

## Introduction to Empirical Methods in Finance

This course is an introduction to empirical finance with a focus on selected topics and econometric methods. The course will cover time-series and cross-sectional properties of asset returns, some aspects of market microstructure, event studies, empirical tests of asset pricing models and other topics time permitting. The interplay between asset pricing theories, statistical assumptions and relevant econometric techniques is explored in the context of published empirical work, including classical papers as well as current research.

**Prerequisites:** Finance 911; Economics 705

**Co-requisites:** Economics 706

### Course Material

- *The Econometrics of Financial Market* by John Y. Campbell, Andrew W. Lo and A. Craig MacKinlay, Princeton University Press, 1997.
- *Asset Pricing* by John H. Cochrane, Princeton University Press, 2005 (revised edition).
- A list of assigned and suggested readings for each topic is given below.

### Course Evaluation

The course grade is based on a midterm exam (30%), final exam (40%), assigned homeworks and class participation (30%). You may discuss and work on the problem sets in groups, but each student should hand in their own assignment.

I expect you to read the assigned material before the class and participate in class discussions.

### Office Hours

Thursday, 4:30 – 5:30pm

## Course Outline with the Required(\*) and Supplemental Readings

1. Return Moments and Temporal Dependence: distributional assumptions and sample moments of asset returns; notions of market efficiency; random walk tests; mean reversion and long-run predictability; time-averaging effects

### Readings:

- (\*) CLM (1997), Chapters 1 & 2 (except for 2.6).
- (\*) Fama E.F. (1970), *Efficient capital markets: A review of theory and empirical work*, Journal of Finance, 25, p.383-417.
- (\*) Fama E.F. (1991), *Efficient capital markets: II*, Journal of Finance, 46, p.1575-1617.
- (\*) Fama E.F., K.R. French (1988), *Permanent and transitory components of stock prices*, Journal of Political Economy, 96, p.246-273.
- Hamilton J. (1994), Chapters 3 & 8, *Time Series Analysis*, Princeton University Press.
- Lo A.W., A.C. MacKinlay (1988), *Stock market prices do not follow random walks: Evidence from a simple specification test*, Review of Financial Studies, 1, p.41-66.
- Lo A.W., A.C. MacKinlay (1989), *The size and power of the variance ratio test in finite samples: A monte carlo investigation*, Journal of Econometrics, 40, p.203-238.
- Poterba J.M., L.H. Summers (1998), *Mean reversion in stock prices: Evidence and implications*, Journal of Financial Economics, 22, p.27-59.
- (\*) Richardson M. (1993), *Temporary components of stock prices: A sceptic's view*, Journal of Business & Economic Statistics, 11, p.199-208.
- Richardson M., J.H. Stock (1989), *Drawing inferences from statistics based on multiyear asset returns*, Journal of Financial Economics, 25, p.323-348.
- (\*) Shiller R.J., P. Perron (1985), *Testing for random walk hypothesis; Power versus frequency of observations*, Economic Letters, 18, p.381-386.
- Working H. (1960), *Note on the correlation of first differences of averages in a random chain*, Econometrica, 28, p.916-918.

2. Asset Pricing Overview: pricing equation; stochastic discount factor; risk and risk premia; mean-variance frontier; expected return–beta representation; consumption-based CAPM; equity premium puzzle

### Readings:

- (\*) Cochrane (2005), Chapters 1 & 2, 8.1–8.2
- (\*) Brandt M.W., J.H. Cochrane, P. Santa-Clara (2006), *International risk sharing is better than you think, or exchange rates are too smooth*, Journal of Monetary Economics, 53, p.671-698.
- Campbell J.Y. (2000), *Asset pricing at the millennium*, Journal of Finance, 55, p.1515-1567.
- Hansen L.P., R. Jagannathan (1991), *Implications of security market data for models of dynamic economics*, Journal of Political Economy, 99, p.225-262.
- Mehra R., E. Prescott (1985), *The equity premium puzzle*, Journal of Monetary Economics, 15, p.145-161.

