University of Toronto
Financial Econometrics, ECO2411/ECO462

Course Outline

Prof. John M. Maheu   2010

Office:	236, 150 St. George St.
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Course Description:

This course provides an introduction to the econometrics used in empirical finance. Topics will include parametric and nonparametric models of volatility, evaluation of asset pricing theories, and models for risk management, and transactions data. The course will emphasize estimation and inference using computer based applications.

Grading:

40% assignments
60% term paper, due December 7, 2010

Text:

Analysis of Financial Time Series, Ruey S. Tsay, Wiley-Interscience, 2005

This text can be purchased at the campus bookstore.

Other Texts at the Library:

GJ: Financial Econometrics, Problems, Models and Methods, C. Gourieroux and J. Jasiak, Princeton University Press, 2001

CLM: The Econometrics of Financial Markets, J. Y. Campbell, A. W. Lo, A. C. MacKinlay Princeton University Press, 1996

Computer Assignments:

Students will complete computer assignments using R (or equivalent, Ox, Gauss, Matlab) econometric package. Computer work can be done on any of the student computers, or a personal version of R can be obtained free of charge from http://cran.r-project.org/. See the course website for links to R and Ox including downloading and documentation. Computer programming applications will be discussed extensively in class along with theory. Students can work together on the computer programming and model estimation but the *final write-up of an assignment should be done independently.* If plagiarism is detected University rules will be enforced.

Term Paper:

Students are required to complete an applied econometric paper based on a finance topic of their choice. Please feel free to discuss the suitability of your topic with me. In selecting a topic it may be helpful to look at current and past periodicals on econometrics in the library or online through the library web page. Some suggested sources are:

1. *Journal of Financial Econometrics*

2. *Journal of Business and Economic Statistics*

3. *Journal of Empirical Finance*

4. *Review of Economics and Statistics*

5. *Journal of Applied Econometrics*

Your paper can be completely original or you can base it on existing work using a different dataset and changing and/or expanding the analysis.

The term paper should consist of an Introduction, Model Description, Results, and Conclusion with References included. All mathematical equations should be written properly in the text. As an example, consider the AR(1)-ARCH(1) model.

$$
\begin{aligned}
y_t &= \mu + \phi y_{t-1} + \epsilon_t \\
\epsilon_t &= \sigma_t z_t \\
\sigma_t^2 &= \omega + \alpha \epsilon_{t-1}^2
\end{aligned}
$$

where $z_t \sim iid(0,1)$, and μ, ϕ, ω, and α, are parameters to be estimated.

Data sources should be included, along with footnotes, and correct citations. Using someone's idea or writings without a citation is plagiarism and University rules will be enforced. Your paper should be self contained. Finally, you should hand in **two** copies of your paper, and a disk with your computer code, the dataset and a file of your printout.

Topics to be covered:

1. Properties of financial time series. Ch 1

2. Review of linear time series models. Ch 2, GJ2

3. Parametric Volatility Models, GARCH and stochastic volatility. Ch 3, GJ6. Bollerslev (1986), Engle and Ng (1993), Bollerslev and Wooldridge (1992), Chan and Maheu (2002),

4. Multivariate GARCH and factor models. Ch 9 and 10 Engle (2002), Tse and Tsui (2002), Ghysels, Harvey, and Renault (1996).

5. Nonparametric Volatility Measures. Ch 5 Andersen, Bollerslev, Diebold, and Labys (2001), Andersen, Bollerslev, Diebold, and Ebens (2001),Andersen, Bollerslev, Diebold, and Labys (2003), Barndorff-Nielsen and Shephard (2004)

6. Nonlinear Models. Ch 4, CLM12 Maheu and McCurdy (2000)

7. Risk and Return. CLM7,8, GJ7,8, French, Schwert, and Stambaugh (1987), Turner, Startz, and Nelson (1989), Campbell and Hentschel (1992), Maheu and McCurdy (2005)

8. Modeling transaction data. Ch 5, CLM3, GJ10,14, Engle and Russell (1998)

9. Bayesian estimation of stochastic volatility, class notes.

References

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BOLLERSLEV, T., AND J. M. WOOLDRIDGE (1992): "Quasi-Maximum Likelihood Estimation and Inference in Dynamic Models with Time-Varying Covariances," *Econometric Reviews*, 11, 143–172.

CAMPBELL, J. Y., AND L. HENTSCHEL (1992): "No News is Good News: An Asymmetric Model of Changing Volatility in Stock Returns," *Journal of Financial Economics*, 31, 281–318.

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FRENCH, K. R., G. W. SCHWERT, AND R. F. STAMBAUGH (1987): "Expected Stock Returns and Volatility," *Journal of Financial Economics*, 19, 3–29.

GHYSELS, E., A. C. HARVEY, AND E. RENAULT (1996): *Stochastic Volatility* chap. 5, Handbook of Statistics vol. 14. Elsevier Science.

MAHEU, J. M., AND T. H. MCCURDY (2000): "Identifying Bull and Bear Markets in Stock Returns," *Journal of Business & Economic Statistics*, 18(1), 100–112.

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TURNER, C., R. STARTZ, AND C. NELSON (1989): "A Markov Model of Heteroskedasticity, Risk, and Learning in the Stock Market," *Journal of Financial Economics*, 25, 3–22.