Tuesday, September 18th

Bernt Øksendal - "Optimal Portfolio for an Insider in a Strategic Market Equilibrium":
We study a market model which is a generalization of the insider equilibrium models of Kyle and Back. We use filtering theory, anticipative stochastic calculus (forward integrals) and stochastic control to find the optimal portfolio for an insider in a market where the action of the insider influences the price. The presentation is based on joint work with Knut Aase and Terje Bjuland.

Chris Rogers - "The Cost of Illiquidity and Its Effects on Hedging":
Illiquidity is an important effect in the markets, yet it is hard to come up with a good definition, which not only has some economic explanation but also retains a reasonable degree of tractability. In this paper, we propose a simple model based on consideration of the limit order book which results in a modification of the usual Black-Scholes dynamics of portfolio wealth. Working with a suitably simple objective, we are able to find a quite direct solution to the hedging problem that requires only the numerical solution of three BS-style PDES. (Joint work with Surbjeet Singh)

Freddy Delbaen - "Monetary Time Consistent Utility Functions and the Viscous Hamilton-Jacobi Quasi-Linear PDE":
Time consistent monetary utility functions (based on Brownian Filtrations) can be characterised by their duality properties. Using the theory of BSDE, the duality theory allows to characterise the cases where the related BSDE have or do not have solutions. In the Markovian case the theory of viscous Hamilton-Jacobi quasi-linear PDE allows to prove that the BSDE has nice solutions for all terminal random random variables that only depend on the final value of the Brownian Motion. I will try to explain why the answer is different in the general case and in the Markovian case. This is joint work with Shige Peng, Rosazza-Gianin, Ying HU and Bao.

Damir Filipovic - "Non-Monotone Risk Measures and Monotone Hulls":
This paper provides some useful results for convex risk measures. In fact, we consider convex functions on a locally convex vector space E which are monotone with respect to the preference relation implied by some convex cone and invariant with respect to some numeraire ("cash"). As a main result, for any function f, we find the greatest closed convex monotone and cash-invariant function majorized by f. We then apply our results to some well-known risk measures and problems arising in connection with insurance regulation.

Martin Schweizer - "Modelling Option Prices":
In this talk, our goal is to construct joint models for underlyings and options written on these. More precisely, we want to specify a volatility structure for both assets and options and to construct from that an arbitrage-free model. It turns out that this is surprisingly tricky and the feasibility of the construction (i.e., the proof of existence) hinges quite a bit on the choice of a suitable parametrization. We shall provide positive results in some classes of examples and also mention open problems. This is joint work with Johannes Wissel (ETH Zurich).

Session 1

Kasper Larsen - "Continuity of Utility-Maximization with Respect to Preferences":
This paper provides an easily verifiable regularity condition under which the investor's utility maximizer depends continuously on the description of her preferences in a general incomplete financial setting. Specifically, we extend the setting of Jouini and Napp (2004) to 1) noise generated by a general continuous semi-martingale and 2) the case where the market price of risk is allowed to be a general adapted process satisfying a mild integrability condition. This extension allows us to obtain positive results for both the mean-reversion model of Kim & Omberg (1996) and the stochastic volatility model of Heston (1993). Finally, we provide an example set in Samuelson's complete financial model illustrating that without imposing additional regularity, the continuity property of the investor's optimizer can fail.

Mikhail Urusov - "Stopping of Integral Functionals of Diffusions and 'No-Loss' Free Boundary Formulation":
This talk is based on joint works with L. Rueschendorf and D. Belomestny. We consider optimal stopping of integral functionals of a one-dimensional diffusion, the coefficients of which are allowed to be discontinuous. Therefore the standard formulation of the free boundary does not work. We provide an interesting modification of the standard form of the free boundary problem that works well here: loosely speaking, the modified free boundary problem has a solution if and only if the stopping problem has an optimal stopping time, and in this case, the solution of the free boundary is unique and provides the solution of the stopping problem.

