HARVARD UNIVERSITY: DEPARTMENT OF ECONOMICS

Economics 2723: Asset Pricing

Syllabus 08/24/17

Fall 2017
Tu Th 2.30-4.00pm, Sever 214
Office hours Tu Th 1.00-2.00pm
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This course is an introduction to asset pricing. It begins with a review of the theory of choice under uncertainty, then develops classical asset pricing theory in discrete time. It also discusses empirical puzzles and recent theories that have been developed to try to solve them.

Ec2723 is the first of two Harvard PhD courses in asset pricing, the second being Xavier Gabaix's course Ec2410a, Macro-Finance: Behavioral and Rational. Several asset pricing topics are covered in that course but not in this one, including continuous-time modeling, derivative pricing, and the economics of foreign exchange rates. Ec2723 is also a natural introduction to other graduate courses in finance, including Ec2725, Corporate Finance and Banking; Ec2726, Theoretical and Empirical Perspectives on Entrepreneurship: Economics and Finance; Ec2727, Empirical Methods in Corporate Finance; and, in years when it is offered, Ec2728, Behavioral Finance.

Requirements for credit in Ec2723 include three assignments and a final exam. Two of the assignments will contain computational exercises. At least one assignment will include a "referee report" to be written on an unpublished asset pricing paper.

Ec2723 is intended for PhD students in economics, and I will assume knowledge of first-year PhD microeconomics, macroeconomics, and econometrics. Undergraduates interested in this field should take Ec1723, Capital Markets.

The book will be taught using my forthcoming textbook, *Financial Decisions and Markets: A Course in Asset Pricing.* I will hand out free chapters of the manuscript until the book becomes available from Princeton University Press in October. An alternative textbook that you may find useful is John H. Cochrane, *Asset Pricing*, Princeton University Press, revised ed., 2005.

Other readings are available on the course website.
* denotes required reading and [ ] denotes classic reading, the original source but not necessarily the easiest reference today.

The teaching fellow for the course is Sarah Ridout, ridout@g.harvard.edu.

What is asset pricing?

Cochrane, John H., 2011, "Presidential Address: Discount Rates", *Journal of Finance* 66, 1047-1108.

Campbell, John Y., 2014, "Empirical Asset Pricing: Eugene Fama, Lars Peter Hansen, and Robert Shiller", *Scandinavian Journal of Economics* 116, 593-634.

1. Choice under uncertainty

Campbell, Chapter 1.

[Arrow, Kenneth J., 1971, "The Theory of Risk Aversion", in *Essays in the Theory of Risk Bearing*, Markham.]

Backus, David K., Bryan R. Routledge, and Stanley E. Zin, 2004, "Exotic Preferences for Macroeconomists", *NBER Macroeconomics Annual* 19, 319-390.

Barberis, Nicholas, Ming Huang, and Richard H. Thaler, 2006, "Individual Preferences, Monetary Gambles, and Stock Market Participation: A Case for Narrow Framing", *American Economic Review* 96, 1069-1090.

*Chetty, Raj and Adam Szeidl, 2007, "Consumption Commitments and Risk Preferences", *Quarterly Journal of Economics* 122, 831-877.

[Kahneman, Daniel and Amos Tversky, 1979, "Prospect Theory: An Analysis of Decision Under Risk", *Econometrica* 47, 263-291.]

[Kimball, Miles, 1990, "Precautionary Saving in the Small and in the Large", *Econometrica* 58, 53-73.]

[Pratt, John W., 1964, "Risk Aversion in the Small and in the Large", *Econometrica* 32, 122-136.]

*Rabin, Matthew, 2000, "Risk Aversion and Expected-Utility Theory: A Calibration Theorem", *Econometrica* 68, 1281-1292.

[Rothschild, Michael and Joseph E. Stiglitz, 1970, "Increasing Risk I: A Definition", *Journal of Economic Theory* 2, 225-243.]

2. Static portfolio choice

Campbell, Chapter 2.

Campbell, John, Martin Lettau, Burton Malkiel, and Yexiao Xu, 2001, "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk", *Journal of Finance* 56, 1-43.

*Canner, Niko, N. Gregory Mankiw, and David N. Weil, 1997, "An Asset Allocation Puzzle", *American Economic Review* 87, 181-191.

DeMiguel, Victor, Lorenzo Garlappi, and Raman Uppal, 2009, “Optimal versus Naïve Diversification: How Inefficient is the 1/*N* Portfolio Strategy? ”, *Review of Financial Studies* 22, 1915-1953.

