



Beyond Single Company Risk Disclosure – Exploring the Efficient Frontier in Physical Risk Reporting

Victor Wattin Håkansson^{1,2}, Sarah Hülsen^{1,2}, Simona Meiler^{1,2}, Leonie Villiger^{1,2}, Chahan M. Kropf^{1,2}, Jamie W. McCaughey^{1,2}, and David N. Bresch^{1,2}

¹Institute for Environmental Decisions, ETH Zurich, Zurich, Switzerland

²Federal Office of Meteorology and Climatology MeteoSwiss, Zurich, Switzerland

Climate change is intensifying natural hazards, significantly increasing financial risks for businesses and stakeholders. This shift in physical risk is transforming companies' risk-return profiles and driving the need for transparent risk disclosure, in line with the guidelines from the Task Force on Climate-Related Financial Disclosure (TCFD; now further developed as IFRS S2). Despite many companies beginning to disclose risks, standardization efforts by regulatory bodies are still evolving. The varied and proprietary nature of climate risk information from commercial providers has hindered transparency and accessibility in risk scoring. This complicates the comparison and evaluation of risks, as well as the aggregation of risks at the portfolio level. Additionally, the scarcity of natural catastrophe models in non-OECD countries and the need for a globally consistent framework incorporating future climate scenarios pose further challenges.

Our study introduces an event-based reporting approach to address these challenges in climate risk disclosure. Companies are required to report modeled financial impacts of standardized hazard sets, including both gross and net risks due to their insurance protection. This method offers a solid foundation for risk metrics, risk-return profiling, and inter-comparison of risks at both individual company and portfolio levels. Leveraging CLIMADA (CLIMate ADaptation), an open-source climate risk assessment platform, we create a globally consistent, interoperable framework with reference hazard event sets for main perils under current and future climate conditions, accessible through a data API.

By applying this method to the balance sheets of hypothetical multinational companies, we effectively assess financial risks and perform risk-return analyses, demonstrating the approach's practicality and potential in climate risk management and disclosure. We show, for instance, the potential for evaluating sectoral and cross-sectoral risk, which is only visible in the cross-company risk profile, and how portfolio risks due to spatial correlations can be captured.