HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF FINANCE

FINANCE 790E: THEORY OF FINANCE

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Lecture	Wed, 9am—12pm

This course is a rigorous introduction to asset pricing theory. The aim is to give a formal treatment of modern asset pricing theories. It is the first course in the series offered at the Department of Finance for Finance Ph.D. students. The course requirements for the course include class attendance, problem sets and a presentation.

The reading list serves as an introduction to the vast literature on various topics. We will not cover all of them; they are included for your future references. If time permits, I will also cover the basics of continuous-time finance and some theoretical aspects of time series econometrics, such as the widely-used GMM estimation in empirical research.

There is no one single textbook. I will make references to the following three books: (1) John Y. Campbell, Andrew W. Lo, A. Craig MacKinlay, *The Econometrics of Financial Markets*, Princeton University Press; (2) John H. Cochrane, Asset Pricing, Princeton University Press; (3) Jonathan E. Ingersoll, *Theory of Financial Decision Making*, Rowman & Littlefield, 1987. The class notes are based on various finance courses taught at Harvard and MIT.

Other reference books:

- John Y. Campbell and Luis M. Viceira, *Strategic Asset Allocation: Portfolio Choice for Long-Term Investors*, Clarendon Lectures in Economics, Oxford University Press, 2002.
- Michael U. Dothan, *Prices in Financial Markets*, Oxford University Press, 1990.
- Darrell Duffie, *Dynamic Asset Pricing Theory*, 2nd edition, Princeton University Press, 1996.
- James D. Hamilton, *Time Series Analysis*, Princeton University Press, 1994.
- Chi-fu Huang and Robert Litzenberger, *Foundations for Financial Economics*, North-Holland, 1988.
- Stephen F. LeRoy and Jan Werner, *Principles of Financial Economics*, Cambridge University Press, 2001.
- Robert C Merton, *Continuous-Time Finance*, Blackwell, 1990.
- Andrei Shleifer, *Inefficient Markets: An Introduction to Behavioral Finance*, Clarendon Lectures in Economics, Oxford University Press, 2000.

I. BASIC CONCEPTS IN FINANCE

A) Measuring Risk and Risk Aversion

Ingersoll, Chapter 1 and 5 (first half) and/or Mas-Colell, Andreu, Michael D. Whinston, and Jerry R. Green, Chapter 6 in *Microeconomic Theory*, Oxford, 1995.

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

Kihlstrom, Richard E., David Romer, and Steve Williams, 1981, "Risk Aversion with Random Initial Wealth", *Econometrica* 49, 911—920.

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

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

B) Portfolio Choice

Ingersoll, Chapters 4, 5 (second half), and 6.

Black, Fischer, 1972, "Capital Market Equilibrium with Restricted Borrowing", *Journal of Business* 45, 444—454.

Merton, Robert C., 1972, "An Analytic Derivation of the Efficient Portfolio Frontier", *Journal of Financial and Quantitative Analysis* 7, 1851—1872.

Merton, Robert C., 1990, "Capital Market Theory and the Pricing of Financial Securities", section 1—5, Chapter 11 in Friedman and Hahn eds. *Handbook of Monetary Economics*, North-Holland.

C) State Prices and Arbitrage

Ingersoll, Chapters 2 and 7.

Chamberlain, Gary, and Michael Rothschild, 1983, "Arbitrage, Factor Structure and Mean-Variance Analysis on Large Asset Markets", *Econometrica* 51, 1281—1304.

Connor, Greg, 1984, "A Unified Beta Pricing Theory", *Journal of Economic Theory* 34, 13—31.

Huberman, Gur, 1984, "A Simple Approach to Arbitrage Pricing Theory", *Journal of Economic Theory* 28, 183—191.

Ross, Stephen A., 1978, "A Simple Approach to the Valuation of Risky Streams", *Journal of Business* 51, 453—475.

Ross, Stephen A., 1976, "The Arbitrage Theory of Capital Asset Pricing", *Journal of Economic Theory* 13, 341—360.