[Markowitz, Harry M., 1952, “Portfolio Selection”, *Journal of Finance* 7, 77-91.]

[Tobin, James, 1958, “Liquidity Preference as Behavior Towards Risk”, *Review of Economic Studies* 25, 65-86.]

3. Static asset pricing models

A. Theory

Campbell, Chapter 3, sections 3.1 and 3.2.

[Black, Fischer, 1972, “Capital Market Equilibrium with Restricted Borrowing”, *Journal of Business* 45, 444-454.]

[Ross, Stephen A., 1976, “The Arbitrage Theory of Capital Asset Pricing”, *Journal of Economic Theory* 13, 341-360.]

[Sharpe, William F., 1964, “Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk”, *Journal of Finance* 19, 425-442.]

B. Test methodology

Campbell, Chapter 3, section 3.3.1 and (optionally) Chapter 4, section 4.4.

Brennan, Michael J., Tarun Chordia, and Avanidhar Subrahmanyam, 1998, “Alternative Factor Specifications, Security Characteristics, and the Cross-Section of Expected Stock Returns”, *Journal of Financial Economics* 49, 345-373.

[Fama, Eugene F. and James D. MacBeth, 1973, “Risk, Return, and Equilibrium: Empirical Tests”, *Journal of Political Economy* 81, 607-636.]

[Gibbons, Michael, Stephen Ross, and Jay Shanken, 1989, “A Test of the Efficiency of a Given Portfolio”, *Econometrica* 57, 1121-1152.]

Kandel, Shmuel and Robert F. Stambaugh, 1995, “Portfolio Inefficiency and the Cross-Section of Expected Returns”, *Journal of Finance* 50, 157-184.

*Lewellen, Jonathan, Stefan Nagel, and Jay Shanken, 2010, “A Skeptical Appraisal of Asset Pricing Tests”, *Journal of Financial Economics* 96, 175-194.

[Roll, Richard, 1976, “A Critique of the Asset Pricing Theory’s Tests: Part I”, *Journal of Financial Economics* 4, 129-176.]

C. Empirical evidence on the cross-section of stock returns

Campbell, Chapter 3, sections 3.3.2 and 3.3.3.

*Fama, Eugene F. and Kenneth R. French, 1993, "Common Risk Factors in the Returns on Stocks and Bonds", *Journal of Financial Economics* 33, 3-56.

Jegadeesh, Narasimhan and Sheridan Titman, 1993, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency", *Journal of Finance* 48, 65-92.

*Lewellen, Jonathan and Stefan Nagel, 2006, "The Conditional CAPM Does Not Explain Asset-Pricing Anomalies", *Journal of Financial Economics* 82, 289-314.

Nagel, Stefan, 2013, "Empirical Cross-Sectional Asset Pricing", *Annual Review of Financial Economics* 5, 167-169.

Wermers, Russ, 2000, "Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses", *Journal of Finance* 55, 1655-1695.

4. Absence of arbitrage and the stochastic discount factor

A. Theory

Campbell, Chapter 4, sections 4.1-4.3.

*Alvarez, Fernando and Urban Jermann, 2005, "Using Asset Prices to Measure the Persistence of the Marginal Utility of Wealth", *Econometrica* 73, 1977-2016.

Bansal, Ravi and Bruce N. Lehmann, 1997, "Growth-Optimal Portfolio Restrictions on Asset Pricing Models", *Macroeconomic Dynamics* 1, 333-354.

*Hansen, Lars Peter and Ravi Jagannathan, 1991, "Implications of Security Market Data for Models of Dynamic Economies", *Journal of Political Economy* 99, 225-262.

B. Limits to arbitrage

Campbell, Chapter 4, section 4.5.

Duffie, Darrell, 2010, "Presidential Address: Asset Price Dynamics with Slow-Moving Capital", *Journal of Finance* 65, 1237-1267.

*Lamont, Owen A. and Richard H. Thaler, 2003, "Anomalies: The Law of One Price in Financial Markets", *Journal of Economic Perspectives* 17(4), 191-202.

Mitchell, Mark, Todd Pulvino, and Erik Stafford, 2002, "Limited Arbitrage in Equity Markets", *Journal of Finance* 57, 551-584.

