Stanford University **Professor Kenneth J. Singleton**
Graduate School of Business **Spring 2013-2014**

F625
Empirical Asset Pricing

My office is located in room E355, telephone number 723-5753. Sandra Berg is my secretary and her location is E372, telephone extension 723-4494.

Course Description

This course in an introduction to empirical research in asset pricing. The focus of the course is on applications of econometric methods in finance. Topics include tests of asset pricing models, return predictability in time-series and cross-section, empirical studies of asset market imperfections, studies of individual and professional investor behavior. The aim is to familiarize you with the interplay between economic theory, econometric methods, and important empirical facts, and to introduce areas of current research.

The prerequisites for F632 are MGTECON 603 - 604 and Finance 620. In particular, I will assume familiarity with large-sample theory for least-squares, generalized method-of-moments, and maximum likelihood estimation methods. We will review these methods in the context of specific applications, but there will not be time to develop them from scratch.

Textbooks

Many of the readings consist of journal articles, but for standard material we will also refer to chapters from the following books. These books should be on the bookshelf of any PhD student in Finance, and so I would recommend buying them if you do not already own them (they will also be on reserve in the GSB library):

Campbell, J., A. Lo, and A. C. MacKinlay, 1997. The Econometrics of Financial Markets. Princeton University Press

Cochrane, John H., 2005. Asset Pricing (second edition). Princeton, NJ: Princeton University Press

Singleton, Kenneth J., 2006. Empirical Dynamic Asset Pricing. Princeton NJ: Princeton University Press

As background reading and reference on econometrics, the following two books will occasionally be useful.

Hamilton, J., 1994. Time Series Analysis. Princeton, NJ: Princeton University Press

Wooldridge, Jeffrey M., 2001. The Econometrics of Cross-Section and Panel Data. Cambridge MA: MIT Press

F632 must be taken for a grade (no pass fail), and auditors will not be allowed except in special circumstances.

Readings

At the end of this syllabus is a tentative list of readings. I will post working papers on the course website. The other readings can be downloaded from JSTOR or Sciencedirect. Note that this list is only tentative at this point. I may update the reading list as we go along in the course and I will post the update on the course website. When preparing for the next class, always check the updated reading list on the website. Each week I will highlight key readings for the following week.

Course requirements and grading

Homework

There will be periodic problem sets involving replication and extension of existing results in the literature. It is important that you produce a well-structured write-up, with easily readable tables and figures, and supplemented with written explanations of your results. Matlab printouts alone are not acceptable. I recommend that you use LaTeX.

Course project

The main requirement for this course is a course project. You are expected to pick a research topic, produce some thorough empirical analysis of this topic, and present it in a well-written paper. This can either involve replicating and extending some previous work of other researchers, or, if you can, some original analysis of a finance research question. Grading will be based on originality of the research question, quality of execution, and clarity of the written presentation. By April 23, you should submit to me a three-page written proposal that outlines the research question you want to look at and how you plan to analyze it. The final version of the completed project is due in the last class session (June 2).

Class participation
This is a PhD level course, so I expect you to actively contribute to the classroom discussion. It is absolutely crucial that you are prepared for class and that you have a thorough understanding of the assigned readings. There is a lot to read for this course. Make sure to plan sufficient time. I will cold-call in this class and will penalize poor preparation.

The overall grade for this course will be based on the course project (50%), problem sets (25%), and class participation (25%). All assignments must be completed in accordance with the provisions of the Stanford University Honor Code. Specific requirements and grading criteria for an assignment will be supplied when the assignment is distributed.

