APPLIES TO ACADEMIC YEAR 2016/2017

DRE 7019 Bayesian Time Series Modelling & Forecasting

Programme
Economics

Responsible for the course
Leif Anders Thorsrud, Mike West

Department
Department of Economics

Term
According to study plan

ECTS Credits
3

Language of instruction
English

Introduction
This course covers principles an methodology of bayesian dynamic modelling in multivariate time series. Several key model developments and examples involve analysis, inference and forecasting in financial and econometric contexts, including Bayesian decision analysis overlaying modelling and computational methodology. Several examples are drawn from these areas, while others exemplify use of this range of models in other fields. The course includes recent modelling and methodological developments in multivariate time series and forecasting, and contacts current research frontiers

Learning outcome
Course participants will gain :
Exposure to the basic ideas and approaches of Bayesian model-based time series analysis using key classes of dynamic models;

Exposure to the integration of Bayesian forecasting with decision analysis in financial applications;

An appreciation of the roles of analytic and simulation-based Bayesian computation in fitting and using multivariate time series models;

Awareness of texts, papers and software that will enable follow-on explorations and analysis; exposure to recent and current research topics, especially focused on scale-up of models and methods to higherdimensional series, and dynamic sparsity modelling in time series and forecasting

Prerequisites
Admission to a PhD program is a general requirement for participation in PhD courses at BI Norwegian Business School.

External candidates are kindly asked to attach confirmation of admission to a PhD programme when signing up for a course with the doctoral administration if they want to take exams. However, candidates can be allowed to sit in on courses by approval of the course leader. Sitting in on courses does not permit registration for courses, handing in exams or gaining credits for the course. Course certificates or conformation letters will not be issued for sitting in on courses
The course material will be accessible to advanced students with strong statistical modelling backgrounds and prior exposure to Bayesian analysis and aspects of time series. Working facility in multivariate distribution theory and statistical inference are prerequisites; prior exposure to some areas of time series analysis will be useful.

Compulsory reading
Books:
Raquel Prado & Mike West. Time Series: Modeling, Computation, and Inference. Chapman Hall/CRC Press Taylor & Francis Group. Reviewing at least introductory material in the book in advance is highly recommended.

Articles:
Aguilar, Omar and Mike West. 2000. “Bayesian Dynamic Factor Models and Portfolio Allocation”. Journal of Business and Economic Statistics, 18(3), 338-357
Carvalho, Carlos M. and Mike West. 2007. “Dynamic Matrix-Variate Grpahical Models”. Bayesian Analysis,2(1),

69-98
Gruber, Lutz and Mike West. 2015. “GPU-Accelerated Bayesian Learning and Forecasting in Simultanous Graphical Dynamic Linear Models”. Bayesian Analysis. TBA
Nakajima, Jouchi and Mike West. “Bayesian Analysis of Latent Threshold Dynamic Models”. Journal of Business and Economic Statistics. 31(2), 151-164
Zhao, Yi Zoey and Mike West. 2015. “Dynamic Dependence Networks: Financial Time Series Forecasting and Portfolio Decisions”. Mimeo
Zhou, Xiaocong, Jouchi Nakajima and Mike West. 2015. “Bayesian Forecasting and Portfolio Decisions Using Dynamic Dependent Sparse Factor Models”. Mimeo

Recommended reading

Course outline
Topics/Schedule:
1. Multivariate Time Series and Multivariate Volatility
2. Multivariate Time Series: Time-Varying Vector AR and Related Models
3. Dynamic Latent Factor Models
4. Dynamic Graphical Models
5. Dynamic Dependence Network Models
6. Dynamic Simultaneous Graphical Models

Computer-based tools
Instructor code in Matlab will be used for course examples, and is available to participants. Working familiarity in Matlab will be needed in advance of the course to get the most out of the examples,and the code provides multiple examples– and supporting utilities– for customization to a range of problems

Learning process and workload
A course of 3 ECTS credits corresponds to a workload of 80-90 hours.
Lectures: 15 h.

Coursework requirements
None

Examination
An individual course paper consisting of maximum 15 pages.
The course is graded pass/fail.

Examination code(s)
DRE 70191 course paper counts for 100% of the final grade in the course DRE 7019.

Examination support materials

Exam aids at written examinations are explained under exam information in our web-based Student handbook. Please note use of calculator and dictionary. http://www.bi.edu/studenthandbook/examaids

Re-sit examination
Re-takes are only possible at the next time a course will be held. When the course evaluation has a separate exam code for each part of the evaluation it is possible to retake parts of the evaluation. Otherwise, the whole course must be re-evaluated when a student wants to retake an exam.

Additional information
Honour Code
Academic honesty and trust are important to all of us as individuals, and represent values that are encouraged and promoted by the honor code system. This is a most significant university tradition. Students are responsible for familiarizing themselves with the ideals of the honor code system, to which the faculty are also deeply committed.

Any violation of the honor code will be dealt with in accordance with BI’s procedures for cheating. These issues are a serious matter to everyone associated with the programs at BI and are at the heart of the honor code and academic integrity. If you have any questions about your responsibilities under the honor code, please ask.