*Shleifer, Andrei and Robert Vishny, 1997, "The Limits of Arbitrage", *Journal of Finance* 52, 35-55.

5. Present value relations and stock return predictability

A. Models of stock prices

Campbell, Chapter 5, sections 5.1-5.3.

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.

*Gabaix, Xavier, 2009, "Linearity-Generating Processes: A Modelling Tool Yielding Closed Forms for Asset Prices", unpublished paper, New York University.

B. Predictability of aggregate stock returns

Campbell, Chapter 5, sections 5.3-5.4.

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.

*Lettau, Martin and Sydney Ludvigson, 2001, "Consumption, Aggregate Wealth, and Expected Stock Returns", *Journal of Finance* 56, 815-849.

Lewellen, Jonathan, 2004, "Predicting Returns with Financial Ratios", *Journal of Financial Economics* 74, 209-235.

*Martin, Ian, 2017, "What is the Expected Return on the Market?", *Quarterly Journal of Economics* 132, 367-443.

Pastor, Lubos and Robert F. Stambaugh, 2009, "Predictive Systems: Living with Imperfect Predictors", *Journal of Finance* 64, 1583-1628.

Stambaugh, Robert F., 1999, "Predictive Regressions", *Journal of Financial Economics* 54, 375-421.

C. Present value logic and the cross-section of stock prices

Campbell, Chapter 5, section 5.5.

Asness, Clifford S., Andrea Frazzini, and Lasse H. Pedersen, 2014, "Quality Minus Junk", unpublished paper, AQR Capital Management.

Cohen, Randolph, Christopher Polk, and Tuomo Vuolteenaho, 2005, "Money Illusion in the Stock Market: The Modigliani-Cohn Hypothesis", *Quarterly Journal of Economics* 120, 639-668.

*Pastor, Lubos and Pietro Veronesi, 2003, "Stock Valuation and Learning About Profitability", *Journal of Finance* 58, 1749-1789.

*Polk, Christopher, Samuel Thompson, and Tuomo Vuolteenaho, 2006, "Cross-Sectional Forecasts of the Equity Premium", *Journal of Financial Economics* 81, 101-141.

6. Consumption-based asset pricing

A. The equity premium, riskfree rate, and equity volatility puzzles

Campbell, Chapter 6, sections 6.1 and 6.2.

Ludvigson, Sydney, 2013, "Advances in Consumption-Based Asset Pricing: Empirical Tests", in George Constantinides, Milton Harris, and Rene Stulz eds., *Handbook of the Economics of Finance*, Volume 2B, North-Holland, 799-906.

[Mehra, Rajnish and Edward Prescott, 1985, "The Equity Premium: A Puzzle", *Journal of Monetary Economics* 15, 145-161.]

B. Rare disasters

Campbell, Chapter 6, section 6.3.

Barro, Robert and Jose F. Ursua, 2012, "Rare Macroeconomic Disasters", *Annual Review of Economics* 4, 83-109.

Gabaix, Xavier, 2012, "Variable Rare Disasters: An Exactly Solved Framework for Ten Puzzles in Macro-Finance", *Quarterly Journal of Economics* 127, 645-700.

*Martin, Ian, 2013, "Consumption-Based Asset Pricing with Higher Cumulants", *Review of Economic Studies* 80, 745-773.

Wachter, Jessica, 2013, "Can Time-Varying Risk of Rare Disasters Explain Aggregate Stock Market Volatility?", *Journal of Finance* 68, 987-1035.

C. Long-run risks and changing volatility

Campbell, Chapter 6, sections 6.4 and 6.5.

*Bansal, Ravi and Amir Yaron, 2004, "Risks for the Long Run: A Potential Resolution of Asset Pricing Puzzles", *Journal of Finance* 59, 1481-1509.

Beeler, Jason and John Y. Campbell, 2012, "The Long-Run Risks Model and Aggregate Asset Prices: An Empirical Assessment", *Critical Finance Review* 1, 141-182.

Epstein, Larry, Emmanuel Farhi, and Tomasz Strzalecki, 2014, "How Much Would You Pay to Resolve Long-Run Risk?", *American Economic Review* 104, 2680-2697.

[Epstein, Larry G. and Stanley E. Zin, 1991, "Substitution, Risk Aversion, and the Temporal Behavior of Consumption and Asset Returns: An Empirical Analysis", *Journal of Political Economy* 99, 263-286.]