Luciano Campi - "Hedging with European or American Vanilla Options":
We consider a general incomplete financial market where the agents are allowed to trade not only in the underlying but also in European or American vanilla options so enlarging the set of contingent claims that can be hedged. We study the spanning properties of such a larger set of hedging opportunities.

Rüdiger Kiesel - "Pricing Forward Contracts in Power Markets by the Certainty Equivalence Principle: Explaining the Sign of the Market Risk Premium":
In this paper we provide a framework that explains how the market risk premium, defined as the difference between forward prices and spot forecasts, depends on the risk preferences of market players. In commodities markets this premium is an important indicator of the behaviour of buyers and sellers and their views on the market spanning between short-term and long-term horizons. We show that under certain assumptions it is possible to derive explicit solutions that link levels of risk aversion and market power with market prices of risk and the market risk premium.

Jörn Sass - "The Numeraire Portfolio Under Transaction Costs":
We study the existence of a numeraire portfolio for a discrete time financial market with proportional transaction costs. In an incomplete market without frictions, consistent prices for derivative securities can be obtained by taking the expectation of the claim with respect to a certain probability measure under which the discounted asset prices become martingales. The numeraire portfolio allows to replace this change of measure by a change of numeraire. For models with transaction costs, the concept of a martingale measure and thus the concept of a numeraire portfolio have to be modified. Without transaction costs a well known approach is to find the growth optimal portfolio (but the numeraire portfolio might not exist). with some modifications and under reasonable conditions the same approach turns out to work for our model. (Joint work with Manfred Schael, Bonn)

Session 2

Dorje C. Brody - "Dam Rain and Cumulative Gain":
Consider a financial contract that delivers a single cash flow given by the terminal value of a cumulative gains process. How can one model the dynamics of the price of such an asset, and determine the price processes of associated options and derivatives? This problem is important, for example, in the determination of optimal insurance claims reserve policies, and in the pricing of reinsurance contracts. In the insurance setting, the aggregate claims play the role of the cumulative gains, and the terminal cash flow represents the totality of the claims payable for the given accounting period. A similar example arises when we consider the accumulation of losses in a credit portfolio, and try to value a contract that pays an amount equal to the totality of the losses over a given time interval. The cumulative gains process is modelled by the product of the terminal cash flow and an independent gamma bridge process, and the market filtration is generated by this process. An explicit expression for the value process is obtained. The price of an elementary Arrow-Debreu security on the value of the cumulative gains process is determined, and is used to obtain closed-form expressions for the price of a European-style option on the value of the asset. The results obtained make use of various remarkable mathematical properties of the gamma bridge process, and are applicable to a wide variety of financial products based on cumulative gains processes such as aggregate claims, credit portfolio losses, gross domestic product, emissions, rainfall, and defined benefit pension funds. (Work carried out in collaboration with L.P. Hughston and A. Macrina.)

Agatha Murgoci - "Vulnerable Options and Good Deal Bounds - Structural Model":
We price vulnerable options - i.e. options where the counterparty may default. The main reason for having a counterparty risk is the fact that these options are traded over-the-counter (OTC). According to BIS, the OTC equity-linked option gross market value in the first half of 2006 USD 6.8 tln. While previous literature models vulnerable options in complete markets, we notice this is a case of market incompleteness. We streamline earlier results in complete markets and, in order to price in incomplete markets, we employ the technique of good deal bounds as developed by Björk-Slinko (2005). We model default in a structural framework and obtain close form solutions for the pricing bounds. Also, we extend the results for European calls to other options and homogeneously linear payoffs, such as exchange options. The price bounds obtained are much tighter than the no-arbitrage bounds.

