University of Guelph
College of Management and Economics
Department of Economics and Finance

ECON*6390 Empirical Finance   **Winter 2012**

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It is your responsibility as a student to be aware of and to abide by the University's policies regarding academic misconduct, e-mail communication, maintaining copies of out-of class assignments, what to do when you cannot meet a course requirement and the drop date for this semester. To better understand these policies, visit:

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Course Description

This course is designed for Master's and Ph.D. students interested in Finance and/or Econometrics. The objective of the proposed course is to provide students with a critical understanding of the empirical finance literature. This will involve instruction in the basic aspects of financial theory, the econometric methods employed in finance, and the practical skills needed to carry out an empirical research project in finance.

There are two broad areas that will be covered. The first broad area is the modeling of conditional volatilities. Following a review of linear time series models, we will begin this segment by presenting the stylized facts that motivates this literature. Then we proceed to study the econometric approaches that have been developed to model this phenomenon, including the Generalized Autoregressive Conditional Heteroskedastic (GARCH) model, along with its various extensions and multivariate generalizations, stochastic volatility models and the recent literature on Realized Volatility.

The second broad area is market efficiency and asset pricing models. This will include the consumption and Sharpe-Linter-Black capital asset pricing (CAPM) models, arbitrage pricing theory, and present value models. We will begin with an informal derivation of the models, followed by an introduction to the econometric methods employed to estimate and test them. Finally, we will read and critically discuss several empirical papers that have estimated, tested, and developed these models.

Time permitting, other areas that may be covered in given years include derivative pricing models, term-structure models, market microstructure, and event-study analysis.

Course Requirements and Evaluation

Your mark will be assigned according to the following weights:

1. Midterm Exam (25%). The midterm exam will be a limited-duration, closed book in class exam. Aids may include an aid sheet of limited size.

2. Final Exam (35%) The final exam will be a cumulative, limited-duration, closed book in class exam. Aids may include an aid sheet of limited size.

3. Class Participation (10%). Students will be expected to have completed the assigned readings ahead of lecture and to engage in meaningful discussion of the class material. Students will be expected to make a short presentation of their research paper or forecast and portfolio selection project at the end of the term.

4. Research Paper or Forecasting and Portfolio Selection Project (30%). You have the choice of either writing an academic paper or working on a forecasting and portfolio selection project. The academic paper is the harder option and will be held to a high standard, but may be a more appropriate choice for Ph.D. students and for M.A. students whose primary objective after graduation is to enroll in a Ph.D. program. The forecasting and portfolio selection project will generally be the better choice for M.A. students whose primary objective after graduation is to obtain practical work experience. For either the paper or project you may work in teams of two handing in a single paper or project with both names on it. By February 1, please indicate in writing to me if you choose to work on the research paper and if you choose to work with a teammate. Otherwise, it will be assumed that you have chosen the default option of working alone on the forecasting and portfolio selection project.

   For the academic paper you are expected to pick your own topic, subject to the approval of the instructor. You should be able to explain clearly how your paper makes a contribution relative to the existing literature. It is expected that the topic fits broadly into the confines of Empirical Finance and students are encouraged to begin discussing possible topics with the instructor as early as possible. You are encouraged to discuss your topic with other department faculty as well, but cannot re-use a paper from another class. For the empirical analysis conducted in the research papers students will be required to hand in their data and programs, together with a brief read-me file that explains how the obtained results can be reproduced.

   For the prediction and forecasting project, you should start by selecting a relatively small sensible group of financial assets from which an investment portfolio can be formed. These assets should be broad enough to allow exposure to risk, but also to provide diversification. You should also ensure that you can obtain real time daily data on the the prices (or interest rates, dividends, etc.) on all of the assets selected. For this you may consider sources such as Yahoo Finance and Data Stream.

   The second step is to select one or more portfolio selection models. Finally, you should employ the methods covered in the course to forecast both the asset returns themselves and measures of their volatility (e.g. squared returns). These should be used to guide your portfolio selection. You should also analysis and seek to improve both the accuracy of your forecasts and the risk-adjusted return on your portfolio. Ideally this should be done for both realtime forecast (turning in a brief forecast report each week) and on historical data. At the end of the semester, you will be asked to turn in a clearly written report, including all the work you have done over the semester.