Hansen, Lars Peter, John C. Heaton, and Nan Li, 2008, "Consumption Strikes Back? Measuring Long-Run Risk", *Journal of Political Economy* 116, 260-302.

Lettau, Martin, Sydney C. Ludvigson, and Jessica A. Wachter, 2008, "The Declining Equity Premium: What Role Does Macroeconomic Risk Play?", *Review of Financial Studies* 21, 1653-1687.

D. Ambiguity aversion

Campbell, Chapter 6, section 6.6.

*Epstein, Larry and Martin Schneider, 2010, "Ambiguity and Asset Markets", *Annual Review of Financial Economics* 2, 315-346.

Hansen, Lars Peter and Thomas J. Sargent, 2008, "Risk Sensitivity, Model Uncertainty, and Asset Pricing", Ch. 14 in *Robustness*, Princeton University Press.

E. Habit formation

Campbell, Chapter 6, section 6.7.

*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.

Constantinides, George, 1990, "Habit Formation: A Resolution of the Equity Premium Puzzle", *Journal of Political Economy* 98, 519-543.

F. Consumption risk and the cross-section of stock returns

Campbell, Chapter 6, section 6.8.

Cochrane, John, Francis Longstaff, and Pedro Santa-Clara, 2008, "Two Trees", *Review of Financial Studies* 21, 347-385.

Garleanu, Nicolae, Leonid Kogan, and Stavros Panageas, 2012, "Displacement Risk and Asset Returns", *Journal of Financial Economics* 105, 491-510.

Parker, Jonathan and Christian Julliard, 2005, "Consumption Risk and Cross-Sectional Returns", *Journal of Political Economy* 113, 185-222.

*Yogo, Motohiro, 2006, "A Consumption-Based Explanation of Expected Stock Returns", *Journal of Finance* 61, 539-580.

7. Production-based asset pricing

A. Q theory

Campbell, Chapter 7, section 7.1.

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

Hou, Kewei, Chen Xue, and Lu Zhang, 2015, "Digesting Anomalies: An Investment Approach", *Review of Financial Studies* 28, 650-705.

*Liu, Laura Xiaolei, Toni M. Whited, and Lu Zhang, 2009, "Investment-Based Expected Stock Returns", *Journal of Political Economy* 117, 1105-1139.

*Zhang, Lu, 2005, "The Value Premium", *Journal of Finance* 60, 67-103.

B. General equilibrium with production

Campbell, Chapter 7, sections 7.2 and 7.3.

*Belo, Frederico, 2010, "Production-based Measures of Risk for Asset Pricing", *Journal of Monetary Economics* 57, 146-163.

Bloom, Nicholas, 2009, "The Impact of Uncertainty Shocks", *Econometrica* 77, 623-685.

Jermann, Urban J., 1998, "Asset Pricing in Production Economies", *Journal of Monetary Economics* 41, 257-275.

*Kaltenbrunner, Georg and Lars A. Lochstoer, 2010, "Long-Run Risk Through Consumption Smoothing", *Review of Financial Studies* 23, 3190-3224.

Kogan, Leonid and Dimitris Papanikolaou, 2012, "Economic Activity of Firms and Asset Prices", *Annual Review of Financial Economics* 4, 361-384.

Papanikolaou, Dimitris, 2011, "Investment Shocks and Asset Prices", *Journal of Political Economy* 119, 639-685.

*Swanson, Eric T., 2012, "Risk Aversion and the Labor Margin in Dynamic Equilibrium Models", *American Economic Review* 102, 1663-1691.

8. Fixed-income securities

A. Basic concepts and the expectations hypothesis of the term structure

Campbell, Chapter 8, sections 8.1 and 8.2.

Bekaert, Geert, Robert J. Hodrick, and David A. Marshall, 2001, "Peso Problem Explanations for Term Structure Anomalies", *Journal of Monetary Economics* 48, 241-270.

Campbell, John Y. and Robert J. Shiller, 1991, "Yield Spreads and Interest Rate Movements: A Bird's Eye View", *Review of Economic Studies* 58, 495-514.

*Cochrane, John H. and Monika 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.

Gurkaynak, Refet S. and Jonathan H. Wright, 2012, "Macroeconomics and the Term Structure", *Journal of Economic Literature* 50, 331-367.

Piazzesi, Monika, 2005, "Bond Yields and the Federal Reserve", *Journal of Political Economy* 113, 311-344.

