Title: Multivariate stochastic dominance and its application in portfolio optimization Problems

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Abstract: This thesis discusses the concept of multivariate stochastic dominance, which serves as a tool for ordering random vectors, and its possible usage in dynamic portfolio optimization problems. We strictly focus on different types of the first-order multivariate stochastic dominance for which we describe their generators in the sense of von Neumann-Morgenstern utility functions. The first one, called strong multivariate stochastic dominance, is generated by all nondecreasing multivariate utility functions. The second one, called weak multivariate stochastic dominance, is defined by relation between survival functions, and the last one, called the first-order linear multivariate stochastic dominance, applies the first-order univariate stochastic dominance notion to linear combinations of marginals. We focus on the main characteristics of these types of stochastic dominance, their relationships as well as their relation to the cumulative and marginal distribution functions of considered random vectors. Formulated stochastic dominance rules for specific distributions are substantial part of the application of multivariate stochastic dominance in portfolio selection. In the thesis we present two dynamic optimization problems, multiperiod and multistage, with multivariate stochastic dominance constraints. We compare the obtained results of both tasks with their traditional counterparts which employ the first-order univariate stochastic dominance constraints at each time instant. Multivariate stochastic dominance is also closely connected with the concept of multivariate risk premiums. We also pay attention to this topic in the thesis. The newly introduced type of multivariate risk premiums is incorporated in multistage portfolio selection problem. Our computational results confirm usefulness of the presented procedures, as well as give additional insights into the behavior of more complex models.