Course Outline

Part I: Basic statistical properties of asset returns

Week 1: Properties of Asset Returns

Returns, Present Values, and Martingales

- Review Finance 620 notes
- Singleton, Chapter 1
- CLM Chapter 7.1
- Section 1 of Campbell, John Y., and Robert J. Shiller, 1988, The Dividend- Price Ratio and Expectations of Future Dividends and Discount Factors, Review of Financial Studies 1, 195–228

Serial Correlation in Stock Returns

- Singleton, Chapter 9
- CLM, Chapters 2 and 3
- Richardson, M., and T. Smith, 1994, A Unified Approach to Testing for Serial Correlation in Stock Returns, Journal of Business 67, 371–399
- Fama, E., and K. French, 1988a, Permanent and Temporary Components of Stock Prices, Journal of Political Economy 96, 246–273

- Poterba, J., and L. Summers, 1988, Mean Reversion in Stock Prices: Evidence and Implications, Journal of Financial Economics 22, 27 –59
- Richardson, M., 1993, Temporary Components of Stock Prices: A Skeptics View, Journal of Business and Economics Statistics 11, 199–207
- Moskowitz, Tobias J., Yao Hua Ooi, and Lasse Heje Pedersen, 2012, Time series momentum,Journal of Financial Economics 104, 228 – 250

Stock Return Prediction with Valuation Ratios

- CLM Chapter 7.2
- Campbell, J., 1991, A Variance Decomposition for Stock Returns, Economic Journal 101, 157–179
- Cochrane Chapter 20
- Campbell, John Y., and Robert J. Shiller, 1988, The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors, Review of Financial Studies 1, 195–228
- Lettau, Martin, and Sydney C. Ludvigson, 2001a, Consumption, Aggregate Wealth, and Expected Stock Returns, Journal of Finance 56, 815–849
- Shiller, R., 1981, Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?, American Economic Review 71, 321 – 436
- Fama, Eugene F., and Kenneth R. French, 1988b, Dividend yields and expected stock returns,Journal of Financial Economics 22, 3 –25

Week 2: Time-Series Predictability of Returns (cont.)

Econometric Issues

- Cochrane, John H., 2008, The Dog That Did Not Bark: A Defense of Return Predictability, Review of Financial Studies 21, 1533–1575
- Section 2 of Stambaugh, Robert F., 1999, Predictive Regressions, Journal of Financial Economics 54, 375–421

- Welch, Ivo, and Amit Goyal, 2008, A Comprehensive Look at The Empirical Performance of Equity Premium PredictionReview of Financial Studies 21, 1455–1508

- Campbell, John Y., and Samuel B. Thompson, 2008, Predicting Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average?, Review of Financial Studies 21, 1509–1531

- Campbell, John Y., and Motohiro Yogo, 2006, Efficient Tests of Stock Return Predictability, Journal of Financial Economics 81, 27–60

Learning and Predictability

- Lewellen, Jonathan, and Jay Shanken, 2002, Learning, Asset-Pricing Tests and Market Efficiency, Journal of Finance 57, 1113–1145

- Bossaerts, Peter, 2004, Filtering Returns for Unspecified Biases in Priors when Testing Asset Pricing TheoryReview of Economic Studies 71, 63–86

Bond Return Predictability

- CLM Chapter 10

- Campbell, J., and R. Shiller, 1991, Yield Spreads and Interest Rate Movements: A Birds Eye View, Review of Economic Studies 58, 495–514

- Cochrane, J., and M. Piazzesi, 2005, Bond Risk Premia, American Economic Review 95, 138–160

- Fama, Eugene F., and Robert R. Bliss, 1987, The Information in Long-Maturity Forward Rates, American Economic Review 77, 680–692

Links Across Asset Classes

- Campbell, J., 1987, Stock Returns and the Term Structure, Journal of Financial Economics 18, 373–399

- Campbell, John Y., and Tuomo Vuolteenaho, 2004b, Inflation Illusion and Stock PricesAmerican Economic Review 94, 19–23

- Fama, E., and K. French, 1989, Business Conditions and Expected Returns on Stocks and Bonds, Journal of Financial Economics 25, 23–49

Foreign Exchange Rate Predictability

- Brunnermeier, Markus K., Stefan Nagel, and Lasse H. Pedersen, 2008, Carry Trades and Currency Crashes, in Daron Acemoglu, Kenneth Rogoff, and Michael Woodford, eds.: NBER Macroeconomics Annual 2008, pp. 313–347, Chicago, IL (University of Chicago Press) [Note: paper will be posted on coursework].