B. Models of bond risk premia

Campbell, Chapter 8, sections 8.3 and 8.4.

*Duffee, Gregory R., 2011, "Information in (and not in) the Term Structure", *Review of Financial Studies* 24, 2895-2934.

*Greenwood, Robin and Dimitri Vayanos, 2014, "Bond Supply and Excess Bond Returns", *Review of Financial Studies* 27, 663–713.

Krishnamurthy, Arvind and Annette Vissing-Jørgensen, 2012, "The Aggregate Demand for Treasury Debt", *Journal of Political Economy* 120, 233-267.

Wachter, Jessica A., 2006, "A Consumption-Based Model of the Term Structure of Interest Rates", *Journal of Financial Economics* 79, 365-399.

9. Intertemporal asset pricing

A. Portfolio choice for long-term investors

*Campbell, Chapter 9, sections 9.1 and 9.2.

Brandt, Michael, 1999, “Estimating Portfolio and Consumption Choice: A Conditional Euler Equations Approach”, *Journal of Finance* 54, 1609-1645.

Cochrane, John H., 2014, “A Mean-Variance Benchmark for Intertemporal Portfolio Theory”, Journal of Finance 69, 1-49.

[Cox, John C. and Chi-fu Huang, 1989, “Optimal Consumption and Portfolio Policies When Asset Prices Follow a Diffusion Process”, *Journal of Economic Theory* 49, 33-83.]

*Pastor, Lubos and Robert F. Stambaugh, 2012, “Are Stocks Really Less Volatile in the Long Run?”, *Journal of Finance* 67, 431-478.

[Samuelson, Paul A., 1969, “Lifetime Portfolio Selection by Dynamic Stochastic Programming”, *Review of Economics and Statistics* 51, 239-246.]

B. Intertemporal asset pricing and the term structure of risky assets

Campbell, Chapter 9, sections 9.3 and 9.4.

*Binsbergen, Jules van, Michael Brandt, and Ralph Koijen, 2012, “On the Timing and Pricing of Dividends”, *American Economic Review* 102, 1596-1618.

*Campbell, John Y., Stefano Giglio, Christopher Polk, and Robert Turley, 2017, “An Intertemporal CAPM with Stochastic Volatility”, forthcoming *Journal of Financial Economics*.

Campbell, John Y. and Tuomo Vuolteenaho, 2004, “Bad Beta, Good Beta”, *American Economic Review* 94, 1249-1275.

*Giglio, Stefano, Matteo Maggiori, and Johannes Stroebel, 2015, “Very Long-Run Discount Rates”, *Quarterly Journal of Economics* 130, 1-53.

Lettau, Martin and Jessica Wachter, 2007, “Why is Long-horizon Equity Less Risky? A Duration-based Explanation of the Value Premium”, *Journal of Finance* 62, 55-92.

10. Household finance

Campbell, Chapter 10.

*Agarwal, Sumit, John Driscoll, Xavier Gabaix, and David Laibson, 2009, "The Age of Reason: Financial Decisions over the Life Cycle and Implications for Regulation", *Brookings Papers on Economic Activity* 2, 51-117.

Calvet, Laurent, John Campbell, and Paolo Sodini, 2007, "Down or Out: Assessing the Welfare Costs of Household Investment Mistakes", *Journal of Political Economy* 115, 707-747.

Campbell, John Y., 2006, "Household Finance", *Journal of Finance* 61, 1553-1604.

*Campbell, John Y., 2016, "Restoring Rational Choice: The Challenge of Consumer Financial Regulation", Ely Lecture, *American Economic Review: Papers and Proceedings* 106(5):1-30.

Chien, Yili, Harold Cole, and Hanno Lustig, 2011, "A Multiplier Approach to Understanding the Macro Implications of Household Finance", *Review of Economic Studies* 78, 199-234.

Chien, YiLi, Harold Cole, and Hanno Lustig, 2012, "Is the Volatility of the Market Price of Risk Due to Intermittent Portfolio Rebalancing?", *American Economic Review*, 102, 2859-96.

Gabaix, Xavier and David Laibson, 2006, "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets", *Quarterly Journal of Economics* 121, 505-540.

*Gomes, Francisco and Alexander Michaelides, 2008, "Asset Pricing with Limited Risk Sharing and Heterogeneous Agents", *Review of Financial Studies* 21, 415-448.