II. THE CROSS-SECTIONAL STRUCTURE OF STOCK RETURNS

CLM Chapter 5, "The Capital Asset Pricing Model", and Chapter 6, "Multfactor Pricing Model".

Ingersoll, Chapter 4, "Mean-Variance Portfolio Analysis".

Fama, Eugene F., and Kenneth R. French, 1992, "The Cross-Section of Expected Stock Returns", *Journal of Finance* 47, 427—465.

Fama, Eugene F., and Kenneth R. French, 1996, "Multifactor Explanations of Asset Pricing Anomalies", *Journal of Finance* 51, 55—84.

Fama, Eugene F., and J. MacBeth, 1973, "Risk, Return, and Equilibrium: Empirical Tests", *Journal of Political Economy* 71, 607—636.

Gibbons, Michael, Stephen Ross, and Jay Shanken, 1989, "A Test of the Efficiency of a Given Portfolio", *Econometrica* 57, 1121—1152.

Jagannathan, Ravi, and Zhenyu Wang, 1996, "The Conditional CAPM and the Cross-Section of Expected Returns", *Journal of Finance* 51, 3—53.

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

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1994, "Contrarian Investment, Extrapolation, and Risk", *Journal of Finance* 49, 1541—1578.

Lo, Andrew, and A. Craig MacKinlay, 1990, "Data-Snooping Biases in Tests of Financial Asset Pricing Models", *Review of Financial Studies* 3, 431—467.

MacKinlay, A. Craig, 1995, "Multifactor Models Do Not Explain Deviations from the CAPM", *Journal of Financial Economics* 38, 3—28.

Roll, Richard, 1977, "A Critique of the Asset Pricing Theory's Tests: Part I", *Journal of Financial Economics* 4, 129—176.

III. PRESENT-VALUE RELATIONS

A) Forecasting Returns

CLM, Chapter 7, "Present-Value Relations"

Bekaert, Geert, and Steven Grenadier, 1999, "Stock and Bond Pricing in an Affine Economy", NBER working paper no. 7346.

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.

Fama, Eugene F., and Kenneth R. French, 1988, "Dividend Yields and Expected Stock Returns", *Journal of Financial Economics* 22, 3-25.

Fama, Eugene F., and Kenneth R. French, 1988, "Business Conditions and Expected Returns on Stocks and Bonds", *Journal of Financial Economics* 25, 23—50.

Keim, Donald B., and Robert F. Stambaugh, 1986, "Predicting Returns in the Stock and Bond Markets", *Journal of Financial Economics* 17, 357—390.

B) Implications for Price Volatility and Asset Allocation

Campbell, John Y., 1991, "A Variance Decomposition for Stock Returns", *Economic Journal* 101, 157—179.

Campbell, John Y., and Robert J. Shiller, 1988, "Stock Prices, Earnings, and Expected Dividends", *Journal of Finance* 43, 661—676.

Cochrane, John H., 1991, "Volatility Tests and Efficient Markets: A Review Essay", *Journal of Monetary Economics* 27, 463—485.

Kandel, Shmuel, and Robert F. Stambaugh, 1996, On the Predictability of Stock Returns: An Asset Allocation Perspective", *Journal of Finance* 51, 385—424.

Kleidon, Allan, 1986, "Variance Bounds Tests and Stock Price Valuation Models", *Journal of Political Economy* 94, 953—1001.

Shiller, Robert J., "Do Stock Prices Move Too much to Be Justified by Subsequent Chages in Dividends?" *American Economic Review* 71, 421—436. Reprinted in Robert J. Shiller, Market Volatility, MIT Press, 1990.

IV. INTERTEMPORAL ASSET PRICING MODELS WITH A REPRESENTATIVE AGENT

A) Intertemporal Models of Consumption and Portfolio Choice

Barberis, Nicholas, 2000, "Investing for the Long Run when Returns are Predictable", *Journal of Finance* 55, 225—264.

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

Campbell, John Y., 1993, "Intertemporal Asset Pricing Without Consumption Data", *American Economic Review* 83, 487—512.

Campbell, John Y., Yeung Lewis Chan, and Luis M. Viceira, 2003, "A Multivariate Model of Strategic Asset Allocation", *Journal of Financial Economics* 67(1), 41—80.

