

University of Pennsylvania
The Wharton School
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Empirical Methods in Finance
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FNCE-921, Spring 2017

I. OBJECTIVES

This course is designed to provide students with foundational knowledge of empirical methods in finance. The course will cover time-series and cross sectional properties of asset returns and tests of asset pricing models. Time permitting the course will also cover several methods often used in empirical corporate finance. The course will introduce and examine various empirical/econometric methods by focusing on classical and relevant recent papers.

II. Recommended Prerequisite

FNCE 911 and Econometrics 705 or Stats 520.

III. Lectures

Lectures: Fridays Room location Finance Dept-Conference Room 9:30-12:00 AM

IV. Communication

You are always welcome to drop by my office or set an appointment. Email will be my main mode of communication. I will use email to send assignments and administrative notices to all registered students. The official information source for FNCE 921 is the class canvas. It holds all lecture notes and assignments that I hand out.

V. Grading

The following components make up your course grade:

- **Assignments (30pts):**

I will assign approximately 5 assignments. These assignments can be worked in groups of no more than 4 students. Group assignments should be submitted as a single submission. Assignments should be handed in before before the beginning of class on the day they are due. You should start working on the assignments as soon as possible. Some of the assignments could take several days to complete. Under no circumstances will I accept late homework.

The assignments are designed to help you understand the material, digest the assigned papers that I do not cover in class, and familiarize yourself with empirical research. Many problems will require the use of computers. You must know or quickly learn a statistical programming language. I recommend that you use Matlab, Gauss, although

other software packages like SAS, EVIEWS may work. Of course, you may be a hard-core programmer and use C, C++, Fortran, or the more user friendly Fortran90.

- **Referee Reports, Presentation & Participation (10pts):**

I will assign two presentations for each student. These presentation will be during the second half of the semester. I will provide a list of papers from which students can choose the paper they wish to present. Further details regarding what a presentation constitute will be given later in the course. However, students should present the questions, summarize the model/findings, and then provide critique and link to the literature.

- **Quiz (10pts):**

There will be a quiz examination of one hour. It will constitute one or two questions regarding the class material. I will announce the exact date later in the semester.

- **Paper/Final Project (50pts):**

I'd like you to make use of the tools you acquired throughout the class or committ to acquire more tools. This should be done by either proposing and executing your research project or taking an existing paper and essentially extending its analysis is someway (data/question/methodology). All papers/projects should be discussed with me ahead of time. The paper/project should be submitted by the end of May. The paper/prohject can be part of or constitute all of your first year paper.

VI. Class Participation

Finally, to make this class work everyone has to work through every assigned reading before class. I expect that you become an active participant in the class. You should ask questions, raise issues, contribute your knowledge, and challenge the opinions of others, including mine. This class will be a lot more enjoyable for everyone if you participate. I will use participation as away to increase your grade in cases in which your grade is at the borderline.

VII. Texts & Readings

You should have access to the following books:

- Campbell, J., A. Lo, and A.C. MacKinlay, 1997, *The Econometrics of Financial Markets*, Princeton University Press.
- Cochrane, J., 2001, *Asset Pricing*, Princeton University Press.
- Hamilton, J., 1994, *Time Series Analysis*, Princeton University Press.

This course will evolve throughout the semester. Here is a preliminary reading list for the semester. I realize this is a long list that provides you with an extensive (albeit still partial) exposure to the literature. Note, however, that I designated a ★ around a small subset of the list for the papers that are required reading.

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1 Introduction

1. CLM (chapters 1-2)
2. ★ Campbell, John Y., 2000, Asset Pricing at the Millennium, *Journal of Finance*, LV (4), 1515-1567.
3. Fama, Eugene F., 1991, Efficient Capital Markets: II, *Journal of Finance*, XLVI (5), 1575-1617.

2 Return Properties

2.1 Basics

1. CLM Chapter 1-2
2. ★ Fama, E., and K. French, 1988a, Permanent and Temporary Components of Stock Prices, *Journal of Political Economy*, 96, 246-273.
3. Lo, Andrew W., and A. Craig MacKinlay, 1990, Data-Snooping Biases in Tests of Financial Asset Pricing Models, *Review of Financial Studies*, 3, 431 - 468.
4. Poterba J. and L Summers (1998), "Mean reversion in Stock prices: Evidence and implications," *Journal of Financial Economics*, 22, 27-59.
5. Shiller R. J. and P. Perron (1985), "Testing for random walk hypothesis: Power versus frequency of observations," *Economic Letters*, 18, 381-386.
6. Working H. (1960) "Note on the correlation of first difference of averages in random chain," *Econometrica*, 28, 916-918.

