

5QQMN938 Intermediate Econometrics

Module Outline 2018/19

This course is an intermediate econometrics module which will focus on the models required to analyse time series data. Students will gain a deep understanding of several types of time series modelling approaches. This will enable them to make real-world forecasts of important economic and financial series, useful for further study and careers in economics, finance, retail and others.

Contact Details

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Assessment

Mid-term Exam (20%) – 24 hour take-home exam, released Tuesday 26th February 12pm

Final Exam (80%)

Pre-Requisites

Students must have taken the pre-requisite module 5SSMN932 Introduction to Econometrics. Students on BSc Economics & Management and BSc Business Management will not be allowed to take this module unless they have the pre-requisites. This course is compulsory for BSc Economics students

Module Structure

There will be 22 hours of lectures (11 x 2 hours) and 9 hours of tutorials for this course. The lectures will cover the material for each topic and students will be encouraged to participate in class by solving problems and discussing the solutions. The lectures will also contain real-world applications of the theory and methods covered. The tutorials will be based in computer labs. Students will be given questions (problems and practical computer questions) to prepare before the tutorial. In the tutorial, students will be instructed in the software Stata and will have the chance to get feedback and ask questions on their work.

Real-World Examples

This course will be grounded in important real-world applications. Examples are: forecasting real GDP growth, house prices, hospital attendances, petrol and diesel prices and the stock market (FTSE100).

Module Objectives

This is an intermediate econometrics course focussing in the methods to analyse time series data. The objectives of the module are:

- To understand theoretical and practical concepts in time series econometrics, building on topics introduced in the module Introduction to Econometrics;
- To be able to develop, estimate and understand the types of models which are used for forecasting and policymaking, and appreciate their limitations;
- To apply econometric models to real-world data relevant to professions in banking and finance, economic policy, consultancy and so on;
- To acquire practical and transferable econometric computing skills using the programme Stata;
- To have the pre-requisite knowledge necessary for further study in final-year modules (such as Applied Econometrics) and MSc programmes at the highest-ranked institutions.

Employability Skills

This course will give students very relevant quantitative skills for further study and careers in economics, policymaking, consultancy, banking and finance, retail and others. Specifically:

- Problem-solving and analytical skills;
- Data analysis and data preparation skills;
- Econometric model-building and forecasting;
- Confidence and ability in econometric software, including elements of code-writing

Reading

This intermediate course in time series econometrics will take the topics typically found in introductory econometrics textbooks but aims to develop a deeper theoretical and practical understanding of the models. The core introductory reading material for this course will be Part 4 of the textbook:

Stock, J. and Watson, M. "Introduction to Econometrics" 3rd Ed., Pearson.

This book gives a good introduction to the themes in this course. Through the lectures and tutorials, students will gain a much deeper understanding of the topics than in Stock and Watson. They are therefore encouraged to study the lectures and tutorials and supplement this reading with the more advanced textbook:

Enders, W. "Applied Econometric Time Series" 4th Ed., Wiley

Another useful textbook with coverage of time series methods is:

Verbeek, M. "A Guide to Modern Econometrics" 5th Ed., Wiley

Lecture Topics

1. Introduction to Time Series

Time series data, properties, transformations, autocorrelation, stationarity, simple time series regression

Stock and Watson (S&W): 14.1 and 14.2

2. Univariate Models – Autoregression Part 1

Intro to the AR(1) model, properties (mean, variance, ACF), estimation by OLS, forecasting

S&W: 14.3, 14.4 and Appendix (also Enders: 2.3, 2.7)

3. Univariate Models – Autoregression Part 2

Intro to the AR(p) model, lag operator notation, stationarity conditions, lag length selection (AIC, BIC), forecasting

S&W: 14.5 (also Enders: 2.3, 2.4, 2.7)

4. Univariate Models - MA and ARMA

Intro to MA(q) and ARMA(p,q) models, properties of MA(1) model, estimation by maximum likelihood, forecasting

S&W: Appendix 14.4, (also Enders: 2.2, 2.4, 2.5)

5. Multivariate Models & Dynamic Causal Effects

Intro to ADL models, dynamic causal effects, cumulative multipliers, HAC standard errors, Granger causality, forecasting

S&W: 14.4, 15.1 – 15.4 (also Enders: 5.2)

6. Multi-step Forecasting and Pseudo Out-of-Sample Methods

Iterated multi-step forecasts in univariate and multivariate, vector autoregression (VAR), direct multi-step forecasts, fan charts, pseudo out-of-sample methods

S&W: 16.1, 16.2, 14.7 (also Enders: 2.9, 5.5, 5.6)

7. Nonstationarity – Trends and Unit Roots

Deterministic and stochastic trends, random walks, unit roots, Dickey-Fuller unit root testing

S&W: 14.6, 16.3 (also Enders: 4)

8. Nonstationarity - Spurious Regression & Cointegration

Intro to spurious regression, order of integration, cointegration, Engle-Granger cointegration testing, error correction models

S&W: 16.3, 16.4 (also Enders: 6)

9. Nonstationarity – Seasonality and Breaks

Seasonal adjustment, seasonal AR models, seasonal random walks, structural break testing (Chow and Quandt) and estimating the break date

S&W: 14.7 (also Enders: 2.11, 2.12)

10. Volatility Models

Intro to volatility, the ARCH and GARCH models, estimation and forecasting

S&W: 16.5 (also Enders: 3)

11. Revision