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Incorporating Climate Risk into Portfolio Credit Risk Models via Distortion

Regulatory requirements are evolving towards mandating financial institutions to estimate and report their climate-related financial risks. Climate risks classify into two broad categories — physical and transition — and, being medium- to long-term in nature, they are important risk factors for credit portfolios. Threshold models for portfolio credit risk specify account level models with both systematic and idiosyncratic effects. These aggregate to generate the portfolio loss distribution from which risk metrics are calculated. Augmenting the systematic factor with climate factors is one method to incorporate climate risk into existing models. Distortion provides a method for re-weighting a probability distribution. The amount of deformation depends on the choice of distortion function and its parameter. Here, we propose distortion as a way of incorporating climate risk into existing credit risk models. Some properties of the distorted credit risk models are derived and explored. The connection between distortion functions and constrained relative entropy optimisation provides insight into distortion function structure and parameter values. This is joint work with Arie Zeldenrijk, Mark Drmac, and Walid Mnif.