

Economics 665

Graduate Forecasting and Time Series Analysis
Winter Term 2007

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Class time/location: Monday, 1:00-3:50 PM (P2072)
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Course objective

This is a course on forecasting concepts and methods aimed at an MA level audience with prior knowledge of time series at the level of the Enders text.

Readings and Textbooks

There is no required textbook for this course. However, the following recommended textbooks will be held on reserve at the library and may prove useful [abbreviations in brackets are used to refer to the books below] :

Enders, W. (2004). Applied Econometric Time Series (2nd Edition). Wiley Series in Probability and Statistics. [**E**]

Diebold, F. (2004). Elements of Forecasting. 3rd Edition. South-Western College Publishing (Cincinnati). [**D**]

Clements, M.P. and D.F. Hendry (1998). Forecasting Economic Time Series. Cambridge: Cambridge University Press. (ISBN 0-521-634806) [**CH**]

Clements, M.P. and D.F. Hendry (1999). *Forecasting Non-stationary Economic Time Series*. Cambridge, Mass.: MIT Press.

Brockwell, P.J. and R.A. Davis (1996). *Introduction to Time Series and Forecasting*, Springer, New York.

Makridakis, S., S. Wheelwright, and R. Hyndman. *Forecasting: Methods and Applications*, 3rd Edition, John Wiley and Sons, Inc., 1998.

Wilson, J. and B. Keating. *Business Forecasting*, 4th Edition, McGraw Hill, 2002.

Throughout the term you may all be assigned journal articles and working papers to read.

Statistical Software

You will need to make heavy use of statistical software, such as Eviews or STATA, in this course. You will also be required to turn in replication files with your assignments that easily reproduce your results.

Assignments, Exams, and Marks

Your mark will be assigned according to the following weights:

1. Real time forecasting project (worth 30%). You are expected to pick five related daily financial series and to use the models learned to provide real-time daily predictions. Students are also expected to analyse the prediction errors and to work to improve their predictions as the semester goes on. Students should also try to employ as many of the methods discussed in class as possible. In other words, this also an opportunity to practice and implement all of the techniques covered in the class. Data stream and Yahoo Finance may be useful starting points. Students are expected to complete this assignment in groups (see group work below). You will be expected to submit regular forecasts throughout the semester as well as a final summary report. Time permitting, you may also be asked to discuss your forecasts on an informal basis in lecture and/or during office hours. Further details may be discussed in class and/or

posted as a link to the course web page.

2. Forecasting replication and extension (worth 30%, group work). Students are expected to replicate the results in a published paper whose primary focus is on forecasting and then to extend these results to more recent data. Students may not choose a paper in which replication programs are provided by the papers authors. This assignment is also expected to be completed in groups. Further details may be posted as link to the course web page.
3. Final Exam (worth 35%) The final exam will primarily test your understanding of the material covered in class. You may also be asked questions about your group work assignments. Further details may be posted as a link to the course web page.
4. Class Participation (5%). This should be self-explanatory.

Suggested homework assignments may also be given out from time to time. These homework assignments will only be graded if you are on the margin between two grades, in which case a good track record on the homework may bring you up to a higher grade.

Group Work

The replication and real-time forecasting exercises may be completed in groups not exceeding three students. Students are free to form their own groups. However, two entirely different groups need to be formed for these two assignments. In other words, none of your fellow students in your real-time forecast group should be in your replication exercise group. Groups will hand in a single assignment, with all three names on it. Each member of each group will also be asked for a confidential and honest assessment of the contributions of the other group members. It is expected that different groups will work on substantially different topics and that there will be minimal interaction between groups.

Presentations

Each group is required to make a short power point type presentation of both their forecasting project and their replication exercise. All members of the group are expected to contribute to this presentation. The presentation does not have its own separate grade attached to it, but is one of the factors that will be considered when grading the project. These presentations may be scheduled outside of the normal class time.

Replication Files

With both your real-time forecasting exercise and your replication exercise you are required to hand in your data and programs, together with a brief readme file that explains how I can easily reproduce your results. You may also be asked to demonstrate the replication in person.

Class Email List

Instructions for joining the class email list are posted on-line at: <http://www.amaynard.ca/teaching/665/announce.html>. You are responsible for joining this list and for checking either your e-mail or the above mentioned web page regularly for any announcements.

Office Hours

I will answer some quick, short questions by e-mail, but most questions in a class of this type are best discussed in person. I encourage you to come by frequently to my office hours to ask me for help or clarifications if you have questions.

Your Feedback

Your feedback and suggestions on the course would be most greatly appreciated. Please feel free to give me your feedback in person, by e-mail or, if you feel more comfortable staying anonymous, by sending an anonymous email from the course web page or by slipping a note under my door when I'm not in.

Topics Covered

Below is a partial list of topics covered that are important to forecasting. I think it is important that students be given a fairly full list of subject matter for their future reference. However, I do not expect to be able to cover all these topics in this one semester course. I will set the pace according to the comfort level of the class and do not promise to cover all of these topics, particularly if it comes at the expense of rushing through material too quickly. Related readings are given in parenthesis next to each topic, using the abbreviations from the list of suggested texts. These may be updated as the course progresses.

1. Using regression and time series models for the purposes of prediction. (D: 2, 8-10; CH: 2.7-2.8)
2. Prediction errors and loss functions. (H: 3.1-3.4)
3. In-sample predictive tests and tests of unbiasedness. (CH: 2.2-2.5)
4. Potential issues with in-sample tests, including overfitting, data mining, and publication bias.
5. Out of sample prediction: separating estimation and forecast samples, examples, and how out-of-sample comparison can become similar to in-sample comparisons.
6. Prediction intervals and risks to the forecast, including forecast risk, estimation risk, and model risk.
7. Forecast comparisons and tests: horse races, forecast comparison tests, encompassing tests. (D11, CH: 3.3, 13.1-13.4)
8. Model Selection: general-to-specific approach, model selection criteria, approximation of infinite order models by finite models, and some difficulties associated with model selection. (CH: 12.2, E: Appendix 2.2, 6.10)
9. Model Averaging. (D: 11, CH 10.1-10.4)

10. Forecasting in the presence of structural breaks.
11. Forecasting Qualitative variables.
12. Forecasting Seasonal variables.
13. Density Forecasts.
14. Non-linear Forecasts. (CH: 4.7, E:7.0)
15. Forecasting with factor models. Latent factors, dimension reduction, using many predictors.

Accessible Learning Statement

Students with disabilities or special needs are advised to contact Laurier's Accessible Learning Centre for information regarding its services and resources. Students are encouraged to review the Calendar for information regarding all services available on campus.

Academic and Research Misconduct

You are reminded that the University will levy sanctions on students who are found to have committed, or have attempted to commit, acts of academic or research misconduct. You are expected to know what constitutes an academic offence, to avoid committing such offences, and to take responsibility for your academic actions. For information on categories of offences and types of penalty, please consult the relevant section of the Undergraduate Academic Calendar. If you need clarification of aspects of University policy on Academic and Research Misconduct, please consult your instructor.

Wilfrid Laurier University uses software that can check for plagiarism. Students may be required to submit their written work in electronic form and have it checked for plagiarism. Instructions for turning in written work will be posted on-line at the following URL: <http://www.amaynard.ca/teaching/665/turnitin.html>.