Jérôme Reboulleau - "Pricing Shipping Derivatives Through the Lévy Market Model":
Historically, freight rates are more volatile than other commodities. Prices for shipping contracts often vary by more than 60% in the course of a single year and the various actors in this industry are demanding new tools in order to hedge their risk. As a response to this demand, shipping derivatives have been successfully introduced in 2001, leading to a market of 50bn USD in 2006 (source HSBC Shipping Services). Due to this large volatility, only models with jumps, such as Lévy processes, are realistic. The work by Bakshi & Madan (2000) provides a basis to price such derivatives either by way of Maximum Likelihood (MLE) or Minimum Mean Square Error (MMSE) directly using the characteristic function. After an introduction to the shipping market, a real-time application of this technology will be presented such as vessel revenue valuation and shipping derivatives trading strategies.

Irene Klein - "Market Free Lunch and Large Financial Markets":
Frittelli (2004) introduced a notion of market free lunch depending on the preferences of investors. I will show the relation to the classical no free lunch condition of Kreps (1981) using the theory of Orlicz spaces. Moreover I will define an asymptotic version of no market free lunch on a large financial market which turns out to be equivalent to no asymptotic free lunch. Further, one can show directly that no asymptotic market free lunch is equivalent to the existence of an equivalent (local-/sigma-) martingale measure for the large financial market.

Tommi Sottinen - "Local Continuity of Stopping Times and Arbitrage":
In a recent work [Bender, C., Sottinen, T. And Valkeila, E. (2006) No-arbitrage pricing beyond semimartingales. WIAS Preprint No. 1110] we considered non-semimartingale pricing models that have non-trivial quadratic variation and a certain "small-ball property". It turned out that in these models one cannot do arbitrage with strategies that are continuous in terms of the spot and some other economic factors such as the running minimum and maximum of the stock. Unfortunately, this result does not extend to even simple strategies, when stopping times are involved. The reason is obvious: Stopping times are typically not continuous in the stock price. in this talk we introduce some rather weak continuity-like properties that allow us to extend the no-arbitrage results of ibid. to strategies that involve stopping. the talk is based on an ongoing joint work with C. Bender, D. Gasbarra, and E. Valkeila.

Session 3

Przemyslaw Klusik - "Optimal Strategy for An Investor with Access to a Stream of Extra Information":
We consider financial market models with two agents on different information levels: a regular agent whose information is contained in the natural filtration of price process, and an insider who additionally has access to a stream of extra information. by means of Malliavin calculus we construct the strategy maximizing the expected utility of insider. The mathematical results obtained are illustrated by proper computer simulations.

Christoph Kühn - "Illiquid Financial Markets and Nonlinear Stochastic Integrals":
A large investor is somebody whose trades move market prices significantly. Put differently, he is faced with an illiquid financial market. Whereas in the standard liquid market model trading gains are modelled by linear stochastic integrals, in the more general illiquid case nonlinear stochastic integrals are required. We discuss the construction of nonlinear stochastic Itô-integrals w.r.t. A family of semimartingales which depend on a *spatial* parameter. In particularly, we are interested in the case that the dependency on the spatial parameter may be discontinuous. We investigate under which conditions a nonlinear integral can be approximated by nonlinear integrals with piecewise constant integrands. This brings us beyond the case that any integral can be approximated by integrals with integrands taking only finitely many values. Furthermore, we discuss the large investor's utility maximization problem and compare its solution with the optimal strategy for small investors.

Teemu Pennanen - "Pricing and Hedging in Convex Markets":
We study pricing and hedging of contingent claims in financial markets where trading costs are given by convex cost functions and portfolios are constrained by convex sets. The model does not assume the existence of a cash account. In addition to classical frictionless markets and markets with transaction costs or bid-ask spreads, our framework covers markets with nonlinear illiquidity effects for large instantaneous trades.

