a) Multiplier analysis or policy analysis with models

8. **Ninth week: Economic and Business Forecasting**

In general, forecasting is the act of predicting the future. In econometrics, forecasting is the estimation of the expected value of a dependent variable for observations that are not part of the same data set. In most forecasts, the values being predicted are for time periods in the future, but cross-sectional predictions of values for countries or people not in the sample are also common. Here we discuss five approaches to economic forecasting based on time series data. They are (1) Exponential smoothing methods; (2) Single-equation models; (3) Simultaneous-equation regression models; (4) Autoregressive integrated moving average models (ARIMA or Box-Jenkins methodology); and (5) Vector autoregressive (VAR models).

**Required readings**


**Required readings**


9. **Modelling and Forecasting of Risk and Volatility in Macroeconomics and Finance**

(c) We discuss volatility of financial assets, inflation, and exchange rate using ARCH and GARCH Estimation.
Discussion of ODA paper

Reference:
Gujarati, Damodar N. (2003), Chapter 22
EViews 6 Chapter 29
Koop, Gary (2003), Analysis of Economic Data, Chapter 11 on “Applications of time

10. Tenth week: Global Level Commodity and Other Econometric Models
Significant improvements in global commodity modelling took place during the 1980s
and since then the expansion of global level commodity models has been
evidenced. Econometric modelling of commodity markets can be used "as
an effective new approach" in this area. Nevertheless, the knowledge of
determination of demand, supply and price is inadequate and the problem
of falling price of primary commodity is unsolved. Thus, quantitative
models of commodity markets can help provide a clear understanding of
the nature of the problems. In this session, we use some estimated
commodity models for agricultural policy analysis in developing countries.

Global level econometric model provides a consistent framework for undertaking
quantitative studies of the international economic transmission
mechanisms. These models will also be useful in quantifying the effects of
international and national policies on the outlook for the world economy.
(a) Impact analysis of commodity prices using commodity models
(b) Agricultural policy analysis using econometric model
(c) Discussion on global level modelling
(d) Discussion on forecasting and policy analysis using global models

Reference:
Development in Asia for Cereal and Meat Demand: An Investigation of
Food Demand Relationships with Application to China” Journal of
the Spring Meeting of Project Link, New York.
Nations University, Tokyo (Chapters 2, 4, 5, 10 and 11).
Klein, Lawrence R. et al. (1999), Principles of Macroeconometric Modeling, ELSEVIER,
The Netherlands. (Chapters 4, pp. 127-146)
Lo, Fu-chen, Hiroyasu Tokuda and N. S. Cooray, Eds. (2000), The Sustainable Future of
the Global System III, The United Nations University/Institute of Advanced
Studies, Tokyo.
See http://www.chass.utoronto.ca/link/ for more details on Project LINK