3. CAPM – Time-Series and Cross-Sectional Tests: Gibbons-Ross-Shanken statistic; Fama-MacBeth procedure; portfolio approach to the tests; size and value premia; conditional v.s. unconditional tests

Readings:

- (\*) CLM (1997), Chapter 5
- (\*) Cochrane (2005), Chapters 9.1, 8.3(pp.136-140, 143), 8.4, 12.3
  - Black F., M. Jensen, M. Scholes (1972), *The capital asset pricing model: Some empirical tests*, in M. Jensen ed., *Studies in the Theory of Capital Markets*. New York: Praeger.
- (\*) Fama E.F., K. R. French (1992), *The cross-section of expected stock returns*, *Journal of Finance*, 47, p.427-465.
- (\*) Fama E.F., J. MacBeth (1973), *Risk, return, and equilibrium: Empirical tests*, *Journal of Political Economy*, 91, p.607-636.
  - Gibbons M.R., Ross S.A., J. Shanken (1989), *A test of the efficiency of a given portfolio*, *Econometrica*, 57, p.1121-1152.
  - Jagannathan R., E. R. McGrattan (1995), *The CAPM debate*, *Federal Reserve Bank of Minneapolis Quarterly Review*, 19, p.2-17.
- (\*) Jagannathan R., Z. Wang (1996), *The conditional CAPM and the cross-section of expected returns*, *Journal of Finance*, 51, p.3-53.
  - Kandel S., R.F. Stambaugh (1987), *On correlations and inferences about mean-variance efficiency*, *Journal of Financial Economics*, 18, p.61-90.
  - Kandel S., R.F. Stambaugh (1995), *Portfolio inefficiency and cross-section of expected returns*, *Journal of Finance*, 50, p.157-184.
- (\*) Roll R. (1977), *A critique of the asset pricing theory's tests. Part 1: On past and potential testability of the theory*, *Journal of Financial Economics*, 4, 129-176.

4. GMM: general framework and asymptotics; estimation of the spectral density matrix; application to discount factor models; GMM v.s. MLE

Readings:

- (\*) Cochrane (2005), Chapters 10 & 11, 14.1–14.2
  - Hansen L. (1982), *Large sample properties of generalized method of moments estimators*, *Econometrica*, 50, p.1029-1054.
- (\*) Hansen L., K. Singleton (1982), *Generalized instrumental variables estimation of nonlinear rational expectations models*, *Econometrica*, 50, p.1269-1288.
- (\*) Hansen L., K. Singleton (1983), *Stochastic consumption, risk aversion and the temporal behavior of asset returns*, *Journal of Political Economy*, 91, p.249-268.
  - Hansen L., K. Singleton (1984), *Generalized instrumental variables estimation of nonlinear rational expectations models; Errata*, *Econometrica*, 52, p.267-268.

5. Arbitrage and Multifactor Asset Pricing Models: estimation and testing of linear factor models; factor analysis and principal components; estimation of non-linear discount factor models; conditional tests

Readings:

- (\*) CLM (1997), Chapter 6
- (\*) Cochrane (2005), Chapters 9.4, 12–16

- (\*) Bansal R., S. Viswanathan (1993), *No arbitrage and arbitrage pricing: A new approach*, Journal of Finance , 48, p.1231-1262.
- (\*) Chen, N., R. Roll, S. Ross (1986), *Economic forces and the stock market: Testing the APT and alternative asset pricing theories*, Journal of Business, 59, p.383-403.
- Connor G., R. Korajczyk (1988), *Risk and return in an equilibrium APT: Application of a new test methodology*, Journal of Financial Economics, 21, p.255-289.
- (\*) Fama E.F., K. R. French (1993), *Common risk factors in the returns on stocks and bonds*, Journal of Financial Economics, 33, p.3-56.
- Fama E.F., K. R. French (1996), *Multifactor explanations of asset pricing anomalies*, Journal of Finance, 51, p.55-84.
- (\*) Ferson W.E., C.R. Harvey (1991), *The variation of economic risk premiums*, Journal of Political Economy, 99, p.385-415.
- Ferson W.E., C.R. Harvey (1999), *Conditioning information and the cross-section of stock returns*, Journal of Finance, 54, p.1325-1360.
- (\*) Jones C.S. (2001), *Extracting factors from heteroskedastic asset returns*, Journal of Financial Economics , 62, p.293-325.
- (\*) Pástor L., R.F. Stambaugh (2003), *Liquidity risk and expected stock returns*, Journal of Political Economy, 111, p.642-85.