Antje Schulz - "Optimal Execution Strategies in Limit Order Books with a General Shape Function":
Following Obizhaeva and Wang (2005), we consider optimal execution strategies for block market orders placed in a limit order book (LOB). in this note, we allow for a general shape of the LOB defined via a given density function. In this setting, there are now two possibilities of modeling the resilience of the LOB after a large market order: the exponential recovery of the number of limit orders, i.e., of the volume of the LOB, or the exponential recovery of the bid-ask spread. We consider both situations and, in each case, derive optimal execution strategies in discrete time. (Joint work with Alexander Schied and Aurélien Alfonsi)

Irina Penner - "Dynamic Convex Risk Measures: Time Consistency, Prudence and Sustainability":
We study various properties of a dynamic convex risk measure for bounded random variables. Our main issue is to investigate possible interdependence of conditional risk assessments at different times and the manifestation of these time consistency properties in dynamics of penalty functions and risk processes. We begin by focusing on the strong notion of time consistency and we characterize this property in terms of penalty functions and a joint supermartingale property of the risk measure and its penalty function. This part of the talk is based on a joint work with Hans Föllmer. In the second part of the talk we introduce and characterize a weaker notion of time consistency that we call prudence. Prudent risk measures induce risk processes that can be upheld without any additional risk. We call such processes sustainable, and we give an equivalent characterization of sustainability in terms of a combined supermartingale property of a process and one-step penalty functions. This supermartingale property allows us to characterize the strongly time consistent risk measure which arises from any dynamic risk measure by recursive construction as the smallest process that is sustainable and covers the final loss.

Session 4

Delia Coculescu - "Valuation of Default-Sensitive Claims Under Imperfect Information":
We propose an evaluation method for financial assets subject to default risk, where investors cannot observe the state variable triggering the default, but do observe a correlated price process. The model is sufficiently general to encompass a large class of structural models and can be seen as a generalization of the model of Duffie and Lando (2001). In this setting we prove that the default time is totally inaccessible in the market's filtration and derive the conditional default probabilities and the intensity process. Finally, we provide pricing formulas for default-sensitive claims and illustrate on particular examples the shapes of the credit spreads.

Yoshio Miyahara - "Option Pricing Based on the Geometric Stable Processes and the Minimal Entropy Martingale Measures":
The geometric stable processes have been focused on as one of the models for the underlying asset price processes which have the strong fat tail properties, and have been studied by many researchers. In this paper we study the GSP (geometric stable process) & MEMM (Minimal Entropy Martingale Measure) Pricing Models. We see that by adopting the MEMM as the suitable martingale measure we can construct the option pricing models based on the stable processes in general form, and that these models have the reproducibility of both the volatility smile and the volatility skew properties. Next we apply this model to the currency options and carry on the empirical analysis, and we have obtained that this model is fitting very well to the market prices of currency options.

Antonis Papapantoleon - "On the Duality Principle in Option Pricing: Semimartingales and Lévy Processes":
The duality principle states that the calculation of the price of a call option in a model with price process S=e^H (w.r.t. A measure P) is equivalent to the calculation of the price of a put option in a dual model S'=e^H' (w.r.t. A dual measure P'). We develop the appropriate mathematical tools for the study of the duality principle in a general semimartingale setting. We consider both uni- and multi-dimensional semimartingale models, thus covering the case of options on several assets as well. a number of more sophisticated duality results are derived for a broad spectrum of exotic options. The duality principle demonstrates its full strength for these options as, in several cases, it allows to reduce a problem involving joint distributions to a univariate problem. Particular cases which are studied are models driven by Lévy processes. Time permitting, we will also sketch valuation methods for exotic options in Lévy models. the talk is based on joint work with Ernst Eberlein and Albert N. Shiryaev.

Teitur Arnarson - "Early Exercise Boundary Regularity Close to Expiry in Indifference Setting":
We investigate the early exercise boundary near expiry for the indifference prices of the American call and put options. We show that, in this setting, the behavior of this boundary depends primarily on the regularity of the option payoff function in the point b_0, where b_0 is the limit point of the early exercise boundary as we approach the expiration time. The analysis is based on scaling and the so called blow-up technique instead of series expansion which is the common approach to these kind of problems.