- Hansen, L., and R. Hodrick, 1980, Forward Exchange Rates as Optimal Predictors of Future Spot Rates: An Economic Analysis, Journal of Political Economy 88, 829–854

- Fama, Eugene F., 1984, Forward and spot exchange ratesJournal of Monetary Economics 14, 319–338

Week 3: Cross-Sectional Predictability of Returns

Cross-Sectional Predictability of Returns

- Nagel, Stefan, 2013, Empirical Cross-Sectional Asset Pricing, Annual Review of Financial Economics, forthcoming Section 2

- Lewellen, Jonathan, 2011, The Cross Section of Expected Stock Returns, Working Paper, Dartmouth College

- McLean, David R., and Jeffrey Pontiff, 2012, Does Academic Research Destroy Stock Return Predictability?, Working Paper, Boston College

- Jegadeesh, Narasimhan, and Sheridan Titman, 1993, Returns to Buying Winners and Selling Losers: Implications for Market Efficiency, Journal of Finance 48, 65–91

- Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2006, The Cross-Section of Volatility and Expected Returns, Journal of Finance 61, 259–299

- Asness, Cliff, Tobias Moskowitz, and Lasse H. Pedersen, 2012, Value and Momentum Everywhere, Journal of Finance, forthcoming

Volatility: ARCH/GARCH

- CLM, Section 12.2
- Singleton Chapter 7
- Bollerslev, T., 1986, Generalized Autoregressive Conditional Heteroskedasticity, Journal of Econometrics 31, 307–327
- Engle, R., 1982, Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of U.K. Inflation, Econometrica 50, 987–1008

Volatility: Realized Volatility

- Andersen, Torben G., Tim Bollerslev, Francis X. Diebold, and Heiko Ebens, 2001, The distribution of realized stock return volatility, Journal of Financial Economics 61, 43–76
- Hansen, Peter R, and Asger Lunde, 2006, Realized Variance and Market Microstructure NoiseJournal of Business & Economic Statistics 24, 127–161
- Andersen, Torben G., Tim Bollerslev, Francis X. Diebold, and Paul Labys, 2003, Modeling and Forecasting Realized Volatility, Econometrica 71, 579– 625

Part II: Estimation and Evaluation of Asset Pricing Models

Week 4: Linear Factor Models

Absence of Arbitrage and Factor Models

- Hansen, Lars P., and Scott F. Richard, 1987, The Role of Conditioning Information in Deducing Testable Restrictions Implied by Dynamic Asset Pricing Models, Econometrica 55, 587–613
- Hansen, Lars P., and Ravi Jagannathan, 1991, Implications of Security Market Data for Models of Dynamic Economies, Journal of Political Economy 99, 225–262

- Ross, S. A., 1976, The Arbitrage Theory of Capital Asset Pricing, Journal of Economic Theory 13, 341–360
- Shanken, Jay, 1982, The Arbitrage Pricing Theory: Is it Testable?, Journal of Finance 37, 1129–1140

Evidence on Factor Models

- Nagel, Stefan, 2013, Empirical Cross-Sectional Asset Pricing, Annual Review of Financial Economics, forthcoming Section 3.2
- Fama, Eugene F., and Kenneth R. French, 1993, Common Risk Factors in the Returns on Stocks and Bonds, Journal of Financial Economics 33, 23–49
- Daniel, K., and S. Titman, 1997, Evidence on the Characteristics of Cross Sectional Variation in Stock Returns, Journal of Finance 52, 1–33
- Hou, Kewei, Chen Xue, and Lu Zhang, 2012, Digesting Anomalies, Working Paper, The Ohio State University
- Koijen, Ralph S., Hanno Lustig, and Stijn Van Nieuwerburg, 2012, The Cross-Section and Time-Series of Stock and Bond Returns, Working Paper, University of Chicago, NYU, and UCLA
- Lustig, Hanno, Nikolai Roussanov, and Adrien Verdelhan, 2011, Common Risk Factors in Currency MarketsReview of Financial Studies 24, 3731–3777

