Berlin Mathematical School

BMS Friday Colloquium

Friday 3 February 2012 at 14:15

Tea before the lecture begins at 13:00

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Michael Kupper

(HU Berlin)

Risk, model uncertainty and nonlinear expectations

Risk is a colloquial and widely used term. There exist many different understandings and interpretations of risk depending on the underlying context, and there are numerous ad-hoc quantitative instruments matching one or another specific dimension of risk (mean, standard deviation, quantile, etc.). Due to this plurality of interpretations of risk, Michael Kupper will concentrate on context-invariant features related to this notion: diversification and monotonicity. He then will define and study general properties of risk measures and provide a uniquely characterized dual robust representation, which allows for an interpretation of risk perception in different settings. Within the setting of random variables, where risk perception can be viewed as model risk, he will illustrate the robust representation by means of several examples.

Closely related to risk measures is the notion of Peng's g-expectation, which is a nonlinear expectation. In a dynamic setting, where the uncertainty is spanned by a Brownian motion, Kupper will discuss the link between g-expectations and backward stochastic differential equations (BSDE). He will give existence, uniqueness and stability results of supersolutions of BSDEs. Unlike usual BSDE methods that are based on fixed point theorems, the results rely on compactness methods. A robust representation allows for a connection of minimal supersolutions with nonlinear expectations and risk measures by providing an interpretation in terms of model uncertainty.

In the last part of the talk Kupper will discuss model uncertainty, where the considered probability models are no longer dominated by a reference probability measure. This is for instance the case, if the uncertainty is spanned by a G-Brownian motion, which corresponds to volatility uncertainty. Within this framework, he will again show the existence of supersolutions of BSDEs, and illustrate the results by studying the problem of hedging under volatility uncertainty.

The talk is based on joint works with Samuel Drapeau and Gregor Heyne.

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