Schmidt, T. (Freiburg, Germany) — **The valuation of insurance products linked to financial markets.**

The valuation of insurance products and the pricing of financial products is one of the major achievements of probabilistic methods in the last 50 years. A large variety of non-linear pricing rules has been developed for insurance products and the fundamental theorems of asset pricing form the core for modern financial pricing approaches via risk-neutral pricing. In recent years, robustifying these methods has also lead to a variety of non-linear pricing rules.

However, the pricing of insurance contracts where the payoff is linked to classical financial products or traded securities seems to be less developed. In this talk we shed some light on possible approaches. Furthermore we present two recent papers, coauthored with L. Ballotta, E. Eberlein and R. Zeineddine on valuing variable annuities and with P. Artzner and K.-T. Eisele on extensions of risk-neutral pricing measures to non-traded assets.

In the first paper, we propose a market-consistent valuation framework for variable annuities with guaranteed minimum accumulation benefit, death benefit and surrender benefit features. The setup is based on a hybrid model for the financial market and uses time-inhomogeneous Lévy processes as risk drivers, leading to explicit analytical formulas. We illustrate the tractability of this approach by means of a detailed sensitivity analysis of the price of the variable annuity and its components with respect to the model parameters.

In the second paper, we study how to extend risk-neutral pricing measures in a natural way to non-traded assets like financial products. We embed the approach in a continuous-time two-filtration approach and show that absence of arbitrage could be violated in this setting and propose conditions to guarantee that this is not the case. Market-consistent and time-consistent pricing rules are given as well as non-linear extensions.