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No. 10600-01

Advanced Asset Pricing I: Standard Models

Course Objective

This course provides an in-depth treatment of selected topics of advanced capital market theory (asset pricing). The main topics are the following:

- We extend the standard one-period setting to multiperiod / intertemporal portfolio decisions and equilibrium.
- We analyze the structure and interrelationship between SDF-, beta- and minimum-variance representations of asset pricing models, with a focus on SDF- and beta-models.
- Special emphasis is put on the testing of multifactor asset pricing models: time-series and cross-sectional tests.
- Pricing errors of asset pricing models can be either interpreted as model diagnostics or performance measures; we show how they can be put in relation to mean-variance efficiency tests (spanning tests).
- The role of conditioning information in asset pricing is briefly addressed and an application in performance measurement is given – for interested students.

Instructors

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Organisation

The course is held via zoom and will be held at the indicated times. The login information is sent a few days before each session. The lectures are not recorded. We expect that the participants are visible by the camera and participate actively.

7 lecture blocks from 09:15 to 15:30 (with breaks and exercises) on:

- January February 31, 1, 2, 3 (Mon through Thur)
- February 7, 8, 9 (Mon through Wed)
- February tdb (Q+A, prep exam)

The fine-tuning of the blocks (lectures, individual reading, exercises, breakout sessions) is announced at beginning of each block. We also distribute a "Reading Guide" for each block which facilitates the pre-reading and review of the relevant material (in particular the book chapters).

Two homeworks are distributed, the first covering Topic # 3 (MHU), the second covering Topics # 4 and 5 (HZI/KBU).

Homeworks due: February 7 (first) and tbd (second)

Final exam: approx. 1st week of March, to be determined

Assessment/Exams/Credits

The course is worth 6 ECTP.

Grading is based on a written final exam (70%) and the two homeworks (each 15%).

Prerequisites

Standard textbook finance (portfolio theory, asset pricing, option pricing) and micro-economics are required to follow the course. The master lecture "Macroeconomics and Finance" (Lein/ Zimmermann) is an ideal basis for following the course. Students who have taken "Intermediate Finance" will have an advantage, but it is not required.

The mathematics we use does not exceed bachelor level, except for some stochastic calculus. The empirical part of the course requires some econometrics, in particular time-series analysis. Empirical exercises complement the lectures.

MATLAB will be used as the programming language, and a brief introduction is given at the beginning of the course. Please download MATLAB before the first day of the lecture from the University Basel asknet software shop. It is free for students. Link: https://its.unibas.ch/de/aktuelles/softwareangebot-service-news/softwareangebot-fuer-studierende/

Complimentary course

The students are motivated to take the course "Advanced Empirical Finance" by Tim Kröncke which is an excellent complement to this lecture.

Course Material

There is no official textbook, but complimentary reading is strongly encouraged. Handouts are put on the website in advance of the lectures; they include

- lecture notes (book chapter drafts)
- slide packages
- original papers
- exercises

Individual notes are indispensable however.

The following papers are used as background reading:

- **Goyal** (2012). "Empirical cross-sectional Asset Pricing: A Survey". Financial Markets and Portfolio Management 26(1), pp. 3-38.

- **Lewellen/ Nagel/ Shanken** (2010). "A skeptical appraisal of asset pricing tests". Journal of Financial Economics 96, pp. 175-194.

Overview

1 Introduction to Asset Pricing

We start with an overview of the topics covered by the field "asset pricing", including an overview on the most important models which have been developed over the years, and some selected "puzzles".

2 Intertemporal Asset Pricing

The CAPM one-factor one-period world is generalized by developing an intertemporal framework for portfolio decisions and equilibrium-based asset pricing. We start with a discrete time framework, and then introduce the continuous-time framework by Merton which allows for intertemporal hedging decisions. The C-CAPM is related to this framework.

3 Factor Pricing and Estimation

The major alternatives to equilibrium asset pricing are arbitrage-based factor pricing models. We present the basic structure of linear factor models, in particular how they are related to arbitrage pricing. We moreover discuss econometric testing issues, in particular the two-pass approach of Fama-MacBeth. We discuss GMM as an integrated framework that allows to estimate risk exposures and factor premiums jointly.

4 SDF Approach to Asset Pricing

The stochastic-discount factor approach is a very flexible way to represent asset pricing models; it is a fairly general framework for relating risk premiums to an underlying economic setting, in particular to (non-traded) economic risks. Moreover, it offers new approaches for empirical testing.

