Robust portfolio allocation under dependence uncertainty

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In this paper, we present a solution to the problem of robust portfolio allocation for an investor facing uncertainty with respect to the dependence between risky assets' returns. We use the Multiplier Preferences framework to build a decision criterion which is robust to this uncertainty and we use copulas to model general dependence structures without additional assumptions. We study the properties of this robust portfolio allocation problem and prove the existence and unicity of its solution. Then, using Bernstein copulas, we devise a solvable approximate version. We prove the existence and unicity of the solution to the approximate problem. We then prove the convergence of the approximate solution to the exact solution when the discretization gets finer. In a numerical study, we provide comparative statics of the relationship between the level of ambiguity aversion and the robust allocations. We find that our robust portfolios are less diversified compared to the standard max-expected utility or maximum Sharpe ratio portfolios. The magnitude of this effect is driven by the level of ambiguity aversion of the considered agent. Finally, in a simulation study, we evidence the robustness of the obtained portfolios against the discovery of the true dependence model.