Friday ***6.1.2017*** ***Chairman***

9:20 - 9:50 *registration* *T. Tichý↓*

9:50 - 10:40 Josef Teichmann · `ETH Zurich, Switzerland`

Bayesian Finance

We consider an abstract two filtration setting to model large financial markets: the trader is using information from the smaller filtration whereas the price process is adapted to the larger filtration. We present an FTAP extending seminal work of Kabanov-Stricker in the discrete time setting for small markets. We show that this modeling approach applies to many important real world situations including model uncertainty, non-semimartingale models, Bayesian calibration, etc. (joint work with Christa Cuchiero and Irene Klein).

10:50 - 11:40 Jan Večeř · `KPMS MFF UK, Prague, CZ`

Maximum Return Portfolio

Traditional portfolio optimization based on Markowitz maximizes the return of the portfolio subject to volatility constraints. This leads to a very diversified selection of assets. This model assumes that the parameters (mean and standard deviation) are stable and do not change with time. However, if we use the same stability assumption, in a long run it is optimal to be fully invested in an asset with the maximal return. This is a trivial consequence of the Law of Large Numbers which assures that the average return will ultimately converge to the expected return. We apply this basic idea on several major indices. The main challenge is that the expected return is not directly observable variable and the corresponding intervals are rather broad. Thus we have several candidate assets for the maximal return choice.

11:40 - 13:40 *lunch time* *J. Večeř↓*

13:40 - 14:30 Bohdan Maslowski · `KPMS MFF UK, Prague, CZ`

Stochastic PDEs driven by Volterra type noise

The talk is based on joint results with P. Coupek, T. E. Duncan, B. Pasik-Duncan and J. Snuparkova. SPDEs in which the noise is Volterra process are discussed. Examples of such processes are cylindrical fractional Brownian motion or more generally, cylindrical mutifractional Brownian motion (in the Gaussian case) or Rosenblatt process (in the non-Gaussian case). Under appropriate hypotheses generalizing the classical ones (for Wiener process), measurability and continuity of the solution to the corresponding linear equation (i.e. of the stochastic convolution integral) are shown. In the second part, bilinear noise is considered. Existence, uniqueness and large time behavior of solutions are discussed in the cases of linear and semilinear drift term.

14:40 - 15:30 Mark Brown · `Columbia University, USA`

Taylor's Law via Ratios, for Some Distributions with Infinite Mean

Taylor's law (TL) originated as an empirical pattern in ecology. In many sets of samples of population density, the variance of each sample was approximately proportional to a power of the mean of that sample. In a family of nonnegative random variables, TL asserts that the population variance is proportional to a power of the population mean. TL, sometimes called fluctuation scaling, holds widely in physics, ecology, finance, demography, epidemiology, and other sciences, and characterizes many classical probability distributions and stochastic processes such as branching processes and birth-and-death processes. We demonstrate analytically for the first time that a version of TL holds for a class of distributions with infinite mean. These distributions and the associated TL differ qualitatively from those of light-tailed distributions. Our results employ and contribute to methodology of Albrecher and Teugels (2006) and Albrecher, Ladoucette and Teugels (2010). This work opens a new domain of investigation for generalizations of TL. This work is joint with Professors Joel Cohen and Victor de la Peña.

15:40 - 16:30 Christa Cuchiero · `University of Vienna, Austria`

Cover's Universal Portfolio, Stochastic Portfolio Theory and the Numéraire Portfolio

Cover's celebrated theorem states that the long run yield of a properly chosen "universal"constant rebalanced portfolio is as good as the long run yield of the best *retrospectively chosen* constant rebalanced portfolio. The "universality"pertains to the fact that this result is *modelfree*, i.e., not dependent on an underlying stochastic process. We extend Cover's theorem to the setting of stochastic portfolio theory as initiated by R. Fernholz: the rebalancing rule need not to be constant anymore but may depend on the present state of the stock market. This result is complimented by a comparison with the log-optimal numéraire portfolio when fixing a stochastic model of the stock market. Roughly speaking, under appropriate assumptions, the optimal long run yield coincides for the three approaches mentioned in the title. We present our results in discrete as well as in continuous time. The talk is based on joint work with Walter Schachermayer and Leonard Wong.