5 Asset Pricing Errors

Expected returns differ from actual returns which can be interpreted either as inadequate model specification or mispricing of assets (alpha). We discuss various ways to represent asset pricing errors or model diagnostics, their practical meaning and important test statistics (GRS, HJD, etc.).

6 Conditioning Information (*extra session offered for interested students*)

Only a subset of the actual information used by the agents can be observed by the econometrician in tests of asset pricing models. How can conditional models be interpreted and implemented? We discuss the implications of conditioning information on performance tests.

Time Schedule

Date	Nr.	Topic	Instr
1 line = 90’			
	1	**Introduction to Asset Pricing**	
Jan 31		Overview on Asset Pricing	HZI
Jan 31		Empirical Foundations and Introduction to MATLAB	MHU
Jan 31		Cont.	MHU
	2	**Intertemporal Asset Pricing**	
Feb 1		Discrete time portfolio choice	HZI
Feb 1		Continuous time portfolio choice	HZI
Feb 1		*Application*	HZI/KBU
Feb 2		Intertemporal asset pricing	HZI
	3	**Factor Pricing and Estimation**	
Feb 2		Foundations of Factor Pricing Models	MHU
Feb 2		Testing Factor Pricing Models: Methodological Approaches	MHU
Feb 3		*Application*: Empirical Estimation of Factor Pricing Models	MHU
Feb 3		Introduction to the Generalized Method of Moments	MHU
Feb 3		*Application*	MHU
Feb 7		Q&A part MHU, homework discussion 1	MHU
	4	**SDF Approach to Asset Pricing**	
Feb 7		Economic interpretation of SDF models	HZI
Feb 7		Utility based models	HZI
Feb 8		*Application*: CCAPM with GMM	KBU
Feb 8		Projection based models	HZI
Feb 8		*Application:* HJ Frontier	HZI
	5	**Asset Pricing Errors**	HZI
Feb 9		LSSR	HZI
Feb 9		Active Management	HZI
Feb 9		*Application:* Mean-variance spanning tests	KBU
tbd		Q&A part HZI/PBO, homework discussion 2, prep exam	HZI/KBU

Readings

The main references for the course are:

Cochrane, J. (2005). Asset pricing. Princeton University Press. Revised edition – Available at Karger Libri

Ferson, W. (2003). Tests of multifactor pricing models, volatility bounds, and portfolio performance, in: Handbook of the Economics of Finance, Edited by G.M. Constantinides, M. Harris and R. Stulz, Elsevier

Campbell J. and L. M. Viceira (2002). Strategic Asset Allocation, Oxford University Press.

Brandt, M. (2010). Portfolio choice problems, in: Y. Ait-Sahalia and L.P. Hansen (eds.), Handbook of Financial Econometrics, Volume 1: Tools and Techniques, North Holland, 2010, 269-336.

Two new books of particular interest are:

Campbell, J. (2018). Financial Decisions and Markets. A Course in Asset Pricing, Princeton University Press.

Ferson, W. (2019). Empirical Asset Pricing: Models and Methods, MIT Press.

There are alternative textbooks that cover much of the material, and you may want to consider these for parallel study. For the theoretical part, the following is suggested:

LeRoy S. and J. Werner (2001). Principles of Financial Economics, Cambridge University Press. (covers much of the non-empirical part of standard equilibrium asset pricing theory)

Back, K. (2010). Asset Pricing and Portfolio Choice Theory, Oxford University Press

Gollier, C. (2001). The Economics of Risk and Time, MIT Press (great economic text)

Ingersoll, J. (1987). Theory of Financial Decision Making, Rowman & Littlefield (slightly outdated, but still extremely useful)

Lengwiler, Y. (2004). Microfoundations of Financial Economics, Princeton University Press.

Munk, C. (2013). Financial Asset Pricing Theory, Oxford University Press

For the empirical part of the lecture, the following texts are also useful:

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

Jagannathan R., E. Schaumburg and G. Zhou (2010). Cross-Sectional Asset Pricing Tests, Annual Review of Financial Economics 2, 49-74.

Selective Literature List

Classic papers which are major references of the lecture
The sections do not exactly follow those of the Lecture
More detailed references are found in the Handouts.

(1) Some classic papers as foundations of advanced asset pricing

Arrow (1963). "The Role of Securities in the Optimal Allocation of Risk-Bearing", Review of Economic Studies 31, pp. 91-96, Reprinted in Essays in the Theory of Risk-Bearing, North-Holland, 1970.