## 6. Over-reaction, Risk v.s. Misspricing, Data-Snooping Biases:

Readings:

- (\*) Daniel K., S. Titman (1997), *Evidence on the characteristics of cross-sectional variation in stock returns*, Journal of Finance, 52, p.1-33.
- DeBondt W., R. Thaler (1985), *Does the stock market overreact?*, Journal of Finance, 40, p.793-805.
- Griffin J., M. Lemmon (2002), *Book-to-Market equity, distress risk, and stock returns*, Journal of Finance, 57, p.2317-2336.
- (\*) Jegadeesh N., and S. Titman (1993), *Returns to buying winners and selling losers: Implications for stock market efficiency*, Journal of Finance, 48, p.65-91.
- (\*) Lakonishok J., A. Shleifer, R. Vishny (1994), *Contrarian investment, extrapolation and risk*, Journal of Finance, 49, p.1541-1578.
- Lo A.W., A.C. MacKinlay (1990), *Data-Snooping Biases in Tests of Financial Asset Pricing Models*, Review of Financial Studies, 3, p.431-467.

## 7. Present-Value Relations and Time-Series Predictability: present-value relation and its testable implications, volatility tests, predictability regressions and finite-sample inference, VAR approach

Readings:

- (\*) CLM (1997), Chapter 7
- (\*) Bansal R., C. Lundblad (2002), *Market efficiency, asset returns, and the size of the risk premium in global equity markets*, Journal of Econometrics, 109, p.195-237.
- (\*) Boudoukh J., M. Richardson, R. Whitelaw (2005), *The myth of long-horizon predictability*, NBER working paper 11841.

- (\*) Campbell J.Y., R. Shiller (1987), *Cointegration and tests of present value models*, Journal of Political Economy, 95, p.1062-1088.
- (\*) Campbell J.Y., R. Shiller (1988), *The dividend-price ratio and expectations of future dividends and discount factors*, Review of Financial Studies, 1, p.195-228.
- Campbell J.Y., R. Shiller (1988), *Stock prices, earnings and expected dividends*, Journal of Finance, 43, p.661-676.
- Cochrane J.H. (1992), *Explaining the variance of price-dividend ratios*, Review of Financial Studies, 5, p.243-280.
- Cochrane J.H. (2006), *The dog that did not bark: A defense of return predictability*, working paper, University of Chicago
- Fama E.F., K.R. French (1988), *Dividend yields and expected stock returns*, Journal of Financial Economics, 22, p.3-25.
- (\*) Fama E.F., K.R. French (1989), *Business conditions and expected returns on stock and bonds*, Journal of Financial Economics, 25, p.23-49.
- (\*) Hodrick R.J. (1992), *Dividend yields and expected stock returns: Alternative procedures for inference and measurement*, Review of Financial Studies, 5, p.357-386.
- (\*) Lamont O. (1998), *Earnings and expected returns*, Journal of Finance, 5, p.1563-1587.
- LeRoy S.F., R.D. Porter (1981), *The present-value relation: tests based on implied variance bounds*, Econometrics, 49, p.555-574.
- Lewellen J. (2004), *Predicting returns with financial ratios*, Journal of Financial Economics, 74, p.209-235.
- Shiller R.J. (1981), *Do stock prices move too much to be justified by subsequent changes in dividends?*, American Economic Review, 71, p.421-436.
- (\*) Stambaugh R.F. (1986), *Bias in regressions with lagged stochastic regressors*, University of Chicago working paper 156.
- Stambaugh R.F. (1999), *Predictive regressions*, Journal of Financial Economics, 54, p.375-421.

