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Title: “Uncertainty Propagation and Dynamic Robust Risk Measures”

Abstract

define dynamic uncertainty sets designed explicitly for discrete stochastic processes over a finite time horizon. These dynamic uncertainty sets capture the uncertainty surrounding stochastic processes and models, accounting for factors such as distributional ambiguity. Examples of uncertainty sets include those induced by the Wasserstein distance and f-divergences.

We further define dynamic robust risk measures as the supremum of all candidates' risks within the uncertainty set. In an axiomatic way, we discuss conditions on the uncertainty sets that lead to well-known properties of dynamic robust risk measures, such as convexity and coherence. Furthermore, we discuss the necessary and sufficient properties of dynamic uncertainty sets that lead to time-consistencies of robust dynamic risk measures. We find that uncertainty sets stemming from f-divergences lead to strong time-consistency while the Wasserstein distance results in a new

notion of non-normalised time-consistency. Moreover, we show that a dynamic robust risk measure is strong or nonnormalized time-consistent if and only if it admits a recursive representation of one-step conditional robust risk measures arising from static uncertainty sets.

This is joint work with Marlon Moresco and Melina Mailhot from Concordia University.