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Ambiguous Jumps, Fears and Robust Portfolio Strategies

Abstract

A number of empirical and theoretical studies have documented that jump risk has a substantial impact on portfolio selection. Given that jumps are inherently infrequent, it is difficult to estimate jump models with adequate precision. This paper presents a novel approach to the optimal portfolio selection problem in a potentially large financial market for an investor who faces both diffusion and jump risk and who is averse not only to the risk of loss but also to the uncertainty associated with jumps. More specifically, we develop a pathwise optimization procedure based on martingale methods and minimax results to solve for the probability of the worst scenario and for the optimal portfolio strategy in jump-diffusion models. Our results show how an ambiguity averse investor fears ambiguous jumps by attaching more weight to the likelihood of adverse events. Finally we apply our theoretical results to a model consisting of three international indices to examine the model uncertainty and properties of the optimal portfolio choices. Our calibration exercise illustrates that it is hard to distinguish the reference model statistically from a set of alternative models and model uncertainty significantly affects the optimal portfolio weights.