Estimation Methods

- Cochrane Chapters 12 and 13
- Singleton Chapter 11
- Gibbons, M., S. Ross, and J. Shanken, 1989, A Test of the Efficiency of a Given Portfolio, Econometrica 57, 1121–1152
- Shanken, Jay, 1992, On the Estimation of Beta-Pricing Models, Review of Financial Studies 5, 1–33

- Hansen, Lars P., and Ravi Jagannathan, 1997, Assessing Specification Errors in Stochastic Discount Factor Models, Journal of Finance 52, 557–590

- Shanken, Jay, 1985, Multivariate Tests of the Zero-Beta CAPM, Journal of Financial Economics 14, 327– 348

Week 5: Structural Linear Factor Models

- Sections 3 and 4 in Nagel, Stefan, 2013, Empirical Cross-Sectional Asset Pricing, Annual Review of Financial Economics, forthcoming

CAPM and ICAPM

- CLM 5.1 to 5.3

- Fama, Eugene F., and Kenneth R. French, 1992, The Cross-Section of Ex- pected Stock Returns, Journal of Finance 47, 427–465

- Campbell, John Y., 1993, Intertemporal Asset Pricing Without Consumption Data, American Economic Review 83, 487–512

- Campbell, John Y., and Tuomo Vuolteenaho, 2004a, Bad Beta, Good Beta, American Economic Review 94, 1249–1275

- Parker, Jonathan A., and Christian Julliard, 2005, Consumption Risk and the Cross Section of Expected Returns, Journal of Political Economy 113, 185– 222

Production-based Approaches

- Cochrane, John H., 1996, A Cross-Sectional Test of an Investment-Based Asset Pricing Model, Journal of Political Economy 104, 572–621

Conditioning Information and Linear Factor Models

- Cochrane Chapter 8

- Lewellen, Jonathan, and Stefan Nagel, 2006, The Conditional CAPM Does Not Explain Asset Pricing Anomalies, Journal of Financial Economics 79, 289–314

- Jagannathan, Ravi, and Zhenyu Wang, 1996, The Conditional CAPM and the Cross-section of Expected Returns, Journal of Finance 51, 3–54
- Lettau, Martin, and Sydney C. Ludvigson, 2001b, Resurrecting the (C)CAPM: A Cross-Sectional Test When Risk Premia Are Time-Varying, Journal of Po- litical Economy 109, 1238–1287

Pitfalls in Estimation and Interpretation

- Lewellen, Jonathan, Stefan Nagel, and Jay Shanken, 2010, A Skeptical Ap- praisal of Asset-Pricing Tests, Journal of Financial Economics 96, 175–194
- Nagel, Stefan, and Kenneth J. Singleton, 2011, Estimation and Evaluation of Conditional Asset Pricing Models, Journal of Finance 66, 873–909

Week 6: Structural Linear Factor Models (cont.)

Heteroskedasticity and the Risk-Return Tradeoff

- French, Kenneth R., G.William Schwert, and Robert F. Stambaugh, 1987, Expected stock returns and volatility, Journal of Financial Economics 19, 3– 29
- Bansal, Ravi, Dana Kiku, Ivan Shaliastovich, and Amir Yaron, 2013, Volatility, the Macroeconomy and Asset Prices, Journal of Finance, forthcoming
- Campbell, John Y., Stefano Giglio, Christopher Polk, and Robert Turley, 2012, An Intertemporal CAPM with Stochastic Volatility, Working Paper, Harvard University

Absence of Arbitrage and the Term Structure of Interest Rates

- Piazzesi, Monika, Affine Term Structure Models, 2011, Handbook of Financial Econometrics, North-Holland, 692–766
- Dai, Qiang, and Kenneth J. Singleton, 2002, Expectations Puzzles, Time-varying Risk Premia, and Affine Models of the Term Structure, Journal of Financial Economics 63, 415–441.

