

Empirical asset pricing and portfolio management

Number of hours: 15
Second Year – Term 1

Course objectives

This course develops the principles of portfolio construction, as well as empirical asset pricing, and introduces to risk and performance measurement in a portfolio management context.

On top of the theoretical foundations, some of the most relevant issues at the frontier of research in empirical asset pricing and portfolio construction are presented.

The course provides the students with the tools needed to understand the ongoing research and to develop new research ideas.

Prerequisites

Basic knowledge of financial calculus, linear algebra, probability and statistics.

Course content

Fundamentals of empirical financial analysis

- Arithmetic/logarithmic returns, volatility. Portfolios of assets. Bond pricing.
- Data sources.

Markowitz model and portfolio construction

- The two-asset case and the diversification effect.
- The multi-asset case: efficient frontier with N risky assets.
- Introduction of a risk-less asset in the Markowitz framework.
- Quadratic utility function and relation with Markowitz portfolio.
- Issues with the Markowitz model: the effect of estimation risk and transaction costs.
- Techniques employed to reduce the impact of estimation risk (shrinkage, weight constraints, motivation for asset pricing models).

The Capital Asset Pricing Model (CAPM)

- Derivation of the CAPM.
- Estimation of expected returns and asset covariances with a single-factor model.
- Lintner test (1965) and its limitations.
- Fama-MacBeth test (1973).
- Roll's critique (1977).

The Arbitrage Pricing Theory (APT)

- Empirical evidence against the CAPM.
- Concept of arbitrage and derivation of APT.
- Estimation of expected returns and asset covariances with a multi-factor model.
- Explicit factor models: Fama-French 3-factor model (1993), Carhart (1997), Fama-French 5-factor model (2015), q -factor model (2015).
- Other factor models: Barra, statistical approach (PCA).

The Efficient Market Hypothesis

- Weak form: serial correlation tests, momentum and reversal strategies, January effect.
- Semi-strong form: size and value anomalies, neglected firm effect, post-earnings announcement drift, first-day underpricing and long-run underperformance of IPOs, equity return predictability.
- Strong form: insider trading.
- Exploiting the anomalies: factor investing.

Portfolio performance evaluation

- The normality assumption: volatility and Sharpe ratio.
- Limitations of the normality assumption: downside risk and higher-order moments.
- Semi-variance and semi-volatility, Sortino ratio.
- Value-at-Risk measures: Historical VaR, Gaussian VaR, Modified VaR.
- Risk-adjusted performance measures referred to a benchmark: Treynor ratio, Jensen's alpha, Information ratio. Importance of the choice of the benchmark: Grinblatt and Titman (1994).
- Preference-based measures: applications of the concept of certainty equivalent.
- Market-timing: Henriksson and Merton, Treynor and Mazuy measure.
- Performance measures for alternative investments, style analysis, performance attribution and persistence, performance manipulation (if time allows).

Dynamic asset allocation

- Static vs dynamic asset allocation.
- Dynamic asset allocation in continuous time: example of Kim and Omberg (1996).

Evaluation

Based on a written exam.

Recommended material

- **Course slides**
- **Recommended textbooks**

Cochrane, J. H. (2009). *Asset Pricing (Revised Edition)*. Princeton University Press.

E. J. Elton, M. J. Gruber, S. J. Brown and W. N. Goetzmann (2014). *Modern Portfolio Theory and Investment Analysis*. Wiley.

- **Other readings**

Barber, B. M., Huang, X., & Odean, T. (2016). Which factors matter to investors? Evidence from mutual fund flows. *Review of Financial Studies* (forthcoming).

Chopra, V. K., & Ziemba, W. T. (1993). The Effect of Errors in Means, Variances, and Covariances on Optimal Portfolio Choice. *The Journal of Portfolio Management*, 19(2), 6-11.

DeMiguel, V., Garlappi, L., & Uppal, R. (2009). Optimal versus naive diversification: How inefficient is the 1/N portfolio strategy? *Review of Financial Studies*, 22(5), 1915-1953.

Fama, E. F., & MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. *The Journal of Political Economy*, 607-636.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *The Journal of Finance*, 47(2), 427-465.

Fama, E. F., & French, K. R. (2004). The capital asset pricing model: Theory and evidence. *The Journal of Economic Perspectives*, 18(3), 25-46.

Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, 116(1), 1-22

Grinblatt, M., & Titman, S. (1994). A study of monthly mutual fund returns and performance evaluation techniques. *Journal of financial and quantitative analysis*, 29(03), 419-444.

Hou, K., Xue, C., & Zhang, L. (2015). Digesting Anomalies: An Investment Approach. *Review of Financial Studies*, 28(3), 650-705.

Hou, K., Xue, C., & Zhang, L. (2015). A Comparison of New Factor Models. Working paper.

Kan, R., & Zhou, G. (2007). Optimal portfolio choice with parameter uncertainty. *Journal of Financial and Quantitative Analysis*, 42(03), 621-656.
Chicago

Kim, T. S., & Omberg, E. (1996). Dynamic nonmyopic portfolio behavior. *Review of Financial Studies*, 9(1), 141-161.

Treynor, J., & Mazuy, K. (1966). Can mutual funds outguess the market? *Harvard Business Review*, 44(4), 131-136.

Welch, I., & Goyal, A. (2008). A comprehensive look at the empirical performance of equity premium prediction. *Review of Financial Studies*, 21(4), 1455-1508.