Campbell, John Y., and Luis M. Viceira, 1999, "Consumption and Portfolio Decisions when Expected Returns are Time Varying", *Quarterly Journal of Economics* 114, 433—495. See also the Erratum.

Campbell, John Y., and Luis M. Viceira, 2001, "Who Should Buy Long-Term Bonds?" *American Economic Review* 91:99-127, March.

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

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.

Liu, Jun, and Jun Pan, 2002, “Dynamic Derivatives Strategies”, UCLA working paper, forthcoming in *Journal of Financial Economics*.

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

B) Dynamic Equilibrium Models

CLM Chapter 8, “Intertemporal Equilibrium Models”

Barberis, Nicholas, Ming Huang, and Tano Santos, 2001, “Prospect Theory and Asset Prices”, *Quarterly Journal of Economics* 116, 1—53.

Breeden, Douglas T., Michael R. Gibbons, and Robert H. Litzenberger, 1989, “Empirical Tests of the Consumption-Oriented CAPM”, *Journal of Finance* 44, 231—262.

Campbell, John Y., 1996, “Understanding Risk and Return”, *Journal of Political Economy* 104, 298—345.

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.

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

Hansen, Lars Peter and Kenneth J. Singleton, 1982, “Generalized Instrumental Variables Estimation of Nonlinear Rational Expectations Models”, *Econometrica* 50, 1269—1286.

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, 1238—1287.

Mehra, Rajnish, and Edward Prescott, 1982, “The Equity Premium—A Puzzle”, *Journal of Monetary Economics* 15, 145—161.

Weil, Philippe, 1989, “The Equity Premium Puzzle and the Riskfree Rate Puzzle”, *Journal of Monetary Economics* 24, 401—421.

V. INTERTEMPORAL ASSET PRICING MODELS WITH HETEROGENEOUS AGENTS

A) Noise Trader Models

Campbell, John Y., and Albert S. Kyle, 1993, “Smart Money, Noise Trading and Stock Price Behavior”, *Review of Economic Studies* 60, 1—34.

Cutler, David, James M. Poterba, and Lawrence H. Summers, "Speculative Dynamics", *Review of Economic Studies* 58, 529—546.

DeLong, J. Bradford, Andrei Shleifer, Lawrence H. Summers, and Robert Waldmann, 1990, "Positive Feedback Investment Strategies and Destabilizing Speculation", *Journal of Finance* 45, 379—396.

DeLong, J. Bradford, Andrei Shleifer, Lawrence H. Summers, and Robert Waldmann, 1990, "Noise Trader Risk in Financial Markets", *Journal of Political Economy* 98, 703—738.

Lee, Charles, Andrei Shleifer, and Richard Thaler, 1991, "Investor Sentiment and the Closed-End Fund Puzzle", *Journal of Finance* 46, 75—109.

Shiller, Robert J., 1984, "Stock Prices and Social Dynamics", *Brookings Papers on Economic Activity* 2, 457—498.

B) Models with Heterogeneous Optimizing Agents

Brav, Alon, George M. Constantinides, and Christopher C. Geczy, 2001, "Asset Pricing with Heterogeneous Consumers and Limited Participation: Empirical Evidence", forthcoming *Journal of Political Economy*.

Chan, Yeung Lewis, and Leonid Kogan, 2002, "Catching Up with the Joneses: Heterogeneous Preferences and the Dynamics of Asset Prices", *Journal of Political Economy* 110(6), 1255—1285.

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

Dumas, Bernard, 1989, "Two-Person Dynamic Equilibrium in the Capital Market", *Review of Financial Studies* 2, 157—188.

Gomes, Joao, Leonid Kogan, and Lu Zhang, 2002, "Equilibrium Cross Section of Returns", MIT working paper, forthcoming in *Journal of Political Economy*.

Grossman, Sanford J. and Guy Laroque, 1990, "Asset Pricing and Optimal Portfolio Choice in the Presence of Illiquid Durable Consumption Goods", *Econometrica* 58, 25—51.