Radner (1972). "Existence of Equilibrium of Plans, Prices, and Price Expectations in a Sequence of Markets", Econometrica 40 (2), 289-303.

Rubinstein (1974). "An Aggregation Theorem for Securities Markets", Journal of Financial Economics 1, 225-244.

Lucas (1978). "Asset prices in an exchange economy", Econometrica 46, 1429-1445.

(2) Intertemporal asset allocation and asset pricing

Samuelson (1969). "Lifetime Portfolio Selection By Dynamic Stochastic Programming," Review of Economics and Statistics, 51, 239–46.

Merton (1973). "An intertemporal capital asset pricing model", Econometrica 41, 867-80.

Breeden (1979). "An intertemporal asset pricing model with stochastic consumption and investment opportunities", Journal of Financial Economics 7, 265-296.

Campbell (1996)."Understanding risk and return", Journal of Political Economy 104, 298-345.

Gerard/ Wu (2006). "How important is intertemporal risk for asset allocation?" Journal of Business, 79, 2203-2241.

(3) Multifactor beta (arbitrage) pricing models: Theory

Ingersoll (1984). “Some Results in the Theory of Arbitrage Pricing”. Journal of Finance 39, pp. 1021–1039.

Ross (1977). “Return, Risk, and Arbitrage. Risk and Return in Finance”, ed. I. Friend and J. Bicksler, 189–218, Ballinger, Cambridge, MA.

Ross (1976). The arbitrage pricing of capital asset pricing. Journal of Economic Theory 13, 341-360.

Chamberlain (1983). Funds, factors, and diversification in arbitrage pricing models. Econometrica 51, 1305–1324.

(4) Anomalies and multifactor beta pricing models: Testing

Banz (1981). "The relationship between return and market value of common stocks”, Journal of Financial Economics 9, pp. 3-18.

Fama/ French (1992). "The Cross-Section of Expected Stock Returns". Journal of Finance 47, pp. 427–465.

Fama/ French (1993). “Common risk factors in the returns on stocks and bonds”, Journal of Financial Economics 33, pp. 3-56.

Chen/ Roll/ Ross (1986). “Economic Forces and the Stock Market”. Journal of Business 59, 383-403.

Pástor/ Stambaugh (2003). “Liquidity risk and expected stock returns.” Journal of Political economy 111, pp. 642-685.

Boudoukh/ Michaely/ Richardson/ Roberts (2007). On the importance of measuring payout yield: Implications for empirical asset pricing. Journal of Finance 62, pp. 877-915.

Balduzzi/ Robotti (2008). “Mimicking Portfolios, Economic Risk Premia, and Tests of Multi-Beta Models”. Journal of Business and Economic Statistics 26, 354-368.

Goyal (2012). “Empirical cross-sectional Asset Pricing: A Survey”. Financial Markets and Portfolio Management 26(1), pp. 3-38.

Novy-Marx (2013). “The other side of value: The gross profitability premium.” Journal of Financial Economics 108, pp. 1-28.

Characteristics versus risk:

Daniel/ Titman (1997). “Evidence on the characteristics of cross-sectional variation in stock returns.” Journal of Finance 52, pp. 1–33.

Berk (2000). “Sorting out sorts.” Journal of Finance 55, pp. 407-427.

Zhang (2005). “The value premium.” Journal of Finance 60, 67-103.

Zhang (2009). “On the explanatory power of firm-specific variables in cross-sections of expected returns”, Journal of Empirical Finance 16, pp. 306–317

Methodology:

Fama/ MacBeth (1973). "Risk, return, and equilibrium: Empirical tests", Journal of Political Economy, pp. 607-636 → quoted as “FM”

Shanken/ Zhou (2007). “Estimating and testing beta pricing models: Alternative methods and their performance in simulations”. Journal of Financial Economics 84, pp. 40-86.

Harvey/ Liu/ Zhu (2016). “… and the cross-section of expected returns.” Review of Financial Studies 29, pp. 5-68.

McLean/ Pontiff (2016). “Does academic research destroy stock return predictability?” Journal of Finance 71, pp. 5-32.

Pukthuanthong/ Roll/ Subrahmanyam (2018). “A protocol for factor identification.” Review of Financial Studies 32, pp. 1573-1607.

