Preface

In ancient times, risk was viewed simply as the will of the gods. And tempting fate was only a way that man could anger the gods (Bernstein 1996). But in the seventeenth century, Blaise Pascal and Pierre Fermat set the mathematical foundations for modern-day probability theory. It was not until the following century that another mathematician, Daniel Bernoulli (1738), pointed out how decisions made in the face of risk were not typically based only on the expected outcomes. Indeed, Bernoulli illustrated how a diminishing marginal valuation of additional wealth could explain an aversion to risk taking. Bernoulli's insight is still relevant today with regards to risk aversion, which is the most basic of all risk attitudes. Similarly, the second moment of any risky distribution of monetary payoffs was relevant as one measure of risk in decision making.

Only more recently did we realize that characteristics of risky distributions rely on more than just its moments. Likewise, attitudes towards taking a given risk depend on more than simple risk aversion. Stochastic dominance and other strong partial orderings of risky distributions led the way to developing stronger risk measures, which could then be used to choose among various risky alternatives. Likewise, attitudes towards higher orders of risk can play a crucial role in analyzing decisions made among risky choices.

The related topics of risk measures and risk attitudes were the focus of a small conference held at the Ludwig-Maximilians University in Munich in December 2010. Several of the papers either presented at that conference or generated by discussions during the meetings are included in this Symposium volume.

In the first chapter, Patrick Cheridito, Samuel Drapeau and Michael Kupper establish a quasi-convexity duality setting for comparing risky distributions (lotteries) that have a compact support. The authors introduce specific types of lower semicontinuity that allow for a convenient functional form in these comparisons and for a robust representation of risk preferences on lotteries with compact support. As a useful illustration, the authors model "Value at Risk" as a functional on a space of lotteries.

Michel Denuit, Louis Eeckhoudt, Ilia Tsetlin and Robert Winkler examine next multivariate stochastic dominance as a tool for partially ordering risky alternatives.

The authors provide definitions of multivariate risk averse and multivariate risk seeking based on stochastic dominance relationships. These definitions are used to reveal some interesting properties of additive or multiplicative background risks. The approach taken here is compared to several other stochastic orders that appear in the literature.

In the third chapter, Jörn Dunkel and Stefan Weber consider some issues in looking at the downside risk associated with potential default in credit markets. They show how the current industry standard Value-at-Risk models do not adequately measure the level of risk and how the introduction of well-defined, tail-sensitive shortfall risk measures (SR) can dramatically improve both the management and the regulation of credit risk. In particular, the authors introduce a novel Monte Carlo approach for the efficient computation of SR by combining stochastic root-approximation algorithms with variance reduction techniques.

Finally, Claudio Fontana and Wolfgang Runggaldier examine a class of Itô-process models for investment markets for which local martingale measures might not exist. In this setting they discuss several notions of no-arbitrage and discuss several sufficient and necessary conditions for their validity in terms of the integrability of the market price of risk process and of the existence of martingale deflators. This is connected to the Growth-Optimal-Portfolio (GOP), which can be explicitly characterized in a unique way and possesses the numéraire property (i.e. all admissible processes when denominated in units of the numéraire are supermartingales). Another major issue of this chapter is the valuation and hedging of contingent claims. In particular, the authors show that financial markets may be viable and complete without the existence of a martingale measure. Contingent claims can be then evaluated by using for example real-world pricing, upper-hedging pricing or utility indifference valuation. In the case of a complete financial market model, these three methods deliver the same valuation formula, given by the GOP-discounted expected value under the original (real-world) probability measure. Some of the results presented in this chapter are already well known. However the authors add also in this case new interesting contributions to the established theory by providing simple and transparent proofs by exploiting the Itô-process structure of the underlying model.

Overall, the papers presented in this volume show how modern theory now incorporates newer approaches to both risk measures and to risk attitudes. They also provide useful illustrations of how these two concepts are inevitably intertwined. Over the coming year, the integrative nature of these concepts will likely become even more transparent. We hope that the reader will find the topics included in this Symposium volume of interest; and we hope that this interest translates into further journeys into this fertile area of research.

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