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

Grossman, Sanford J. and Zhongquan Zhou, 1996, "Equilibrium Analysis of Portfolio Insurance", *Journal of Finance* 51, 1379—1403.

Heaton, John and Deborah J. Lucas, 1996, "Evaluating the Effects of Incomplete Markets on Risk Sharing and Asset Pricing", *Journal of Political Economy* 104, 443—487.

Mankiw, N. Gregory, 1986, "The Equity Premium and the Concentration of Aggregate Shocks", *Journal of Financial Economics* 17, 211-219.

Telmer, Chris, 1993, "Asset Pricing Puzzles and Incomplete Markets", *Journal of Finance* 48, 1803—1832.

Wang, Jiang, 1996, "The Term Structure of Interest Rates in a Pure Exchange Economy with Heterogeneous Investors", *Journal of Financial Economics* 41, 75—110.

C) International Asset Pricing and the Home Bias Puzzle

Baxter, Marianne and Urban Jermann, 1997, "The International Diversification Puzzle is Worse than You Think", *American Economic Review* 87, 170—180.

Chue, Timothy K., 2001, "State-Dependent Benefits of International Risk Sharing", working paper, Department of Economics, HKUST.

French, Kenneth R., and James M. Poterba, 1991, "Investor Diversification and International Equity Markets", *American Economic Review* Papers and Proceedings 81, 222—226.

Kang, Jun-Koo, and Rene Stulz, 1997, "Why Is There a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan", *Journal of Financial Economics* 46, 3—28.

Lewis, Karen K., 1996, "What Can Explain the Apparent Lack of Consumption Risk Sharing", *Journal of Political Economy* 104, 267—297.

Obstfeld, Maurice, 1994, "Risk-Taking, Global Diversification, and Growth", *American Economic Review* 84, 1310—1329.

Serrat, Angel, 2001, "A Dynamic Equilibrium Model of International Risk-Sharing Puzzles", *Econometrica* 69(6), 1467—1489.

D) Models of Trading Volume and Asymmetric Information

Blume, Lawrence, David Easley, and Maureen O'Hara, 1994, "Market Statistics and Technical Analysis: The Role of Volume", *Journal of Finance* 49, 153—181.

Campbell, John Y., Sanford Grossman, and Jiang Wang, 1993, "Trading Volume and Serial Correlation in Stock Returns", *Quarterly Journal of Economics* 108, 905—939.

Conrad, Jennifer S., Allaudeen Hameed, and Cathy Niden, 1994, "Volume and Autocovariance in Short-Horizon Individual Security Returns", *Journal of Finance* 49, 1305—1329.

He, Hua, and Jiang Wang, 1995, "Differential Information and Dynamic Behavior of Stock Trading Volume", *Review of Financial Studies* 8, 919—972.

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

Kyle, Albert S., and Wei Xiong, 2001, "Contagion as a Wealth Effect", *Journal of Finance* 56, 1401—1440.

Pastor, Lubos, and Robert Stambaugh, 2001, "Liquidity Risk and Expected Stock Returns", working paper, Chicago GSB, forthcoming in *Journal of Political Economy*.

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

Wang, Jiang, 1994, "A Model of Competitive Stock Trading Volume", *Journal of Political Economy* 102, 127—167.

VI. FIXED-INCOME SECURITIES

A) Basic Concepts and the Expectations Theory

CLM Chapter 10, "An Introduction to Fixed-Income Securities"

Bekaert, Geert, Robert J. Hodrick, and David A. Marshall, 1997, "On Biases in Tests of the Expectations Hypothesis of the Term Structure of Interest Rates", *Journal of Financial Economics* 44, 309—348.

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.

Campbell, John Y., and Robert J. Shiller, 1996, "A Scorecard for Indexed Government Debt", *NBER Macroeconomics Annual* 11, 155—197.

Dai, Qiang, and Kenneth J. Singleton, 2000, "Specification Analysis of Affine Term Structure Models", *Journal of Finance* 55, 1943—1978.