**8. Econometrics of Event Studies:** measuring abnormal performance; size and power of event study tests; long-horizon event studies; event-time v.s. calendar-time approach; event endogeneity and cross-sectional tests

Readings:

- (\*) CLM (1997), Chapter 4
- (\*) Barber B.M., J.D. Lyon (1997), *Detecting long-run abnormal stock returns: The empirical power and specification of test statistics*, Journal of Financial Economics, 43, p.341-372.
- Brav A., P.A. Gompers (1997), *Myth or reality? The long-run underperformance of initial public offerings: Evidence from venture and nonventure capital-backed companies*, Journal of Finance, 52, p.1791-1821.
- Brav A. (2000), *Inference in long-horizon event studies: A bayesian approach with application to initial public offerings*, Journal of Finance, 55, p.1979-2016.
- Brown S.J., J.B. Warner (1980), *Measuring security price performance*, Journal of Financial Economics, 8, p.205-258.

- (\*) Brown S.J., J.B. Warner (1985), *Using daily stock returns: The case of event studies*, Journal of Financial Economics, 14, p.3-31.
- Eckbo B.E., V. Maksimovis, J. Williams (1990), *Consistent estimation of cross-sectional models in event studies*, Review of Financial Studies, 3, p.343-365.
- Fama E.F., L. Fisher, M.C. Jensen, R. Roll (1969), *The adjustment of stock prices to new information*, International Economic Review, 10, p.1-21.
- (\*) Mitchell M.L., E. Stafford (2000), *Managerial decisions and long-term stock price performance*, Journal of Business, 73, p.287-329.
- Prabhala N.R. (1997), *Conditional methods in event studies and an equilibrium justification for standard event-study procedure*, Review of Financial Studies, 10, p.1-38.
- Ritter J.R. (1991), *The long-run performance of initial public offerings*, Journal of Finance, 46, p.3-27.
- (\*) Schultz P. (2003), *Pseudo market timing and the long-run underperformance of IPOs*, Journal of Finance, 58, p.483-517.
- Viswanathan S., B. Wei (2007), *Endogenous event and long-run returns*, working paper, Duke University.

## 9. Market Microstructure: non-synchronous trading; bid-ask spread; price discovery

Readings:

- (\*) CLM (1997), Chapters 3.1-3.2, 3.4
- (\*) Blume M., R. Stambaugh (1983), *Biases in computed returns: An application to the size effect*, Journal of Financial Economics, 12, p.387-404.
- Dimson E. (1979), *Risk measurement when shares are subject to infrequent trading*, Journal of Financial Economics, 7, p.197-226.
- Fowler D., C. Rorke (1983), *Risk measurement when shares are subject to infrequent trading: Comment*, Journal of Financial Economics, 12, p.279-283.
- (\*) Hasbrouck J. (1995), *One security, many markets: Determining the contributions to price discovery*, Journal of Finance, 50, p.1175-1199.
- (\*) Hasbrouck J. (1991), *Measuring the information content of stock trades*, Journal of Finance, 46, p.176-208.
- (\*) Huang R., H. Stoll (1997) *The components of the bid-ask spread: A general approach*, Review of Financial Studies, 4, p.995-1034.
- Lo A., C. MacKinlay (1990), *An econometric analysis of non-synchronous trading*, Journal of Econometrics, 45, p.181-212.
- (\*) Madhavan A., M. Richardson, M. Roomans (1997), *Why do security prices change? A transaction-level analysis of NYSE stocks*, Review of Financial Studies, 10, p.1035-1064.
- Roll R. (1984), *A simple implicit measure of the effective bid-ask spread in an efficient market*, Journal of Finance, 39, p.1127-1139.
- (\*) Scholes M., J. Williams (1977), *Estimating beta from non-synchronous data*, Journal of Financial Economics, 5, p.309-327.

## 10. Endogeneity and Identification issues