Predictive performance of FM:

Lewellen (2015). “The cross-section of expected stock returns.” Critical Finance Review 4, pp. 1–44.

(5) Critique of the Portfolio Sorts Testing Methodology

Lo/ MacKinlay (1990). “Data-snooping biases in tests of financial asset pricing models.” Review of Financial Studies 3, pp. 431-467.

Ferson/ Sarkissian/ Simin (1999). “The Alpha Factor Asset Pricing Model: A Parable.” Journal of Financial Markets 2, pp. 49-68.

Grauer/ Janmaat (2004). «The unintended consequences of grouping in tests of asset pricing models.” Journal of Banking & Finance 28, pp. 2889-2914.

Kan (2004). “On the Explanatory Power of Asset Pricing Models Across and Within Portfolios.” Working Paper

Ang/ Liu/ Schwarz (2009). “Using Individual Stocks or Portfolios in Tests of Factor Models.” Working Paper

Daniel/ Titman (2012), "Testing Factor-Model Explanations of Market Anomalies", Critical Finance Review 1, pp. 103-139.

Jegadeesh/ Noh/ Pukthuanthong/ Roll/ Wang (2016). “Empirical Tests of Asset Pricing Models with Individual Assets: Resolving the Errors-in-Variables Bias in Risk Premium Estimation”. Working Paper

Ledoit/ Wolf/ Zhao (2016). “Beyond Sorting: A More Powerful Test for Cross-Sectional Anomalies”, Working Paper [from Sorts to Markowitz: estim of covar matrix]

Hoechle/ Schmid/ Zimmermann (2020). “Does Unobservable Heterogeneity Matter for Portfolio-Based Asset Pricing Tests?”, Working Paper

(6) SDF-Approach to Asset Pricing

Beja (1971). “'The structure of the cost of capital under uncertainty”. Review of Economic Studies 38, pp. 359–368.

Dybvig/ Ingersoll (1982). “Mean variance theory in complete markets”. Journal of Business 55, pp. 233-251.

Hansen/ Jagannathan (1991). “Implications of security market data for models of the dynamic economies”. Journal of Political Economy 99, pp. 225-262.

Rosenberg / Engle (2002). “Empirical pricing kernels”. Journal of Financial Economics, 64(3), 341-372.

Behavioral applications:

Shefrin (2008). “Risk and return in behavioral SDF-based asset pricing models”, Journal of Investment Management 6, pp. 1-18.

GMM:

Hansen (1982). “Large Sample Properties of Generalized Method of Moments Estimators”, Econometrica 50, pp. 1029-1054.

(7) Representation and equivalence of asset pricing models

Roll (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,pp. 129−176.

Hansen/ Richard (1987). “The role of conditioning information in deducing testable restrictions implied by dynamic asset pricing models”, Econometrica 55, pp. 587−613.

Gibbons/ Ross/ Shanken (1989). “A test of the efficiency of a given portfolio”, Econometrica 57, pp. 1121−1152.

MacKinlay (1995). “Multifactor models do not explain deviations from the CAPM”, Journal of Financial Economics 38, pp. 3−28.

Huberman/ Kandel/ Stambaugh (1987). “Mimicking portfolios and exact arbitrage pricing”, Journal of Finance 42, pp. 1−10.

Campbell/ Cochrane (2000). “Explaining the poor performance of consumption-based asset pricing models.” Journal of Finance 55, pp. 2863-2878.

Jagannathan/ Wang (2002). “Empirical Evaluation of Asset–Pricing Models: A Comparison of the SDF and Beta Methods”. The Journal of Finance 57, pp. 2337-2367.

(8) Pricing errors and alphas

Treynor/ Black (1973). "How to use security analysis to improve portfolio selection", Journal of Business 46, pp. 66-86.

Shanken (1987): “Multivariate proxies and asset pricing relations: living with the Roll critique”, Journal of Financial Economics 18, pp. 91−110.

Kandel/ Stambaugh (1995). «Portfolio Inefficiency and the Cross-section of Expected Returns.” Journal of Finance 50, pp. 157-184 [GLS as diagnostic]

MacKinlay (1995). “Multifactor models do not explain deviations from the CAPM.” Journal of Financial Economics 38, pp. 3-28.

Hansen/ Jagannathan (1997). “Assessing specification errors in stochastic discount factor models”, Journal of Finance 52, pp. 557−590.

