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Bounds on total economic capital: the DNB case study

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Abstract Most banks use the top-down approach to aggregate their risk types when computing total economic capital. Following this approach, marginal distributions for each risk type are first independently estimated and then merged into a joint model using a copula function. Due to lack of reliable data, banks tend to manually select the copula as well as its parameters. In this paper we assess the model risk related to the choice of a specific copula function. The aim is to compute upper and lower bounds on the total economic capital for the aggregate loss distribution of DNB, the largest Norwegian bank, and the key tool for computing these bounds is the Rearrangement Algorithm introduced in Embrechts et al. (2013). The application of this algorithm to a real situation poses a series of numerical challenges and raises a number of warnings which we illustrate and discuss.

Keywords Model risk · Risk Aggregation · Total economic capital · Value-at-Risk · Diversification benefit · Rearrangement Algorithm.

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1 Introduction

Pillar 1 (Minimum Capital Requirements) of the Basel II capital framework calculates the overall minimum capital requirement of a bank as the sum of marginal capital requirements for credit, operational and market risk. Basel II

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