UNIVERSITEIT STELLENBOSCH UNIVERSITY

ADVANCED TIME-SERIES ECONOMETRICS 872

Course Outline 2020

Department of Economics

Aims and objectives

This course prepares you for empirical economic research using time series data as well as serving as an introduction to theoretical econometric work. All theoretical methods will be complemented with practical applications using standard statistical packages.

Having completed this course successfully a student will

- understand the problems associated with empirical research with time series data in economics and some of the leading formal paradigms developed to address those problems;
- have experience in how to select and apply the correct approach;
- be able to understand and critique current empirical and theoretical research.

Part 1 will expose students to a number of advanced applications that build on the theory developed in the Masters econometrics module from the first semester.

Part 2 will build the basic intuition for Bayesian time series analysis, which builds the foundation for Part 3 of this module. Several applications of the Bayesian modelling paradigm will be explored.

Part 3 will introduce Bayesian analysis as an alternative paradigm, particularly suited for the systematic empirical evaluation of more non-linear full structural theoretical macroeconomic models, typically built with specific functional form assumptions.

Lecturers: Prof Willem Boshoff (wimpie2@sun.ac.za)
Part 1: Time Series Econometrics: Advanced Applications
Rm 501 C.G.W. Schumann Building
Tel: 021 808 2387

Dr Dawie van Lill (convenor, dvanlill@sun.ac.za)
Part 2: Bayesian Time Series Econometrics
Rm 511 C.G.W. Schumann Building
Tel: 021 808 2394

Prof Guangling Liu (gliu@sun.ac.za)
Part 3: Bayesian Estimation of Structural DSGE models
Rm 504 C.G.W. Schumann Building
Tel: 021 808 2238

Prerequisites

This course is intended for students who have shown proficiency in mathematical and statistical reasoning and will presume basic knowledge. Admission to the course is therefore subject to obtaining certain minima in graduate mathematical and econometric courses.

We will mostly work in terms of matrix algebra representations of all multivariate methods. While we will carefully develop the notation and techniques we need within the course, the onus rests on the student to ensure mastery of these skills by diligent practice.

Assessment

The course assessment is presented below.

	Date	Weight
Written Exam	November 2020	50%
Time Series Project	Early November 2020 (for graduation in December 2020) December 2020 (for graduation in March 2021)	25%
Bayesian DSGE Project	Early November 2020 (for graduation in December 2020) December 2020 (for graduation in March 2021)	25%

If the exam is not passed on first attempt but a mark greater than 40% was achieved, there will be a supplementary exam where the maximum mark will be capped at 50%.

There will be several problem sets and practical tutorials, but these will not be for submission and grade – they are to be seen as opportunities to obtain practice on the work covered to ensure mastery. The onus rests entirely on the student for participating in these tutorials and bringing problems encountered to the attention of the lecturer involved.

Projects

To demonstrate their mastery of the work covered, students must do an applied empirical project using the methods studied in the course (or related methods, should the student wish to). The project will include detailed discussions of the data used, motivation of methods and evaluations of results.

Students are required to submit two projects: The first on time series topics related to the first two parts of the course. The second an application of the Bayesian estimation methods in part three of the course.

Applying time series methods correctly to effectively illuminate empirical questions is a skill that cannot be fully taught in a classroom environment. It takes personal interest, time and trial-and-error to learn how to do this well. The projects are therefore intended as learning-by-doing opportunities where the **students are expected actively seek guidance of the instructors** when problems are encountered on the way. This will require systematic planning and effort, and several consultations with the instructors. To aid the development of the ideas, each student will give a short presentation on their proposed project after the recess.

Max words: 8000 (strictly enforced).

Textbooks

Reading and prescribed material for the first and second part will be assigned as the course is presented with documents uploaded to SUNLearn.

The third part of the course will follow the prescribed text of the course closely:

Fabio, Canova (2007) Methods for Applied Macroeconomic Research. Princeton University Press, Princeton and Oxford. Chapters 9 & 11.

Marco Del Negro and Frank Schorfeide (2011): "Bayesian Macroeconometrics" in J. Geweke, G. Koop, and H. van Dijk (eds): The Oxford Handbook of Bayesian Econometrics, Oxford University Press. Chapter 4.

Further readings and prescribed material will be assigned as the course is presented

Lecture topics in brief (provisional)

Topic:	Dates:	Weeks:
Part 2: Time Series Econometrics: Advanced Applications		
1. Maximum likelihood approaches in time series	28 and 31 July	1
2. Structural Breaks Modelling	4 and 7 August	1
3. Regime-switching Modelling	11 and 14 August	1
Part 2: Bayesian Time Series Econometrics		
1. Introduction to Bayesian Statistics	18 and 21 August	1
2. Bayesian Computation	25 and 28 August	1
3. Bayesian Computation and Regression Models	1 and 4 September	1
4. State Space Modelling and the Kalman Filter	8 and 11 September	1
Recess	15 and 18 September	1
5. Bayesian VARs	22 and 25 September	1
6. TVP-VARs with stochastic volatitility	29 September, 2 October	1
Part 3: Bayesian Estimation of Structural DSGE Models		
1. Bayesian analysis of DSGE models	6 and 9 October	1
2. Evaluating DSGE models	13 and 16 October	1
3. Estimating DSGE models using Dynare	20 and 23 October	1
4. MS-DSGE	27 and 30 October	1