

Constraints

We develop a duality approach to study a family's optimal consumption, portfolio choice and life insurance purchase when the family receives deterministic labor income which may be terminated due to premature death or retirement of the family's wage earner. The family faces a borrowing constraint and the wage earner has an uncertain lifetime. We establish the existence of an optimal solution to the optimization problem and solve the problem explicitly for several cases.

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CP12**Optimal Dividend Payments for the Piecewise-Deterministic Compound Poisson Risk Model**

This work deals with optimal dividend payment problem for a piecewise-deterministic compound Poisson insurance risk model. The objective is to maximize the expected discounted dividend payout up to ruin time. When the dividend payment rate is restricted, the value function is shown to be a solution of the corresponding HJB equation. For the case of unrestricted payment rate, the value function and an optimal barrier strategy are determined explicitly with exponential claim size distributions.

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CP13**On the Credit Risk of Secured Loans**

We use stochastic control techniques to analyze the credit risk of secured revolving loans, whose collateral cannot be liquidated immediately. The objective function is a trade-off between the expected loss due to a liquidation event and the shortfall due to the borrower drawing on the credit line less than the full amount available. We exhibit the lender's optimal strategies and compare them with the standard LTV-based lending policy favored by practitioners.

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CP13**Conditional Expected Default Rate Calculations****for Credit Risk Applications**

Calculation of portfolio loss distributions for large numbers of correlated losses (e.g. credit risk applications) typically use brute force Monte Carlo simulation. We use an asymptotic probabilistic model based on the Central Limit Theorem for solving the portfolio risk aggregation problem for credit risky portfolios. We then prove a theorem that enables efficient computation of the conditional expectation of the default rate for any subportfolio, conditioned on the total portfolio loss. This theorem enables us to solve the capital allocation problem (using expected shortfall as the risk measure) without resorting to Monte Carlo simulation. The approach is very efficient, even for portfolios with several million positions.

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CP13**Measure Changes for Reduced-Form Affine Credit Risk Models**

We consider a reduced-form credit risk model, with default intensity driven by an affine process. We fully characterize the family of all locally equivalent probability measures which preserve the structure of the model, providing necessary and sufficient conditions on their density process. In particular, this allows for a rigorous treatment of diffusive and jump-type risk premia. As an application, we characterize the family of all risk-neutral measures for a jump-to-default Heston model.

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CP13**Killed Brownian Motion with a Prescribed Lifetime Distribution and Models of Default**

The inverse first passage time problem asks for some distribution whether there is a barrier such that the first time a Brownian motion crosses the barrier has the given distribution. We consider a 'smoothed' version of this problem in which the first passage time is replaced by the first instant that the time spent below the barrier exceeds an independent exponential random variable. We show that any distribution results from some unique barrier.

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CP13**Analysis of Recovery Rate of Non-Performing Consumer Credit**

There have been more studies on recovery rate modeling of bonds than on recovery rate modeling of personal loans and retail credit. Little to no research have been conducted on recovery rates in non-performing retail credit with emphasis on third-party buyers. From an empirical point of view, in order to analyze the recovery rate distributions across the different industries, over nine million defaulted or non-performing consumer credit data provided by a German

debt collection company are used. A variety of statistical and data mining methods will be examined with respect to prediction and classification. A two-stage model which first classifies debts as extreme or non-extreme with respect to recovery rate is applied; then, the extreme debts are classified into full payment and non-payment. Moreover, the non-extreme recovery rates are predicted in the entire unit interval $[0,1]$.

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CP13

Maximum Likelihood Estimation for Large Interacting Stochastic Systems

Parameter estimation for a large system is facilitated by use of the asymptotic SPDE to which the system weakly converges. Standard particle filtering methods are often not applicable for parameter estimation of the SPDE. A method of moments reduces the SPDE into an SDE system. We then develop a particle filtering method for the SDE system. Theoretical convergence of the finite system's likelihood to the asymptotic likelihood is discussed. Important credit risk and mortgage applications motivate the method.

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MS1

Price Dynamics in Limit Order Markets: Limit Theorems and Diffusion Approximations

We propose a queueing model for the dynamics of a limit order book in a liquid market where buy and sell orders are submitted at high frequency. We derive a functional central limit theorem for the joint dynamics of the bid and ask queues and show that, when the frequency of order

arrivals is large, the intraday dynamics of the limit order book may be approximated by a Markovian jump-diffusion process in the positive orthant, whose characteristics are explicitly described in terms of the statistical properties of the underlying order flow [Cont Larrard 2011]. This result allows to obtain analytical expressions for the probability of a price increase or the distribution of the duration until the next price move, conditional on the state of the order book and characterize various other quantities as solutions of elliptic PDEs in the positive orthant [Cont Larrard 2012]. Our results allow for a wide range of distributional and dependence assumptions in the orders and apply to a wide class of stochastic models proposed for order book dynamics, including Poisson point processes, self-exciting point processes [Cont, Andersen Vinkovskaya 2011] and models of the ACD-GARCH family.

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MS1

Information and the Value of Guaranteed Trade Execution

In many markets, uncertainty about whether a trade is executed can be removed by paying a price premium. We use financial markets as a particular setting in which to study this trade-off. In particular, we assess the role of information in the choice between certain trade at a price premium in an intermediated market such as a dealer market or a limit order book and contingent trade in a dark pool. Our setting consists of intrinsic traders and speculators, each endowed with heterogeneous fine-grained private information as to an assets value, that endogenously decide between these two venues. We solve for an equilibrium in this setting, and address three main questions: First, we illustrate how the choice between certain and contingent trade depends on information available to an individual agent, as well as the overall distribution of information across all agents. Second, we analyze how the premium for certain trade over contingent trade affects the strategic behavior of traders. Finally, we demonstrate how the option for contingent trade affects the ability of intermediating market makers to set transaction costs to maximize profit.

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MS1

Mean-variance Optimal Adaptive Order Execution and Dawson-Watanabe Superprocesses

It is well-known that the mean-variance optimization of adaptive order execution strategies is not dynamically consistent. By localizing the mean-variance criterion, one is led to the optimization of the mean versus quadratic variation, which is a dynamically consistent stochastic control problem with fuel constraint. We show how this latter