2.2 Return Predictability

1. ★ CLM Chapter 7
2. Campbell, J., and R. Shiller, 1988, The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors, *Review of Financial Studies* 1, 195-228.
3. ★ Hodrick, R., 1992, Dividend Yields and Expected Stock Returns: Alternative Procedures for Inference and Measurement, *Review of Financial Studies* 5, 357- 386.
4. Lewellen, Jonathan W., 2004, Predicting Returns with Financial Ratios, *Journal of Financial Economics*, 74 (2), 209-235.
5. Lamont Own, 1998, "Earnings and Expected Returns," *Journal of Finance*
6. ★ Stambaugh, Robert F., 1999, "Predictive Regressions, *Journal of Financial Economics*," 54, 375-421.

More recent contribution to this debate

7. Ang A. and Bekaert G. Is Predictability there?, RFS.

8. Campbell, J., and R. Shiller, 1987, Cointegration and Tests of Present Value Models, *Journal of Political Economy* 95, 1062-1087.
9. Boudoukh Jacob Matthew Richardson and Robert Whitelaw, 2008, "The Myth of Long Horizon Predictability," *Review of Financial Studies*.
10. Cochrane John, 2008, "The Dog that did not Bark: A Defense of Return Predictability", *Review of Financial Studies*.
11. Cochrane John, 2011, "Presidential Address: Discount Rates," *Journal of Finance*.
12. Lamont, Owen, 1998, "Earnings and Expected Returns, *Journal of Finance*," 53, 1563 - 1587.
13. Welch Ivo and Amit Goyal, 2008, "A Comprehensive Look at the Empirical Performance of Equity Premium Prediction," *Review of Financial Studies*.

2.3 Volatility Models

1. Bollerslev, T., 1986, Generalized Autoregressive Conditional Heteroscedasticity, *Journal of Econometrics* 31, 307-327.
2. Bollerslev, T., R. Chou, and K. Kroner, 1980, ARCH Modeling in Finance: A Review of the Theory and Empirical Evidence, *Journal of Econometrics* 52, 5-59.
3. Hamilton, J., 1989, A New Approach to the Economic Analysis of Nonstationary Time Series and the Business Cycle, *Econometrica* 57, 357-384.

2.4 Conditional Means and Variances

1. ★ Bollerslev, T., R. Engle, and J. Wooldridge, 1988, A Capital Asset Pricing Model with Time Varying Covariance, *Journal of Political Economy* 96,116-131.
2. ★ French, K., W. Schwert and R. Stambaugh, 1987, Expected Stock Returns and Volatility, *Journal of Financial Economics* 19, 3-30.
3. Lawrence R. Glosten, Ravi Jagannathan, David E. Runkle, 1993, "On the Relation between the Expected Value and the Volatility of the Nominal Excess Return on Stocks," *The Journal of Finance*, Vol. 48, No. 5, pp. 1779-1801
4. Whitelaw, R., 1994, Time Variations and Covariations in the Expectation and Volatility of Stock Market Returns, *Journal of Finance* 49, 515-541.

3 Asset Pricing Models: Euler Equations, Consumption Based Models, SDF

3.1 Preferences & Equilibrium Endowment

1. ★ Hansen, L.P., and R. Jagannathan, 1991, Implications of Security Market Data for Models of Dynamic Economies, *Journal of Political Economy* 99, 225 – 262.
2. ★ Hansen, L.P., and K. Singleton, 1982, Generalized Instrumental Variables Estimation of Nonlinear Rational Expectation Models, *Econometrica* 50, 1269 – 1286.

3. ★ Mehra, R., and E. Prescott, 1985, The Equity Premium: A Puzzle, *Journal of Monetary Economics* 15, 145 – 161.