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

Mankiw, N. Gregory, and Jeffrey A. Miron, 1986, "The Changing Behavior of the Term Structure of Interest Rates", *Quarterly Journal of Economics* 101, 211-221.

Shiller, Robert J., 1990, "The Term Structure of Interest Rates", in Friedman and Hahn eds., *Handbook of Monetary Economics*.

B) Equilibrium Models

CLM Chapter 11, "Models of the Term Structure of Interest Rates"

Backus, David K., Silverio Foresi, and Stanley E. Zin, 1998, "Arbitrage Opportunities in Arbitrage-Free Models of Bond Pricing", *Journal of Business and Economic Statistics*, 16, 13—26.

Brown, R.H., and S.M. Schaefer, 1994, "The Term Structure of Real Interest Rates and the Cox, Ingersoll, and Ross Model", *Journal of Financial Economics* 35, 3—42.

Chan, K.C., G. Andrew Karolyi, Francis A. Longstaff, and Anthony B. Sanders, 1992, "An Empirical Comparison of Alternative Models of the Short-Term Interest Rate", *Journal of Finance* 47, 1209—1227.

Cox, John C., Jonathan E. Ingersoll, and Stephen A. Ross, 1985, "A Theory of the Term Structure of Interest Rates", *Econometrica* 53, 385—408.

Heath, D., R. Jarrow, and A. Morton, 1992, "Bond Pricing and the Term Structure of Interest Rates: A New Methology for Contingent Claims Valuation", *Econometrica* 60, 77—105.

Ho, T.S., and S. Lee, 1986, "Term Structure Movements and Pricing Interest Rates Contingent Claims", *Journal of Finance* 41, 1011—1029.

Santa-Clara, Pedro, and Didier Sornette, 2001, "The Dynamics of the Forward Interest Rate Curve with Stochastic String Shocks", *Review of Financial Studies* 14:1, 149—185.

Stambaugh, Robert F., 1988, "The Information in Forward Rates: Implications for Models of the Term Structure", *Journal of Financial Economics* 21, 41—70.

Vasicek, Oldrich A., 1977, "An Equilibrium Characterization of the Term Structure", *Journal of Financial Economics* 5, 177—188.

VII. SPECIAL TOPICS

A) Event Studies

CLM Chapter 4, "Event Studies Analysis"

Asquith, Paul, 1983, "Merger Bids, Uncertainty, and Stockholder Returns", *Journal of Financial Economics* 11, 51—83.

Barber, Brad M. and John D. Lyon, 1997, "Detecting Long-Run Abnormal Stock Returns: The Empirical Power and Specification of Test Statistics", *Journal of Financial Economics* 43, 341—372.

Bernard, Victor, and Jacob K. Thomas, 1990, "Evidence that Stock Prices Do Not Fully Reflect the Implications of Current Earnings for Future Earnings", *Journal of Accounting and Economics* 13, 305—340.

Brav, Alon, and Paul Gompers, 1997, "Myth or Reality? The Long-Run Underperformance of Initial Public Offerings: Evidence from Venture and Non-venture Capital-Backed Companies", *Journal of Finance* 52, 1791—1821.

Brown, Stephen J., and Jerold B. Warner, "Using Daily Stock Returns: The Case of event Studies", *Journal of Financial Economics* 14, 3—31.

Kaplan, Steven, 1989, "The Effect of Management Buyouts on Operating Performance and Value", *Journal of Financial Economics* 24, 217—254.

Kothari, S.P., and Jerold B. Warner, 1997, "Measuring Long-Horizon Security Price Performance", *Journal of Financial Economics* 43, 301—339.

B) Performance Evaluation

Admati, Anat R., and Stephen A. Ross, 1985, "Measuring Investment Performance in a Rational Expectations Equilibrium Model", *Journal of Business* 58, 1—26.

Brown, Stephen J., William N. Goetzmann, and Stephen A. Ross, 1995, "Survival", *Journal of Finance* 50, 853—873.

Desai, Hemang, and Prem C. Jain, 1995, “An Analysis of the Recommendations of the ‘Superstar’ Money Mangers at Barron’s Annual Roundtable”, *Journal of Finance* 50, 1257—1273.