16:30 - 16:50 *coffee break* *J. Swart↓*

Friday ***6.1.2017*** ***Chairman***

16:30 - 16:50 *coffee break* *J. Swart↓*

16:50 - 17:40 Tomáš Tichý · `Technical University of Ostrava, CZ`
Jiří Hozman · `Technical University of Liberec, CZ`

Implementation of DG solver for selected Exotic options

DG solver is a promising method for solution of complex PDE systems. It might be suitable for pricing of selected exotic options as well. The presentation is focused on three types of path-dependent options on two assets. After general introduction to the topic and review of current knowledge about (Exotic) option pricing and suitable methods, we focus on numerical approach via DG method and design and analyze a scheme for valuation of (A) barrier, (B) Asian, (C) lookback options on two assets. We also present some numerical experiments using real market data.

17:50 - 18:40 Karel Kadlec · `KPMS MFF UK, Prague, CZ`

Ergodic Control for Lévy-driven stochastic evolution equations

In this contribution, controlled linear stochastic evolution equations driven by square integrable Lévy processes are studied in the Hilbert space setting. The control operator may be unbounded which makes the results obtained in the abstract setting applicable to parabolic SPDEs with boundary or point control. The first part contains some preliminary technical results, notably a version of Itô formula which is applicable to weak/mild solutions of controlled equations. In the second part, the ergodic control problem is solved: The feedback form of the optimal control and the formula for the optimal cost are found. As examples, various parabolic type controlled SPDEs are studied.

18:50 - 19:30 Petr Dostál · `KPMS MFF UK, Prague, CZ`

Robust filtering and log-optimal trading

We consider an agent interested in estimating of the rates of the return of several risky assets. We use robust filtering method based on Bayesian principle and provide a corresponding link to long run log-optimal trading in a frictionless market. The obtained results (in continuous time) are quite general and the model admits some kind of external information observed in time. It is a joint work with Tibor Mach.

19:30 - 22:00 *dinner*

Saturday ***7.1.2017***

9:15 - 9:30 *tea* *P. Dostál↓*

9:30 - 10:20 Jan Swart, Vít Peržina · `ÚTIA AS CR (AV ČR), Prague, CZ`

The Stigler-Luckock model with market makers

The Stigler-Luckock model is a simple stochastic model for the evolution of an order book on a stock market. It has been introduced at least four times independently, by Stigler (1964), Luckock (2003), Plačková (2011), and Yudovina (2012). In its simplest form, the model is unrealistic for a number of reasons. One of the most unrealistic features of the model is that the spread is huge, most of the time, and the volume of trade is much higher than predicted by classical theory of equilibrium markets going back to Walras (1874). In this talk, we will show how the introduction of market makers reduces the spread and the volume of trade, while retaining many of the pleasant properties of the original model, such as explicit formulas for the equilibrium distribution of the bid and ask prices. In particular, we are able to calculate the number of market makers needed to achieve a perfectly liquid market in which the spread is zero (in the continuum limit) or given by the tick size (in discrete models).

10:30 - 11:20 Martin Šmíd · `ÚTIA AS CR (AV ČR), Prague, CZ`

On Distribution of a Generalized Luckock Model of a Limit Order Market

11:30 - 12:20 Fima Klebaner · `Monash University, Australia`

Alternative models in finance

The Black-Scholes formula has been derived under the assumption of constant volatility in stocks. In spite of evidence that this parameter is not constant, this formula is widely used by the markets. It is therefore natural to ask whether a model for stock price exists such that the Black-Scholes formula holds while the volatility is non-constant. In this talk I will review a number of results on the existence of alternative models in option pricing and beyond. Joint work with Kais Hamza, Olivia Mah and Jie Yen Fan.

12:20 - 14:00 *lunch time*