3.2 Habits

1. Abel, Andrew B., 1990, Asset prices under habit formation and catching up with the Joneses, *American Economic Review* 80, 38–42.
2. ★ Campbell, John Y., and John H. Cochrane, 1999, By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior, *Journal of Political Economy*, 107, 205 - 251.
3. Constantinides, George, 1990, Habit Formation: A Resolution of the Equity Premium Puzzle, *Journal of Political Economy* 98, 519 – 543.

3.3 Long Run Risks

1. ★ Bansal, Ravi, and Amir Yaron, 2004, “Risk for the Long Run: A Potential Resolution of Asset Pricing Puzzles,” *Journal of Finance*, 59(4), 1481-1509,
2. ★ Bansal, Ravi, Dana Kiku, and Amir Yaron, 2010, “Long Run Risks: Estimation with Time Aggregation”.
3. Bansal Ravi, Khatacharian Varoujan, and Amir Yaron, ”Interpretable Asset Markets?”, *European Economic Review*. 49, April 2005: 531-560.
4. Epstein, L., and S. Zin, 1989, Substitution, Risk Aversion, and the Temporal Behavior of Consumption and Asset Returns: An Empirical Analysis, *Journal of Political Economy* 99, 263-286.

3.4 Disasters

1. ★ Robert Barro Rare Disasters, Asset Prices, and Welfare Costs, *American Economic Review*, March 2009.
2. Wachter Jessica ”Can time-varying risk of rare disasters explain aggregate stock market volatility?”, forthcoming *Journal of Finance*
3. Bansal Ravi, Dana Kiku, Amir Yaron, 2010, Long-Run Risks, the Macroeconomy, and Asset Prices,” *American Economic Review*

4 Cross-section of Returns: ICAPM, Beta Representation, and SDF Methods

4.1 Cross section of returns: Facts

1. CLM – Chapter 5.
2. Berk, Jonathan, 1995, A Critique of Size-Related Anomalies, *Review of Financial Studies*, 8, 275-286.

3. ★ Fama, Eugene F., and Kenneth R. French, 1992, The Cross-Section of Expected Stock Returns, *Journal of Finance*, 47, 427-465.
4. Fama, Eugene F., and Kenneth R. French, 1995, Size and Book-to-Market Factors in Earnings and Returns, *Journal of Finance*, 50, 131-155.
5. Fama, Eugene F., and Kenneth R. French, 1996, Multifactor Explanations of Asset Pricing Anomalies, *Journal of Finance*, 51, 55-84.

4.2 Methods: SDF & Cross sectional Regressions

1. Bansal Ravi, Dana Kiku, Ivan Shaliatovich, and Amir Yaron, 2012, "Volatility, the Macroeconomy, and Asset Pricing" working paper.
2. ★ Cochrane –Chapter 9.1, 8.3-8.4, 12.2-12.3
3. ★ Fama Eugene F., and J MacBeth, 1973, "Risk, Return and Equilibrium test", *Journal of Political Economy*, 91, 607-636.
4. Gibbons, Michael R., Stephen A. Ross, and Jay Shanken, 1989, A Test of the Efficiency of a Given Portfolio, *Econometrica*, 57, 1121-1152.
5. Hansen, L.P., and R. Jagannathan, 1997, Assessing Specification Errors in Stochastic Discount Factor Models, *Journal of Finance* 52, 557-590.
6. ★ Jagannathan, Ravi, and Zhenyu Wang, 1996, The Conditional CAPM and the Cross-Section of Expected Returns, *Journal of Finance*, 51, 354.
7. ★ Lettau, Martin, and Sydney Ludvigson, 2001, Resurrecting the (C)CAPM: A Cross-Sectional Test When Risk Premia Are Time-Varying, *Journal of Political Economy*, 109 (6), 1238-1287.
8. Hansen Lars Peter, John Heaton, and Nan Li. Consumption Strikes Back?, 2011, *Journal of Political Economy*.
9. Jonathan Lewellen, and Stefan Nagel, and Jay Shanken, 2010, A Skeptical Appraisal of Asset Pricing Tests, *Journal of Financial Economics*.
10. Jagannathan, Ravi and Zhenyu Wang, 2002, Empirical evaluation of asset pricing models: A comparison of the SDF and Beta methods, *Journal of Finance* 57, 2337 – 2367.
11. Menzly Lior, Tano Santos, Pietro Veronesi, 2004, The Time Series of the Cross Section of Asset Prices, *Journal of Political Economy*.
12. Lewellen, J., and S. Nagel, 2006, The Conditional CAPM Does Not Explain Asset-Pricing Anomalies, *Journal of Financial Economics*, 82, 289-314.
13. Lewellen, J., and J. Shanken, 2002, Learning, Asset-pricing Tests, and Market Efficiency, *Journal of Finance* 57, 1113-1145

