

Teaching:

1. Derivative Securities and Risk Management Techniques

Source material:

- Hull, J., “Options, Futures and Other Derivatives”, 2003, Fifth edition, Prentice Hall.
- Wilmott, P. “Derivatives: The Theory and Practice of Financial Engineering”, 1999, John Wiley & Sons.
- Arditti, F. D., “Derivatives”, 1996, Harvard Business School Press.
- Course notes

2. Advanced Investment and Funds Management

Source material:

- Luenberger, D. G., “Investment Science”, 1997, Oxford University Press.
- Several recent journal articles
- Course notes

3. Empirical Technique in Finance

Source material:

- Hafner, C. M. (1998), Nonlinear Time Series Analysis with Applications to Foreign Exchange Rate Volatility, Physica-Verlag, Berlin.
- Hardle, W. (1990), Applied Nonparametric Regression, Cambridge University Press, New York.
- Hart, J. D. (1997), Nonparametric Smoothing and Lack-of-Fit Tests, Springer, Berlin.
- Harvey, A. C. (1989), Forecasting, structural time series models and the Kalman filter, Cambridge University Press.
- Jazwinski, A. H. (1970), Stochastic Processes and Filtering Theory, Academic Press, New York and London.
- Kim, C. and Nelson, C. R. (1999), State Space Models with Regime Switching: Classical and Gibbs-Sampling Approach with Applications, The MIT Press, Cambridge.
- Luenberger, D. G. 1998, Investment Science, Oxford University Press, Oxford.
- Ross, S. M. 2000, Introduction to Probability Models, Seventh edition, Harcourt Academic Publishers, London.
- Scott, D. W. (1992), Multivariate Density Estimation, John Wiley & Sons, New York.
- Shumway, R. H. and Stoffer, D. S. (2000), Time Series Analysis and Its Applications, Springer Text in Statistics, New York.
- Silverman, B. W. (1986), Density Estimation for Statistics and data Analysis, Chapman and Hall, New York.
- Tanizaki, H. (1993), Nonlinear Filters: Estimation and Applications, Lecture Notes in Economics and mathematical Systems, H. Tanizaki, Springer-Verlag.
- Tapeiro, C. S. 2000, Applied Stochastic Models and Control for Finance and Insurance, Kluwer Academic Publishers, Dordrecht, The Netherlands.

- Wells, C. (1996), *The Kalman Filter in Finance*, Kluwer Academic Publishers, Dordrecht.
- Several recent journal article

Current Research:

1. Hidden Markov Models

- Markov Chains to Represent Stochastic Nature of Financial and Economic Variables
- Adapting (Viterbi) Algorithm Used for Speech Recognition
- Conference Board, NY
- Regional Differences in Business Cycles

2. Estimation of Stochastic Variance Specification

- Very “Tricky” to Estimate
- Likelihood Function Cannot be Fully Specified Due to Unobserved Nature
- Need to Resort to Other Numerically Intensive Approaches
- Short Term Interest Rate – An Important Application Area

3. State Space Framework with Markov Switching

- Extremely Suitable for Models with Unobserved Dynamic Components
- Originally Developed for Space Tracking Applications
- Ideal for Dealing with Expectation Variables e.g. Inflation, Learning in the Market, Time Varying Risk Preferences etc
- Separating Cyclical Component of Earnings
- Coincident Economic Indicator

4. Speculative Component in Asset Price

- Different Approaches to Separating Asset Prices to Fundamental and Non-Fundamental Components
- Use this as a Timing Device to Switch Investment from Risky Asset to Safer Assets
- Portfolio Performance Over Long Run
- Research Funding Applications (Australian Research Council)

5. Dynamic Bayesian Algorithm

- Recursive Bayes Formula Applied to Continuous Time Diffusion Model of Interest Rate
- Made Computable by Spatial Discretisation
- ‘Finance and Stochastic’ Publication
- Further Application to Term Structure of Interest Rates

6. Portfolio Flows and Asset Price

- Exchange Rate Changes are Characterised by Different Regimes

- Transition between Regimes Might be Influenced by Portfolio Flows
- Knowledge of Portfolio Flows Might be Useful for Currency Trading
- Research Funding Applications (Australian Research Council) with Industry Partner!!

7. Credit Risk Modelling and Derivatives

- Credit Derivatives Have Grown Exponentially Since Early 1990s
- Participants: Banks, Insurance Companies and Other Credit Providers
- Attempt to Separate Market Risk from Credit Risk
- Huge Challenge to Come up With Consistent Valuation Methodologies (IRB, Basel II Recommendations)
- Honors and PhD Student

Research Student Projects:

Undergraduate Honors:

1. Estimation of Markovian Mean Reverting Short-Term Interest Rate Model (Thesis completed 2004)

Ph. D.

1. Risk Aversion Parameters Implied by Derivative Prices (completed 2006)
2. Credit Risk Models and Credit Risky Security Pricing with Emphasis on Two Factor Models for Options on Yield Spread
3. Market Integration with Special Emphasis on BRIC (Brazil, Russia, India and China)
4. Extending Time Series Dynamics of Latent Process for Stochastic Volatility Models and the Related Estimation Techniques
5. Arbitrage Possibilities in the Credit Default Swaps with Emphasis on iTraxx and CDX Markets