More instructions for both the paper and project options may be provided on the course web page or in lecture.

Textbooks

There is no required textbook for this course. Specific chapters or sections from several of the books listed below are included in the reading list and all of these books are valuable references. However, you do not need to purchase them. Either a library (if available) or instructor copy of these books will be held for the course on short-term reserve. Of these books, the reading list draws most heavily from Campbell *et al.* (1997), Cochrane (2001), and Enders (2004).

Campbell, John Y., Andrew W. Lo and Craig MacKinlay (1997). *The Econometrics of Financial Markets*. Princeton University Press.

Cochrane, John H. (2001). *Asset Pricing*. Princeton University Press.

Cuthbertson, Keith and Dirk Nitzsche (2004). *Quantitative Financial Economics: Stocks, Bonds, & Foreign Exchange*. 2nd ed.. John Wiley & Sons.

Elton, Edwin J., Martin J. Gruber, Stephen J. Brown and William N. Goetzmann (2003). *Modern Portfolio Theory and Investment Analysis*. 6th ed.. John Wiley and Sons.

Enders, Walter (2004). *Applied Econometric Time Series*. Wiley Series in Probability and Statistics. 2nd ed.. Wiley.

Gourieroux, Christian and Joann Jasiak (2001). *Financial Econometrics*. Princeton University Press.

Hasbrouck, Joel (2007). *Empirical Market Microstructure: The Institutions, Economics, Econometrics of Securities Trading*. Oxford University Press.

Jr., Jonathan E. Ingersoll (1987). *Theory of Financial Decision Making*. Rowman & Littlefield Publishers, Inc.

Obstfeld, Maurice and Kenneth Rogoff (1996). *Foundations of International Macroeconomics*. MIT Press. Cambridge, Massachusetts.

Stock, James H. and Mark W. Watson (2007). *Introduction to Econometrics*. Addison-Wesley Longman.

Tsay, Ruey S. (2005). *Analysis of Financial Time Series*. 2nd ed.. John Wiley and Sons.

Wang, Peijie (2003). *Financial Econometrics*. Routledge.

Topics Covered

A list of topics and suggested readings is included below. Due to time constraints some of the topics marked with a star (*) below be covered only briefly or skipped entirely. However, all topic areas are equally suitable for the research paper.

It is strongly suggested that students complete the readings ahead of lecture so that they are able to participate fully. A few of the readings include some highly technical mathematical material that may be difficult to follow. Students are not expected to understand such highly technical material unless or until it is covered in lecture. However, in all cases, students should attempt to understand the main arguments and findings in each paper.

1. Review of Linear Time Series Models with Application to Finance

    (a) Stationary ARMA modeling and forecasting (Enders, 2004, Chapter 2) (Tsay, 2005, Sections 2.1-2.6)

    (b) Non Stationary modeling, testing and forecasting (Enders, 2004, Chapters 4 and 6) (Tsay, 2005, Sections 2.7-2.8)

    (c) Tests of Random Walk in financial data (Campbell *et al.*, 1997, Section 1.5,2.2-2.4,2.7-2.9)

2. Volatility Modeling

    (a) Stylized facts for asset returns

    Textbook Readings: (Enders, 2004, Section 3.1)

    (b) Autoregressive conditional heteroskedasticity (ARCH) and generalized ARCH (GARCH) models

    Textbook Readings: (Enders, 2004, Section 3.2-3.5, 3.7-3.8)

    Bollerslev, T., R. F. Engle and D. B. Nelson (1994). ARCH models. In: *Handbook of Econometrics Volume IV* (R. F. Engle and D L. McFadden, Eds.). Elsevier Science B.V.. pp. 2959–3038.

    Bollerslev, T. (1986). Generalized autoregressive conditional heteroscedasticity. *Journal of Econometrics* **31**, 307–327.

    Engel, R. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. *Econometrica* **50**, 987–1007.