Elton, Edwin J., Martin J. Gruber, Sanjiv Das, and Matthew Hlavka, 1993, “Efficiency with Costly Information: A Reinterpretation of Evidence from Managed Portfolios”, *Review of Financial Studies* 6, 1—22.

Ferson, Wayne E., and Rudi W. Schadt, 1996, “Measuring Fund Strategy and Performance in Changing Economic Conditions”, *Journal of Finance* 51, 425—461.

Graham, John R., and Campbell R. Harvey, 1996, “Market Timing Activity and Volatility Implied in Investment Newsletters’ Asset Allocation Recommendations”, *Journal of Financial Economics* 42, 397—421.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1992, “The Structure and Performance of the Money Management Industry”, *Brookings Papers on Economic Activity* 339—379.

Malkiel, Burton, 1995, “Returns from Investing in Equity Mutual Funds 1971—1991”, *Journal of Finance* 50, 549—572.

Womack, Kent, 1996, “Do Brokerage Analysts’ Recommendations Have Investment Value?” *Journal of Finance* 51, 137—168.

C) Changing Volatility

CLM Chapter 12, “Nonlinearities in Financial Data”, section 12.2.

Bollerslev, Tim, Ray Y. Chou, and Kenneth F. Kroner, 1992, “ARCH Modelling in Finance: A Review of the Theory and Empirical Evidence”, *Journal of Econometrics* 52, 5—59.

Bollerslev, Tim, Robert F. Engle, and Jeffrey Wooldridge, 1988, “A Capital Asset Pricing Model with Time Varying Covariances”, *Journal of Political Economy* 96, 116—131.

Campbell, John Y., and Ludger Hentschel, 1992, “No News is Good News: An Asymmetric Model of Changing Volatility in Stock Returns”, *Journal of Financial Economics* 31, 281—318.

French, Kenneth R., G. William Schwert, and Robert F. Stambaugh, 1987, “Expected Stock Returns and Volatility”, *Journal of Financial Economics* 19, 3—30.

Harvey, Campbell R., 1989, “Time Varying Conditional Covariances in Tests of Asset Pricing Models”, *Journal of Financial Economics* 24, 289—317.

D) Nonlinear Modeling in Finance

CLM Chapter 12, “Nonlinearities in Financial Data”, all but section 12.2.

Ait-Sahalia, Yacine, and Andrew Lo, 1998, “Nonparametric Estimation of State Price Densities Implicit in Financial Asset Prices”, *Journal of Finance* 53, 499—547.

Hamilton, James D., 1994, “Modeling Time Series with Changes in Regime”, Chapter 22 in Time Series Analysis, Princeton University Press.

Hsieh, David A., 1991, “Chaos and Nonlinear Dynamics: Application to Financial Markets”, *Journal of Finance* 46, 1839—1877.

Hutchinson, J., A. Lo, and T. Poggio, 1994, “A Nonparametric Approach to Pricing and Hedging Derivative Assets Via Learning Networks”, *Journal of Finance* 49, 851—889.

E) Methods of Moments: General, Simulated, and Efficient

Brandt, Michael, and Pedro Santa-Clara, 2002, “Simulated Likelihood Estimation of Diffusions with an Application to Exchange Rate Dynamics in Incomplete Markets”, *Journal of Financial Economics* 63(2), 161—210.

Duffie, Darrell, and Kenneth J. Singleton, 1993, “Simulated Moments Estimation of Markov Models of Asset Prices”, *Econometrica* 61, 929—952.

Gallant, A. Ronald, and George Tauchen, 1996, “Which Moments to Match?” *Econometric Theory* 12, 657—681.

Hansen, Lars Peter, 1982, “Large Sample Properties of Generalized Method of Moments Estimators”, *Econometrica* 50, 1029—1054.

Tauchen, George, 1997, “New Minimum Chi-Square Methods in Empirical Finance”, in David M. Kreps and Kenneth F. Wallis, eds., Advances in Economics and Econometrics: Theory and Applications: Seventh World Congress. Volume 3. Econometric Society Monographs, no.28, Cambridge University Press.