

## **A Mixture Model Approach to Operational Risk Management**

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Operational risk is defined as ‘the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events’ by the Basel Committee on Banking Supervision (BCBS). Modeling and quantification of operational risk are now required by the Basel II Accord and have become a critical part of the risk management of a financial institution. A general approach is to use the so-called Loss Distribution Approach (LDA) in which events per year (frequency) and the loss per event (severity) are separately described using statistical probability distributions for each of the units of measure. The distributions are then combined using copulas and Monte Carlo Simulation (or similar alternatives) to develop a view range and probability of total annual losses such that capital requirements can be calculated. In this paper, we propose a mixture model approach to model and quantify the loss frequency and severity and the dependency between the units of measure. Under our approach there is no need to use a copula and the use of Monte Carlo simulation is minimal. Using real loss data from the Operational Riskdata eXchange Association (ORX), we demonstrate the efficiency and accuracy of the approach.

Key Words: Operational risk, loss frequency and severity, dependence, mixture model