    (c) Univariate generalizations of GARCH, including the ARCH-M, IGARCH, TARCH, and EGARCH models

    Textbook Readings: (Enders, 2004, Section 3.6, 3.9-3.11), (Campbell *et al.*, 1997, Section 12.2.1)

    Engle, R. F. (2001). GARCH 101: The use of ARCH/GARCH models in applied econometrics. *Journal of Economic Perspectives* **15**, 157–168.

    Engle, R., D. Lilien and R. Robins (1987). Estimating time varying risk premia in the term structure: The ARCH-M model. *Econometrica* **55**, 391–407.

    Glosten, L. R., R. Jagannathan and D. E. Runkle (1993). On the relation between the expected value and the volatility of the nominal excess return on stocks. *Journal of Finance* **48**, 1779–1801.

    Nelson, D. B. (1990). Stationarity and persistence in the GARCH(1,1) model. *Econometric Theory* **6**, 318–334.

    Nelson, D. B. (1991). Conditional heteroskedasticity in asset returns: A new approach. *Econometrica* **59**, 347–370.

    (d)* Multivariate generalizations of GARCH, including the constant-correlation, VECH, BEKK, and factor GARCH models

    Textbook Readings: (Campbell *et al.*, 1997)[Section 12.2.2]

Bollerslev, T., R. G. Engle and J. M. Wooldridge (1988). A capital asset pricing model with time varying covariances. *Journal of Political Economy* **96**, 116–131.

Bollerslev, T. (1990). Modelling the coherence in short-run nominal exchange rates: A multivariate generalized ARCH model. *The Review of Economics and Statistics* **72**, 498–505.

Engle, R. F. and K. F. Kroner (1995). Multivariate simultaneous generalized arch. *Econometric Theory* **11**(01), 122–150.

Ng, V., R. F. Engle and M. Rothschild (1992). A multi-dynamic-factor model for stock returns. *Journal of Econometrics* **52**(1-2), 245–266.

(e) Stochastic volatility models

Textbook Readings: (Campbell *et al.*, 1997, Section 12.2)

Ghysels, E., A. C. Harvey and E. Renault (1996). *Stochastic Volatility.* Chap. 5. Vol. 14 of *Handbook of Statistics.* Elsevier Science.

Melino, A. and S. M. Turnbull (1990). Pricing foreign currency options with stochastic volatility. *Journal of Econometrics* **45**(1-2), 239–265.

Wiggins, J. B. (1987). Option values under stochastic volatility: Theory and empirical estimates. *Journal of Financial Economics* **19**, 351–372.

(f) Realized volatility

Andersen, T., T. Bollerslev, F. X. Diebold and H. Ebens (2001*a*). The distribution of realized stock return volatility. *Journal of Financial Economics* **61**, 43–76.

Andersen, T., T. Bollerslev, F. X. Diebold and P. Labys (2001*b*). The distribution of realized exchange rate volatility. *Journal of the American Statistical Association* **96**, 42–55.

Andersen, T., T. Bollerslev, F. X. Diebold and P. Labys (2003). Modeling and forecasting realized volatility. *Econometrica* **71**, 529–626.

Barndorff-Nielsen, O. E. and N. Shephard (2004). Econometric analysis of realized covariation: High frequency based covariance, regression and correlation in financial economics. *Econometrica.*

McAleer, M. and M. Medeiros (2008). Realized volatility: A review. *Econometric Reviews* **27**(1-3), 10–45.

- Market Efficiency and Asset Pricing
    - i. The consumption CAPM and the equity premium puzzle

    Textbook Readings: (Cochrane, 2001, Chapters 1, 2, 21)

    Hansen, L. P. and Singleton K. J. (1982). Generalized instrumental variables of nonlinear rational expectations models. *Econometrica* **50**, 1269–1286.

    Mehra, R. and E. Prescott (1985). The equity premium puzzle. *Journal of Monetary Economics.*

    - ii.* The international consumption CAPM, the home bias puzzle and the forward premium puzzle

    Textbook Readings: (Cochrane, 2001, p. 430-434), (Obstfeld and Rogoff, 1996, Sections 5.3, 8.7.5)

    Fama, E. (1984). Forward and spot exchange rates. *Journal of Monetary Economics* **14**, 319–338.

