

A Numerical Conversion from Multiple Decrement Rates to Absolute Rates of Decrements



SPEAKER

Taewon Lee

Professor,
Dept. of Applied Math & Statistics,
SUNY Korea

**MONDAY**

25, March 2024

**TIME**

6:30 pm–7:30 pm

**LOCATION**

B105

Modeling interactions of competing risks affecting the occurrence of various decrements such as death or disease is a critical issue in survival analysis and actuarial science. It is essential to incorporate multiple decrements for offering various coverages in an insurance contract. Popular assumptions for the construction of decrement models are uniform distributions of decrements (UDD) in a multiple decrement table (MDT) and associated single decrement tables (ASDT). Whereas the conversion from absolute rates of decrements in ASDT to multiple decrement rates in MDT under the UDD assumption has an explicit formula, extracting absolute rates from multiple decrement rates becomes solving a system of non-linear equations. A novel numerical algorithm using a fixed point iteration method for searching a solution of the system of equations is proposed. The proposed numerical algorithm to obtain absolute rates of decrement from observed probabilities of decrement makes it possible to estimate a new multiple-decrement table from an old multiple-decrement table with some risk factors to be removed. The algorithm delivers reliable results in terms of efficiency and accuracy. The proposed algorithm is proved to be a stable algorithm that never diverges out of range of probability during the iterations. The self-mapping property in iteration is expected to lead to prove the existence of a solution of the system of equations.