

# MODELING OPERATIONAL RISK USING EXTREME-VALUE THEORY AND COPULAS

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## **Abstract**

The aim of this thesis is to provide a mathematical framework to the analysis of operational losses. The analysis is done both at the enterprise and business line / event type level. We first model the marginal distributions of losses using Extreme Value Theory. Then, under the Basel II assumption of perfect dependence between the business lines, we calculate the capital charges and analyze their sensitivities to some parameters. Practical conclusions regarding operational risk management are drawn. Then we focus on the dependencies of the business lines using copulas, present and compare several families of multivariate copulas. We analyze the behavior of capital charges with regards to the dependence structure, and give guidelines when infinite-mean models are involved.