    Grauer, R. R. and N. H. Hakansson (1987). Gains from international diversification: 1968-1985 returns on portfolios of stocks and bonds. *Journal of Finance.*

Maynard, A. and P. C. B. Phillips (2001). Rethinking an old empirical puzzle: Econometric evidence on the forward discount anomaly. *Journal of Applied Econometrics* **16**(6), 671–708.

iii. Mean-variance portfolio selection and the Sharpe-Linter-Black CAPM: theory, econometrics tests, and empirical results

Textbook Readings: (Cochrane, 2001, Section 5.1-5.2, Section 9.1, Section 20.2 p. 434-436), (Campbell *et al.*, 1997, Chapter 5)

Banz, R. (1981). The relation between return and market value of common stocks. *Journal of Financial Economics* **9**, 3–18.

Basu, S. (1977). The investment performance of common stocks in relation to their price to earnings ratios: a test of the efficient market hypothesis. *Journal of Finance* **32**, 663–682.

Fama, Eugene and J. MacBeth (1973). Risk, return, and equilibrium: empirical tests. *Journal of Political Economy* **81**, 607–636.

iv. Multi-factor pricing models and arbitrage pricing theory

Textbook Readings: (Cochrane, 2001, Section 9.2 9.5, Chapter 10, Section 20.2, p. 437-448)), (Campbell *et al.*, 1997, Chapter 6)

Fama, E. and K. French (1992). The cross-section of expected stock returns. *Journal of Finance* **47**, 427–465.

Fama, E. and K. French (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* **33**, 3–56.

v. Market efficiency, return predictability, and present value models

Textbook Readings: (Campbell *et al.*, 1997, Sections 1.5, 2.1, 2.8, Chapter 7) (Cochrane, 2001, Section 20.1)

De Bondt, Werner F M and Richard Thaler (1985). Does the stock market overreact?. *Journal of Finance* **40**(3), 793–805.

Fama, E. and K. French (1988). Dividend yields and expected stock returns. *Journal of Financial Economics* **22**, 3–25.

Campbell, J.Y. and R. Shiller (1988*b*). The dividend-price ratio and expectations of future dividends and discount factors. *Review of Financial Studies* **1**(3), 195–228.

Campbell, J. Y. and R. J. Shiller (1988*a*). Stock prices, earnings, and expected dividends. *Journal of Finance* **43**, 661–76.

vi.* Econometrics issues in predictive testing: predictive tests with persistent regressors, long-horizon predictive tests

Cavanagh, C. L., G. Elliott and J. H. Stock (1995). Inference in models with nearly integrated regressors. *Econometric Theory* **11**, 1131–1147.

Jansson, M. and M. J. Moreira (2006). Optimal inference in regression models with nearly integrated regressors. *Econometrica* **74**, 681–714.

Liu, W. and A. Maynard (2007). A new application of exact non-parametric methods to long-horizon predictability tests. *Studies in Nonlinear Dynamics & Econometrics* **11**(1), Article 7.

Mankiw, N.G., D. Romer and M. Shapiro (1985). An unbiased reexamination of stock market volatility. *Journal of Finance* **40**, 667–678.

Maynard, A. and K. Shimotsu (2009). Covariance-based orthogonality tests for regressors with unknown persistence. *Econometric Theory.*

Stambaugh, R. F. (1999). Predictive regressions. *Journal of Financial Economics* **54**, 375–421

Valkanov, R. (2003). Long-horizon regressions: theoretical results and applications. *Journal of Financial Economics* **68**, 201–232.

3.* Additional Topics

(a) Market microstructure models

Textbook Readings: (Campbell *et al.*, 1997, Chapter 3), (Hasbrouck, 2007, Chapters 6-7)

(b) Event-study analysis

Textbook Readings: (Campbell *et al.*, 1997, Chapter 4)

(c) Derivative and option pricing

Textbook Readings: (Campbell *et al.*, 1997, Chapter 9)

(d) Term structure models

Textbook Readings: (Campbell *et al.*, 1997, Chapter 11), (Cochrane, 2001, Chapter 19)

Course Evaluations

You will be asked to complete an evaluation of this course at some time during the last two weeks of the semester. The Department of Economics policy regarding the conduct and use of these evaluations will be found at:

www.economics.uoguelph.ca/course-evaluation.asp