

F540 – Topics in Applied Asset Management

Outline: This course will address a number of practical issues that arise in contemporary asset management and portfolio design. The intention is to provide you with both practical tools and theoretical insight into the quantitative techniques used (and difficulties faced) by asset managers in delivering performance on a daily basis. This implies some empirical work and you will have to become somewhat proficient (not an expert) in the programming language R- there are associated classes in R provided for the course. R is easy to learn, there is a lot of on-line support and is one of the leading software packages for empirical analysis in the finance industry (along with Python) and will be useful if you are looking for a job in the Finance Industry at the end of the year.

Evaluation will be through an empirical project using R together with take home theoretical questions related to the empirical work- no exam. There will be weekly reading lists- largely drawn from the applied literature – there is no set text - and empirical exercises. I will draw on my own experience in market neutral Long Short Equity funds and a managed futures hedge fund (CTA) throughout the course to give you practical insights. I will try to cover Equities, Fixed Income, FX and Futures in some form. I will also consider several specific trading strategies as we go through the course; Market neutral equity, Smart Beta and ETF's- factor models, convergence trades/ statistical arbitrage, the carry trade and both cross-sectional and time series momentum in futures markets.

In recent years Machine Learning tools have been rapidly adopted by many systematic strategies and we will spend some time critically evaluating the tools used this area. There are significant advantages but also potentially serious dangers through the naïve use of Machine Learning methods in asset management.

Three broad themes will be covered;

1. **Portfolio design; position sizing-** the practical limitations of mean variance analysis in reality as opposed to theory and alternative approaches- Parametric Portfolios, factor based allocation, volatility timing, smart beta and risk parity.
2. **Conditional asset allocation; signal generation-** the central role of the predictability of *risk adjusted* returns and volatility measurement to asset allocation and finally
3. **Risk management and Performance Evaluation-** tools for controlling risk and monitoring performance

The provisional lecture outline is below but if time is tight I will not rush through the material but the last one or two topics may be dropped.

Topic 1. *Failures of Mean Variance in practice.*

The shape of the risk return trade off, the efficient frontier and static Mean Variance Allocation. The role of leverage, what do we mean by diversification- the lessons of 2008. Why does 1/N appear to dominate mean variance portfolio allocation? Rebalancing and dynamic portfolio design; transactions costs, slippage and cost minimization

Topic 2. Alternatives to Mean Variance and volatility timing

Direct Optimisation- Brandt and Santa Clara, Higher Moments. Parametric Portfolios , 1/N in risk, Risk Parity in its various forms, volatility managed portfolios, Min Variance – Smart Beta- Low vol/beta anomaly, beta or market neutral.

Topic 3. Factor models, ETF's, Regimes

Factor based allocations; CAPM and APT, size , value, growth, momentum...
Regimes, sentiment and style rotation

Topic 4. Predictability:

Predictable risk premia and market efficiency, state dependence and pockets of predictability, Machine learning review and big data. Economic and statistical loss functions, Directional prediction: asymmetric loss.

Topic 5. Case Study 1 : Momentum trading in the cross section and trend following

Topic 6. Risk Management and performance evaluation

Value at Risk, Expected Shortfall, Maximum Drawdown, trading limits and the impact of leverage, stop loss rules. Manipulation Proof measures of performance, Tail dependence , concordance and failures of correlation

Topic 7. Case Study 2: The carry trade-in FX and other asset classes

Topic 8. Case Study 3: Convergence trades

Mean reversion, statistical arbitrage and pairs trading, fixed income strategies

Reading:

Most of the reading will be taken from journal articles, one or two articles a week, but I will make some reference to the following texts:

- 1) *Quantitative Equity Portfolio Management*, Qian, Hua and Sorenson (2007), Chapman Hall
- 2) *Introduction to Risk Parity and Budgeting*, Thierry Roncalli, (2013), Chapman Hall
- 3) *An Introduction to Analysis of Financial Data with R* , Ruey Tsay, (2013),Wiley
- 4) *Analyzing Financial Data and implementing financial models using R*, Clifford Ang, (2014), Springer.

Pre-reading for the course:

Campbell, J. Y. (2014). Empirical asset pricing: Eugene Fama, Lars Peter Hansen, and Robert Shiller. *Scandinavian Journal of Economics*, 116(3):593-634.

and/or

RSAS (2013). Understanding asset prices. Compiled by the Economic Sciences Prize Committee of the Royal Swedish Academy of the Sciences (RSAS).

Available at: http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2013/advanced-economicsciences2013.pdf.