*Guiso, Luigi and Paolo Sodini, 2013, "Household Finance: An Emerging Field", in George Constantinides, Milton Harris, and Rene Stulz eds., *Handbook of the Economics of Finance*, Volume 2B, North-Holland, 1397-1531.

Lustig, Hanno and Stijn Van Nieuwerburgh, 2005, "Housing Collateral, Consumption Insurance and Risk Premia: an Empirical Perspective", *Journal of Finance*, 60, 1167-1219.

Odean, Terrance, 1998, "Are Investors Reluctant to Realize Their Losses?", *Journal of Finance* 53, 1775-1798.

Vissing-Jørgensen, Annette, 2002, "Limited Asset Market Participation and the Elasticity of Intertemporal Substitution", *Journal of Political Economy* 110, 825-853.

11. Risksharing and speculation

A. Incomplete markets

Campbell, Chapter 11, section 11.1.

Athanasoulis, Stefano and Robert Shiller, 2000, "The Significance of the Market Portfolio", *Review of Financial Studies* 13, 301-329.

*Constantinides, George M. and Darrell Duffie, 1996, "Asset Pricing with Heterogeneous Consumers", *Journal of Political Economy* 104, 219-240.

Dávila, Eduardo and Anton Korinek, 2017, "Pecuniary Externalities in Economies with Financial Frictions", forthcoming *Review of Economic Studies*.

Garleanu, Nicolae and Stavros Panageas, 2015, "Young, Old, Conservative and Bold: The Implications of Finite Lives and Heterogeneity for Asset Pricing", *Journal of Political Economy* 123, 670-685.

[Geanakoplos, John and Heracles Polemarchakis, 1985, "Existence, Regularity, and Constrained Suboptimality of Competitive Allocations When the Asset Market Is Incomplete", Cowles Foundation for Research in Economics Discussion Paper 764.]

[Hart, Oliver D., 1975, "On the Optimality of Equilibrium when the Market Structure is Incomplete", *Journal of Economic Theory* 11, 418-443.]

[Grossman, Sanford J. and Robert J. Shiller, 1982, "Consumption Correlatedness and Risk Measurement in Economies with Non-Traded Assets and Heterogeneous Information", *Journal of Financial Economics* 10, 195-210.]

[Stiglitz, Joseph, 1982, "The Inefficiency of the Stock Market Equilibrium", *Review of Economic Studies*, 49, 241-61.]

Storesletten, Kjetil, Christopher I. Telmer, and Amir Yaron, 2007, "Asset Pricing with Idiosyncratic Risk and Overlapping Generations", *Review of Economic Dynamics* 10, 519-548.

B. Private information and default

Campbell, Chapter 11, sections 11.2 and 11.3.

*Alvarez, Fernando and Urban Jermann, 2000, "Efficiency, Equilibrium, and Asset Pricing with Risk of Default", *Econometrica* 68, 775-797.

Chien, YiLi and Hanno Lustig, 2010, "The Market Price of Aggregate Risk and the Wealth Distribution", *Review of Financial Studies* 23, 1596-1650.

*Kocherlakota, Narayana and Luigi Pistaferri, 2009, "Asset Pricing Implications of Pareto Optimality with Private Information", *Journal of Political Economy* 117, 555-590.

C. Heterogeneous beliefs and speculation

Campbell, Chapter 11, section 11.4.

Barberis, Nicholas, Robin Greenwood, Lawrence Jin, and Andrei Shleifer, 2015, "X-CAPM: An Extrapolative Capital Asset Pricing Model", *Journal of Financial Economics* 115, 1-24.

*Geanakoplos, John, 2009, "The Leverage Cycle", *NBER Macroeconomics Annual* 1-65.

[Harrison, J. Michael and David M. Kreps, 1978, "Speculative Investor Behavior in a Stock Market with Heterogeneous Expectations", *Quarterly Journal of Economics* 92, 323-336.]

Scheinkman, Jose and Wei Xiong, 2003, "Overconfidence and Speculative Bubbles", *Journal of Political Economy* 111, 1183-1219.

Simsek, Alp, 2013, "Belief Disagreements and Collateral Constraints", *Econometrica* 81, 1-53.

12. Asymmetric information and liquidity

A. Rational expectations equilibrium

Campbell chapter 12, section 12.1.

*Allen, Franklin, Stephen Morris, and Hyun Song Shin, 2006, "Beauty Contests, Bubbles, and Iterated Expectations in Financial Markets", *Review of Financial Studies* 19, 719-752.