- Joslin, Scott, Kenneth J. Singleton, and Haoxiang Zhu, 2011, A New Perspective on Gaussian Dynamic Term Structure Models, Review of Financial Studies 24, 926–970.

- Litterman, R., and J. Scheinkman, 1991, Common Factors Affecting Bond Returns, Journal of Fixed Income 1, 54–61

Week 7: Nonlinear Rational Expectations Models

CRRA Preferences

- Singleton Chapter 10

- Hansen, Lars P., and Kenneth J. Singleton, 1982, Generalized Instrumental Variables Estimation of Nonlinear Rational Expectations Models, Econometrica 50, 1269–1286

Econometric Issues

- Hansen, Lars P., 1982, Large Sample Properties of Generalized Method of Moments Estimators, Econometrica 50, 1029–1054

- Hansen, Lars P., John C. Heaton, and Amir Yaron, 1996, Finite-Sample Properties of Some Alternative GMM Estimators, Journal of Business and Economic Statistics 14, 262–280

- Hansen, L., J. Heaton, and E. Luttmer, 1995, Econometric Evaluation of Asset Pricing Models, Review of Financial Studies 8, 237–274

Long-run Risks

- Epstein, L., and S. Zin, 1991, Substitution, Risk Aversion, and the Temporal Behavior of Consumption and Asset Returns: An Empirical Investigation, Journal of Political Economy 99, 263–286

- Bansal, R., D. Kiku, and A. Yaron, 2007, Risks for the Long Run: Estimation and Inference, Working Paper, Duke University

- Beeler, Jason, and John Y. Campbell, 2012, The Long-Run Risks Model and Aggregate Asset Prices: An Empirical AssessmentCritical Finance Re- view 1, 141–182

- Bansal, Ravi, Dana Kiku, and Amir Yaron, 2012, An Empirical Evaluation of the Long-Run Risks Model for Asset PricesCritical Finance Review 1, 183–221

Disasters and Crashes

- Barro, Robert J., 2006, Rare Disasters and Asset Markets in the Twentieth Century, Quarterly Journal of Economics 121, 823–866
- Broadie, Mark, Mikhail Chernov, and Michael Johannes, 2009, Understanding index option returns, Review of Financial Studies 22, 4493–4529
- Nakamura, Emi, Jon Steinsson, Robert Barro, and Jose Ursua, 2012, Crises and Recoveries in an Empirical Model of Consumption Disasters, American Economic Journal: Macroeconomics, forthcoming
- Backus, David, Mikhail Chernov, and Ian Martin, 2011, Disasters Implied by Equity Index OptionsThe Journal of Finance 66, 1969–2012

Learning

- Collin-Dufresne, Pierre, Michael Johannes, and Lars A. Lochstoer, 2012, Parameter Learning in General Equilibrium: The Asset Pricing Implications, Working Paper, Columbia Business School
- GLS...

Part III: Investor Behavior and Heterogeneity

Week 8: Investor Behavior and Heterogeneity

Limited Stock Market Participation and Consumption Risk

- Brav, Alon, George M. Constantinides, and Christopher C. Geczy, 2002, Asset Pricing with Heterogeneous Consumers and Limited Participation: Empirical Evidence, Journal of Political Economy 110, 793–824
- Mankiw, N. Gregory, and Stephen Zeldes, 1991, The Consumption of Stockholders and Nonstockholders, Journal of Financial Economics 29, 97–112

- Malloy, Christopher J., Tobias J. Moskowitz, and Annette Vissing-Jrgensen, 2009, Long-Run Stockholder Consumption Risk and Asset Returns, Journal of Finance 64, 2427–2479