4.3 Cross Section: Arbitrage, Multifactor Models

1. CLM —Chapter 6
2. Cochrane Chapter 9.4, 12-16
3. Chen, Nai-Fu, Richard Roll, and Stephen Ross, 1986, Economic Forces and the Stock Market, *Journal of Business*, 59, 3, 383-403.
4. Jagannathan, Ravi and Zhenyu Wang, 1998, An asymptotic theory for estimating beta-pricing models using cross-sectional regressions, *Journal of Finance* 53, 1285 – 1309.
5. Bansal, Ravi and Viswanathan, S. (1993), No-arbitrage and and arbitrage pricing: A new approach”, *Journal of Finance* 48, 1231 – 1262.
6. Ferson, Wayne E., and Campbell R. Harvey, 1999, Conditioning Variables And Cross-Section of Stock Returns, *Journal of Finance*, 54, 1325-1360.
7. Ferson Wayne, and Campbell R. Harvey, 1991, The Variation of Economic Risk Premiums, *Journal of Political Economy*, 99, 285-315.
8. Pastor L. and R.F. Stambaugh, 2003, Liquidity risk and expected stock returns, *Journal of Political Economy*, 111, 642-85.

4.4 Term Structure

1. ★ Singleton book — Chapters 12 and 13
2. Ang, Andrew, and Monika Piazzesi, 2002, A No-Arbitrage Vector Autoregression of Term Structure Dynamics with Macroeconomic and Latent Variables, *Journal of Monetary Economics*,
3. Bansal, R. and H. Zhou (2002). Term Structure of Interest Rates with Regime Shifts. *Journal of Finance* 57, 1997–2043.
4. Campbell, John Y., and Robert J. Shiller, 1991, Yield Spreads and Interest Rates: A Birds Eye View, *Review of Economic Studies*, 58, 495-514.
5. Bansal Ravi and Ivan Shaliastovich, 2009, "A Long-Run Risks Explanation of Predictability Puzzles in Bond and Currency Markets
6. ★ Cochrane, John, and Monika Piazzesi, 2004, Bond Risk Premia, *American Economic Review*.
7. Fama, Eugene F., and Robert R. Bliss, 1987, The Information in Long-Maturity Forward Rates, *American Economic Review*, 77, 680-692.
8. Joslin, Scott, Marcel Pribsch and Ken Singleton, 2013, Risk Premiums in Dynamic Term Structure Models with Unspanned Macro Risks, *Journal of Finance*, forthcoming.

4.5 Overreaction, Momentum, Payouts & Accruals

1. Asness Clifford, Tobias J. Moskowitz, and Lasse H. Pedersen, 2009, Value and Momentum Everywhere, NBER working paper.
2. Daniel, Kent, and Sheridan Titman, 1997, Evidence on the Characteristics of Cross Sectional Variation in Stock Returns, *Journal of Finance*, 52, 133.
3. DeBondt W R. Thaler, 1985, Does the stock market overreact?, *Journal of Finance*, 40, 793-805.
4. Lakonishok J. A Shleifer R Vishny, 1994, Contrarian Investment, Extrapolation and risk, *Journal of Finance*, 49, 1541-1578.
5. ★ Grundy, Bruce D., and J. Spencer Martin, 2001, Understanding the Nature of the Risks and the Source of the Rewards to Momentum Investing, *Review of Financial Studies*, 14 (1), 2978.
6. ★ Jegadeesh, Narasimhan, and Sheridan Titman, 1993, Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, *Journal of Finance*, 48 (1), 6591.
7. Jegadeesh, Narasimhan, and Sheridan Titman, 2002, Cross-Sectional and Time-Series Determinants of Momentum Returns, *Review of Financial Studies*, 15 (1), 143157.
8. Lo, Andrew, and A. Craig MacKinlay, 1990, When Are Contrarian Profits Due to Stock Market Overreaction, *Review of Financial Studies*, 3 (2), 175205.
9. ★ Sloan, Richard G., 1996, Do Stock Prices Fully Reflect Information in Accruals and Cash Flows About Future Earnings? *The Accounting Review* 71 (3), 289315.

