

DIRECTED RISK RESEARCH PROBLEM STATEMENT

Risk Theme	Operational Risk	Problem Nr.	PS16005
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Client Name	John Wessels	Client Org.	MiWay		
Designation	Actuarial Analyst				
E-mail	JohnWe@miway.co.za	Tel (w)	0860 646 464	Mobile	083 533 9896

PROJECT TITLE: Parameter dependence in collective risk models

PROJECT GOAL:

Develop the necessary theory and investigate the uses of collective risk models with dependence structures based on the dependence of the parameters of the underlying distributions and compare this approach to commonly used approaches.

HIGH LEVEL DESCRIPTION OF PROBLEM:

Collective risk models are commonly used to model risks where it is useful to model the frequency and severity distributions separately. For a portfolio of “n” risk groups, we may model the frequency and severity of losses in each risk group separately (a common example of this is a compound Poisson model). In order to determine the joint distribution of the aggregate losses (the sum of the losses across all risk groups), we need to determine the dependence structure between the risk groups. The joint distribution is necessary to simulate aggregate losses from the portfolio of risks for example to determine a value at risk.

The most common approach in the literature to model the dependence structure between the risk groups is to fit a copula on the losses between different risk groups.

The aim of this project is to investigate an alternative approach to modeling the dependence structure which assumes that the dependence structure can be modeled by assuming the parameters of the underlying distributions are dependent.

The model can be used to simulate aggregate losses from a portfolio of dependent risks. This may be useful in a number of different applications for example determining a VaR in operational risk models where it is necessary to determine a dependence structure.

PROJECT OBJECTIVES:

The objective of this project is to investigate an alternative approach to modeling the dependence structure in collective risk models, for example:

- Dependence between the frequency parameters of losses in the different risk groups
- Dependence between the severity parameters of losses in the different risk groups
- Dependence of frequency and severity parameters within a particular risk group
- Dependence between frequency and severity parameters across different risk groups

OUTPUTS REQUIRED:

- A paper in the academic financial literature
- Practical Guidance to the industry on local / international best practice

STRATEGIC VALUE TO DIRECTED RISK RESEARCH:

This research will contribute conceptually and materially towards competency in the financial services industry in South Africa.