Session 5

Johannes Muhle-Karbe - "Portfolio Optimization Under Transaction Costs":
We consider the problem of maximizing expected logarithmic utility from consumption in a Black-Scholes market with proportional transaction costs. A solution to this problem has been obtained by Davis and Norman (1990) using methods from stochastic control theory. Similar arguments are also used in most of the other work that aims for numerically tractable solutions in this field. We present a different approach here. By using a "shadow price process" instead of the original one, we show how this problem can be reformulated as an optimal consumption problem in a frictionless market. (Joint work with Jan Kallsen)

Stefan Thonhauser - "Optimal Dividend Strategies for a Risk Process Under Force of Interest":
In the classical Cramer-Lundberg risk model the problem of maximizing the expected cumulated discounted dividends is a widely discussed topic. In the most general case within this framework it is proved (Gerber 1969, Azcue and Muler 2005, Schmidli 2006) that the optimal dividend strategy is of the not very intuitive band strategy type. We discuss this maximization problem in a modified setting including a constant force of interest in the risk model. The value function can be identified in the set of viscosity solutions of the associated HJB equation and the optimal dividend strategy in this risk model with interest can be derived. (Joint work with Hansjoerg Albrecher, TU Graz)

Ralf Wunderlich - "Computing Optimal Investment Strategies Under Partial Information and Bounded Shortfall Risk":
We consider a time-continuous financial market and a dynamic portfolio optimization problem where the expected utility from terminal wealth has to be maximized. The special features of this paper are an additional shortfall constraint on the terminal wealth and a financial market with partial information. The shortfall risk is measured in terms of expected loss. Stock prices are assumed to satisfy a stochastic differential equation with a drift parameter modeled as an unobservable continuous-time, finite state Markov chain (HMM). Combining martingale and convex duality methods we find the form of the optimal terminal wealth. For the optimal trading strategies explicit formulas are given by using Malliavin calculus. Numerical examples illustrate the analytic results. (Joint work with Jörn Sass from RICAM in Linz)

Markus Fischer - "Discretisation of Continuous-Time Stochastic Optimal Control Problems with Delay":
A semi-discretisation scheme for a class of infinite-dimensional stochastic optimal control problems is introduced. The system dynamics of the control problems are described by stochastic differential equations with delay or "memory" (SDDEs / SFDEs). Performance is measured in terms of an "evolutional" cost functional over a finite time horizon. The coefficients of an SDDE/SFDE depend not only on the current state, but also on past values or entire segments of the solution trajectory. Control problems of this kind arise, for example, as growth models in economics or biology or in finance when pricing and hedging weather derivatives. the approximation scheme consists in the construction of a sequence of finite-dimensional discrete-time optimal control problems in two steps. Under quite natural assumptions, we obtain convergence of the scheme as well as a prior bounds on the discretisation error. Important ingredients in the construction are a version of the Principle of Dynamic Programming and a bound on the second moment of the modulus of continuity of Brownian motion. the question of how to numerically solve the resulting finite-dimensional problems and, in particular, how to deal with the "curse of dimensionality" is also addressed. the results to be presented are based on joint work with Giovanna Nappo (University of Rome "La Sapienza").

Semyon Malamud - "A Unified Approach to Market Incompleteness":
Until now, the principle obstacle to "getting one's hands on" the equilibria for incomplete markets was a "concrete" solution to the utility maximization problem for a single agent. We have discovered a general method for constructing explicit solutions to a wide variety of optimization problems that are associated with a general class of incomplete markets. Effectively, our class characterizes the macroeconomic and finance models of incomplete markets that satisfy the Keynes axiom of decreasing marginal propensity to consume. It includes all classic incomplete market models. Our construction is the first new ingredient that makes it possible to extract detailed economic information from the equilibria of our models. We directly apply our method to disprove several well known macroeconomic conjectures. Our method is also perfectly suited for utility indifference pricing. We explicitly calculate the derivatives of the utility indifference price, analyze its asymptotic bahavior for large/small payoffs and establish sharp global estimates for the price.