Balduzzi/ Robotti (2010): “Asset pricing models and economic risk premia: A decomposition”, Journal of Empirical Finance 17, pp. 54-80

Lewellen/ Nagel/ Shanken (2010). “A skeptical appraisal of asset pricing tests”. Journal of Financial Economics 96, pp. 175-194.

Kan/ Robotti (2011). "On the estimation of asset pricing models using univariate betas", Economics Letters 110, pp.117-121.

Kan/ Robotti (2012)**. "**Pricing model performance and the two-pass cross-sectional regression methodology". Journal of Finance 68, pp. 2617-2649.

(9) Spanning Tests

Huberman/ Kandel (1987). "Mean-variance spanning", Journal of Finance 42, pp. 873–888.

Jobson/ Korkie (1989). "A performance interpretation of multivariate tests of asset set intersection, spanning, and mean-variance efficiency." Journal of Financial and Quantitative Analysis 24, pp. 185-204.

Kandel/ Stambaugh (1989). "A Mean-Variance Framework for Tests of Asset Pricing Models", Review of Financial Studies 2, pp.125-156.

Errunza/ Hogan/ Hung (1999). "Can the gains from international diversification be achieved without trading abroad?" Journal of Finance 54, pp. 2075-2107.

Kan/ Zhou (2012). "Tests of mean-variance spanning". Annals of Economics and Finance 13, pp. 139-187.

Overview:

DeRoon/ Nijman (2001). "Testing for mean-variance spanning: A survey", Journal of Empirical Finance 8, pp. 111–155.

(10) Conditioning information in asset pricing and asset allocation

Dybvig/ Ross (1985). "Differential Information and Performance Measurement Using a Security Market Line", Journal of Finance 40, pp. 383–399

Hansen/ Richard (1987): "The role of conditioning information in deducing testable restrictions implied by dynamic asset pricing models", Econometrica 55, pp. 587−613.

Campbell (1991). "A variance decomposition for stock returns", The Economic Journal 101, pp. 157-179

Fama/ French (1989) "Business conditions and expected returns on stocks and bonds", Journal of Financial Economics 25, pp. 23-49.

Ferson/ Harvey (1993). "The risk and predictability of international equity returns", Review of Financial Studies 6, pp. 527-566.

Oertmann/ Zimmermann (1998). “Global economic conditions and risk premia on international investments”, Working paper, University of St. Gallen.

Ferson/ Schadt (1996). “Measuring Fund Strategy and Performance in Changing. Economic Conditions”, Journal of Finance 51, 425-462

Ferson/ Siegel (2001). „The Efficient Use of Conditioning Information in Portfolios,” Journal of Finance 56, pp. 967-982.

Brandt/ Santa-Clara/ Valkanov (2009). "Parametric portfolio policies: Exploiting characteristics in the cross-section of equity returns." Review of Financial Studies 22, pp. 3411-3447.

(11) International Asset Pricing

(suppl. topic, not covered in class, but as special session upon request)

Solnik (1974). “An equilibrium model of the international capital market“, Journal of Economic Theory 8, pp. 500-524.

Sercu (1980). “A generalization of the international asset pricing model“, Finance 1, pp. 91-135.

Stulz (1981). “A model of international asset pricing”, Journal of Financial Economics 9, pp. 383-406

Adler/ Dumas (1983). “International portfolio choice and corporation finance. A synthesis“, Jounal of Finance 38, pp. 925-984.

Black (1990). “Equilibrium exchange rate hedging“, Journal of Finance 45, pp. 899-908.

Adler/ Prasad (1992). ”On universal currency hedges”, Journal of Financial and Quantitative Analysis 27, pp. 19-38.

Solnik (1993). “Currency hedging and Siegel’s paradox: On Black’s universal hedging rule“, Review of International Economics 1, pp. 33-55.

Dumas/ Solnik (1995). “The world price of foreign exchange risk“, Journal of Finance 50, pp. 445-479.

Overviews:

Stulz (1984). “Pricing Capital Assets in an International Setting: An Introduction”, Journal of International Business Studies 15, pp. 55-73.

Dumas (1994). “Partial vs General Equilibrium Models of the International Capital Market,” in Van der Ploeg, ed., Handbook of International Macroeconomics, Blackwell, chap. 10

Stulz (1999). “Golbalization, corporate finance, and the cost of capital”, Journal of Applied Corporate Finance 12, pp. 8-25.

Zimmermann/ Drobetz/ Oertmann (2003). “Global Asset Allocation”, Wiley, chap. 2