4.6 Other Assets

1. Backus David, Chernov Mikhail and Ian Martin, 2011, "Disasters Implied by Equity Index Options," *Journal of Finance*, 66, 2011 *Journal of Finance*
2. Hui Chen " Macroeconomic Conditions and the Puzzles of Credit Spreads and Capital Structure", *Journal of Finance*
3. Drechsler Itamar and Amir Yaron "What's Vol Got To Do With It", 2011, January, *Review of Financial Studies*.
4. Adrien Verdhelen and Hanno Lustig, 2007, The Cross-Section of Foreign Currency Risk Premia and US Consumption Growth Risk, *American Economic Review*, vol. 97, No 1, pp 89-117.

5 Financial Econometric Methods

1. Cochrane John , *Asset Pricing*, Chapter 10, 11, 14.1-14.2.
2. Hamilton, James, *Time Series Analysis*
3. Kim, Chang-Jin and Charles Nelson, *State-Space Models with Regime Switching*, *Book*
4. Hansen, L.P., 1982, Large Sample Properties of Generalized Method of Moments Estimators, *Econometrica* 50, 1029–1054.

5. Lee, B., and B. Ingram, 1991, Simulation Estimation of Time-Series Models, *Journal of Econometrics* 47, 197–205.
 6. Ogaki, M., 1993, Generalized Method of Moments: Econometric Applications, in *Handbook of Statistics*, Vol. 11.
 7. Gallant, R., and G. Tauchen, 1996, Which Moments to Match, *Econometric Theory* 12, 657–681.
 8. Tauchen G. and R. Hussey, 1991, "Quadrature-Based Methods for Obtaining Approximate Solutions to Nonlinear Asset Pricing Models," *Econometrica*, Volume 59, No. 2, pp. 371–396.
- Applications of Time Series:*
9. Johannes, M., L. Lochstoer and Y. Mou (2015), Learning about Consumption Dynamics. *The Journal of Finance*

6 Firms, Asset Pricing, and Macro-Finance

Heterogeneous Firm Models and Asset Pricing:

1. Berk, Jonathan B, Richard C. Green and Vasant Naik, 1999, Optimal Investment, Growth Options and Security Returns, *Journal of Finance*, 54, 1153 - 1607.
2. Gomes, Joao F., Leonid Kogan, and Lu Zhang, 2002, Equilibrium Cross-Section of Returns, *Journal of Political Economy*,
3. Zhang, Lu, 2005, The Value Premium, *Journal of Finance*
4. Livdan, Dmitry, Horacio Sapriza, and Lu Zhang, 2009, Financially Constrained Stock Returns, *Journal of Finance*
5. Hennessy, Christopher, and Whited, Toni, Debt Dynamics, *Journal of Finance*, 2005.
6. Kuehn, Lars-Alexander and Schmid, Lukas, Investment-Based Corporate Bond Pricing (June 6, 2014). *Journal of Finance*

Asset Pricing in a General Equilibrium with Production

1. Cochrane, J., 1991, Production-Based Asset Pricing and the Link between Stock Returns and Economic Fluctuations, *Journal of Finance* 46, 207-234
2. Jermann, Urban J., 1998, Asset Pricing in Production Economies, *Journal of Monetary Economics*, 41, 257 - 275.
3. Boldrin, Michele, Lawrence J. Christiano, and Jonas D. M. Fisher. 2001. "Habit Persistence, Asset Returns, and the Business Cycle." *American Economic Review*, 91(1): 149-166.
4. Lochstoer Lars, 2011, Long-Run Risk through Consumption Smoothing, *Review of Financial Studies*
5. Croce, Max 2014, Long-run productivity risk: A new hope for production-based asset pricing?, *Journal of Monetary Economics*
6. Kung, Howard and Lukas Schmid (2015), Innovation, Growth, and Asset Prices. *The Journal of Finance*

7 Other Applications in Finance

1. Time permitting
2. TBD — topics targeted are use of instrumental variables, identifications schemes, uses of Probit & Logit, regression discontinuity.