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Stability of stochastic programs specified by distortion risk measures with the application in the game theory

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In this paper, we deal with the stability of stochastic programming problems that are specified by distortion risk measures. The distortion risk measure is a specific type of risk functional that is defined as the Choquet integral of a random variable with respect to distorted probability measure. The distortion of the probability measure is governed by a distortion function that encodes the agent's "distorted perception" of the true probability measure. Distortion risk measures characterize risk functionals that are monotone with respect to first-order stochastic dominance. This class of risk measures covers most of the commonly used risk measures, in particular, all coherent risk measures are distortion risk measures. The stability of stochastic programming problems has been in great extent covered by the work of Werner Römish. Our goal is to extend this work to stochastic programs that are specified in terms of some distortion risk measures. The main results of this paper are qualitative and quantitative conditions for the stability of such programs. We formulate these conditions in terms of program-canonical distances on the sets of probability measures, but we also show the conditions for the stability with respect to risk-neutral version of these distances that correspond to distances used by Römish. We apply these results to the problem of finding generalized equilibria in the model of a game with random payoff.

Authors: RAČKO, Lukáš (Charles university); Prof. LACHOUT, Petr (Charles University)

Orateur: RAČKO, Lukáš (Charles university)

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