[Diamond, Douglas W. and Robert E. Verrecchia, 1981, "Information Aggregation in a Noisy Rational Expectations Economy", *Journal of Financial Economics* 9, 221-235.]

Eyster, Erik, Matthew Rabin, and Dimitri Vayanos, 2015, "Financial Markets Where Traders Neglect the Informational Content of Prices", NBER Working Paper No. 21224.

[Grossman, Sanford and Joseph Stiglitz, 1980, "On the Impossibility of Informationally Efficient Markets", *American Economic Review* 70, 393-408.]

B. Market microstructure.

Campbell chapter 12, section 12.2.

*Berk, Jonathan and Richard Green, 2004, "Mutual Fund Flows and Performance in Rational Markets", *Journal of Political Economy* 112, 1269-1295.

Duffie, Darrell, Nicolae Garleanu, and Lasse Pedersen, 2005, "Over-The-Counter Markets", *Econometrica* 73, 1815-1847.

Easley, David, Nicholas M. Kiefer, Maureen O'Hara, and Joseph B. Paperman, 1996, "Liquidity, Information, and Infrequently Traded Stocks", *Journal of Finance* 51, 1405-1436.

[Glosten, Lawrence and Paul Milgrom, 1985, "Bid, Ask, and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders", *Journal of Financial Economics* 14, 71-100.]

[Kyle, Albert S., 1985, "Continuous Auctions and Insider Trading", *Econometrica* 53, 1315-1335.]

C. Liquidity and asset prices

Campbell chapter 12, section 12.3.

Acharya, Viral V. and Lasse Heje Pedersen, 2005, "Asset Pricing with Liquidity Risk", *Journal of Financial Economics* 77, 375-410.

*Adrian, Tobias, Erkko Etula, and Tyler Muir, 2014, "Financial Intermediaries and the Cross-Section of Asset Returns", *Journal of Finance* 69, 2557-2596.

Amihud, Yakov, Haim Mendelson, and Lasse Heje Pedersen, 2005, "Liquidity and Asset Prices", *Foundations and Trends in Finance* 1, 269-364.

*Brunnermeier, Markus K. and Lasse Heje Pedersen, 2009, "Market Liquidity and Funding Liquidity", *Review of Financial Studies* 22, 2201-2238.

Cho, Thummim, 2017, "Turning Alphas into Betas: Arbitrage and Endogenous Risk", unpublished paper, Harvard University.

*Gârleanu, Nicolae and Lasse Heje Pedersen, 2011, "Margin-Based Asset Pricing and Deviations from the Law of One Price", *Review of Financial Studies* 24, 1980-2022.

Pastor, Lubos and Robert F. Stambaugh, 2003, "Liquidity Risk and Expected Stock Returns", *Journal of Political Economy* 111, 642-685.

Vayanos, Dimitri and Jiang Wang, 2013, "Market Liquidity – Theory and Empirical Evidence", in George Constantinides, Milton Harris, and Rene Stulz eds., *Handbook of the Economics of Finance*, Volume 2B, North-Holland, 1289-1361.

Alternative textbooks and lecture series

Back, Kerry, 2010, *Asset Pricing and Portfolio Choice Theory*, Oxford University Press.

Bali, Turan G., Robert F. Engle, and Scott Murray, 2016, *Empirical Asset Pricing: The Cross Section of Stock Returns*, John Wiley.

Björk, Tomas, 2009, *Arbitrage Theory in Continuous Time*, third ed., Oxford University Press.

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

Campbell, John Y. and Luis M. Viceira, 2002, *Strategic Asset Allocation: Portfolio Choice for Long-Term Investors*, Oxford University Press.

Cochrane, John H., 2005, *Asset Pricing*, revised ed., Princeton University Press.

Duffie, Darrell, 1992, *Dynamic Asset Pricing Theory*, Princeton University Press.

Hansen, Lars Peter and Thomas J. Sargent, 2008, *Robustness*, Princeton University Press.

Hull, John C., 2005, *Options, Futures, and Other Derivatives*, sixth ed., Prentice-Hall.

Ingersoll, Jonathan E., Jr., 1987, *Theory of Financial Decision Making*, Rowman and Littlefield.

Merton, Robert C., 1990, *Continuous-Time Finance*, Blackwell.

Munk, Claus, 2013, *Financial Asset Pricing Theory*, Oxford University Press.

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