

Time-consistency of Indifference Prices and Monetary Utility Functions

Patrick Cheridito, Princeton

Abstract: We consider an economic agent with dynamic preference over a set of uncertain monetary payoffs. We assume that the agent's preferences are given by utility functions, which are updated in a time-consistent way as more information is becoming available. Our main result is that the agent's indifference prices are time-consistent if and only if his preferences can be represented with utility functions that are additive with respect to cash. We call such utility functions monetary. The proof is based on a characterization of time-consistency of dynamic utility functions in terms of indifference sets. As a special case, we obtain the result that expected utility leads to time-consistent indifference prices if and only if it is based on a linear or exponential function.

Computing Strategies for Achieving Acceptability

Soumik Pal, Columbia

[Abstract \(.pdf\)](#)

On Multi-period Factor Models as Cointegration Models

David Lando, Copenhagen and Princeton

Abstract: We consider a multi-period APT model for log asset price of securities formulated as a parameter restriction in a cointegrated VAR model. The economic argument for the multi-period model builds upon the possibility of reducing the risk by holding portfolios over time, and not as for the one-period model by diversification of portfolios. The analogue of factors will be common stochastic trends and the analogue of idiosyncratic risks will be stationary processes. The proposed structure is not thought of as one obtained by considering cumulated versions of the classical one-period APT model, and it does not seek to have the classical APT as an embedded model. The statistical model is analyzed by assuming a Gaussian likelihood and a test for the no arbitrage condition is derived.

Shortfall Risk Measures and Utility Maximization under Model Uncertainty

Stefan Weber, Cornell

Abstract: We consider the problem of utility maximization under model uncertainty in the presence of both cost and risk constraints. Downside risk is measured by utility-based shortfall risk. We first review the properties of utility-based shortfall risk. The acceptance sets of these risk measures are defined in terms of a convex loss function and a fixed threshold level. Second, we discuss utility maximization under both cost and risk constraints, if there is no model uncertainty. By means of its dual problem, the optimization problem can explicitly be solved. Finally, we characterize the solution of the robust utility maximization problem under robust constraints. In this case, model uncertainty involves three aspects: the measurement of the utility, the cost and the downside risk. We assume that investors take a worst case approach.

What Is a Good Measure of Risk: The Controversies and a Different Set of Axioms

Steve Kou, Columbia

Abstract: By: C. C. Heyde, S.G. Kou, and Xianhua Peng Columbia University Axioms-based coherent risk measures have been widely used in mathematical finance. In this paper we point out some controversies of the axioms. We then suggest a different set of axioms and derive risk measures based on the

axioms.

Malliavin Greeks without Malliavin Calculus

Nan Chen, Columbia

Abstract: In this paper, we derive and analyze Monte Carlo estimators of Greeks (i.e., price sensitivities). There have traditionally been two categories of methods for estimating sensitivities: methods that differentiate paths and methods that differentiate measures. A more recent line of work derives estimators through Malliavin calculus. Most implementations of continuous-time models use discrete-time approximations, raising the question of whether one should discretize first and then differentiate, or differentiate first and then discretize. We show that in several important cases the first route produces the same estimators found through Malliavin calculus, but using only traditional elementary techniques. Time-averaging of multiple unbiased estimators emerges as a key feature of this approach. This is based on joint work with Paul Glasserman.

Are Option-Pricing and Utility-Maximization Problems Well Posed?

Kasper Larsen, CMU

[Abstract \(.pdf\)](#)

Time Consistency and Executive Stock Options

Vicky Henderson, Princeton

It is well documented that executives granted stock options tend to exercise early and in a few large transactions or "blocks". Standard risk-neutral valuation models cannot explain these patterns and attempts to capture the exercise behavior of risk averse executives have been limited to the special case of one option or assume all options are exercised at one time. This paper solves for the optimal exercise behavior for a risk averse executive who is granted multiple stock options. Our executive is not able to trade in the company stock itself, but can hold another risky asset which is correlated with the company stock. This underlying portfolio choice problem induces the need for a "time-consistent" utility function which ensures the exercise decisions are not distorted by the opportunity to invest in the risky asset. We show that traditional utility-based models do not predict block exercise behavior. Rather, the risk averse executive exercises individually at an increasing sequence of stock price thresholds, which we give in closed form.

A Market-Induced Mechanism for Stock Pinning

Marco Avellaneda, NYU, joint work with Michael Lipkin

We propose a model to describe stock pinning on option expiration dates. We argue that if the open interest in a particular contract is unusually large, Delta-hedging in aggregate by floor market-makers can impact the stock price and drive it to the strike price of the option. We derive a stochastic differential equation for the stock price which has a singular drift that accounts for the price-impact of Delta-hedging. According to this model, the stock price has a finite probability of pinning at a strike. We calculate analytically and numerically this probability in terms of the volatility of the stock, the time-to-maturity, the open interest for the option under consideration and a price-elasticity constant that models price impact. Our model was (reasonably well) validated subsequently by a cross sectional study conducted by Ni Pearson and Poteshman based on empirical data.

This is a joint work with Michael Lipkin.

Default Risk Premia and Asset Returns

Antje Berndt, Carnegie Mellon

This paper investigates the source for common variation in the portion of returns on corporate debt that is not explained by changes in risk-free rates or expected default losses. We extract a latent common component from firm-specific changes in default risk premia that is orthogonal to known systematic risk factors during our sample period from 2001 to 2004. Asset pricing tests using returns on Bloomberg-NASD corporate bond indices generated from actual transaction prices of actively traded issues suggest that our discovered latent default risk premia factor is priced in the corporate bond market. A cross-sectional analysis of 30 Merrill Lynch corporate bond industry portfolios supports these findings. For equity markets results are mixed. We test for firm characteristics including contemporaneous default probabilities, leverage ratios, and recovery rates. Our results indicate that it is not likely that the common variation in changes in default risk premia is due to these firm characteristics. This is joint work with Aziz Lookman and Iulian Obreja.

A Generalized Lando's Formula: A Filtration Expansion Perspective

Xin Guo, Cornell

Abstract: Using a new filtration expansion approach, we extend Lando's formula for pricing credit risky derivatives to models where a firm's characteristics and default point process need not be conditionally independent. This filtration expansion approach both generalizes and simplifies a number of critical concepts and techniques used in the credit risk literature. For example, we demonstrate the consistency of the mathematical definition and the intuitive (statistical) notion of a default time's intensity. This talk is based on joint work with R. Jarrow and C. Menn.

Asymptotic Analysis of Utility Based Hedging Strategies for Small Quantities of Derivatives

Dmitry Kramkov, Carnegie Mellon

In the framework of incomplete financial models the role of a hedging strategy is to provide the optimal trade-off between risk (error of replication) and return. We show that for small quantities of contingent claims the hedging strategy is actually a mean-variance hedging strategy under an appropriate choice of a numeraire and a risk-neutral probability. Moreover, we show that some intuitively desirable properties of hedging strategies hold true iff there is a risk-tolerance wealth process. The presentation is based on a joint project with Mihai Sirbu.