Time-variation in Household Risk-taking

- Brunnermeier, Markus, and Stefan Nagel, 2008, Do Wealth Fluctuations Generate Time-Varying Risk Aversion? Micro-Evidence on Individuals Asset Allocation, American Economic Review 98, 713–736
- Malmendier, Ulrike, and Stefan Nagel, 2011, Depression Babies: Do Macroeconomic Experiences Affect Risk-Taking?, Quarterly Journal of Economics 126, 373–416

Belief Formation

- Malmendier, Ulrike, and Stefan Nagel, 2013, Learning from Inflation Experiences, Working Paper, Stanford and UC Berkeley
- Vissing-Jorgensen, Annette, 2003, Perspectives on Behavioral Finance: Does Irrationality Disappear with Wealth? Evidence from Expectations and Actions, in NBER Macroeconomics Annual
- Piazzesi, Monika, and Martin Schneider, 2012, Inflation and the Price of Real Assets, Working Paper, Stanford University

Investor Sentiment

- Section 5 in Nagel, Stefan, 2013, Empirical Cross-Sectional Asset Pricing, Annual Review of Financial Economics, forthcoming
- Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1994, Contrarian Investment, Extrapolation and Risk, Journal of Finance 49, 1541–1578
- Stambaugh, Robert F., Jianfeng Yu, and Yu Yuan, 2012, The Short of It: Investor Sentiment and AnomaliesJournal of Financial Economics 104, 288 –302

- Diether, Karl B., Christopher J. Malloy, and Anna Scherbina, 2002, Differences in Opinion and the Cross Section of Stock Returns, Journal of Finance 57, 2113–2140
- Baker, Malcolm, and Jeffrey Wurgler, 2006, Investor Sentiment and the Cross-Section of Stock Returns, Journal of Finance 61, 1645–1680
- Cohen, Lauren, and Andrea Frazzini, 2008, Economic Links and Predictable Returns, Journal of Finance 63, 1977–2011

Part IV: Imperfect Markets and Liquidity

Week 9: Imperfect Markets and Liquidity

Limited Arbitrage and Liquidity Supply

- Duffie, Darrell, 2010, Presidential Address: Asset Price Dynamics with Slow-Moving CapitalJournal of Finance 65, 1237–1267
- Coval, Joshua, and Erik Stafford, 2007, Asset Fire Sales (and Purchases) in Equity MarketsJournal of Financial Economics 86, 479–512
- Garleanu, Nicolae, Lasse Heje Pedersen, and Allen M. Poteshman, 2009, Demand-Based Option PricingReview of Financial Studies 22, 4259–4299
- Brunnermeier, Markus K., and Stefan Nagel, 2004, Hedge Funds and the Technology BubbleJournal of Finance 59, 2013–2040

Time-varying Liquidity Supply and Arbitrage Intensity

- Nagel, Stefan, 2012, Evaporating Liquidity, Review of Financial Studies 25, 2005–2039
- Hu, Grace Xing, Jun Pan, and Jiang Wang, 2012, Noise as Information for Illiquidity, Working Paper, MIT

Liquidity, Liquidity Risk, and Expected Returns

- Krishnamurthy, Arvind, 2002, The Bond/Old-Bond SpreadJournal of Financial Economics 66, 463 –506

- Acharya, Viral, and Lasse H. Pedersen, 2005, Asset Pricing with Liquidity Risk, Journal of Financial Economics 77, 374–410
- Pastor, Lubos, and Robert F. Stambaugh, 2003, Liquidity Risk and Expeced Stock Returns, Journal of Political Economy 111, 642–685
- Adrian, Tobias, Erkko Etula, and Tyler Muir, 2012, Financial Intermediaries and the Cross-Section of Asset Returns, Journal of Finance, forthcoming
- Frazzini, Andrea, and Lasse H. Pedersen, 2011, Betting Against Beta, Work- ing Paper, NYU
- Amihud, Yakov, and Haim Mendelson, 1986, Asset pricing and the bid-ask spreadJournal of financial Economics 17, 223–249