

# A unisex stochastic mortality model to comply with EU Gender Directive

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April 14, 2015

## Abstract

EU Gender Directive ruled out discrimination against gender in charging premium for insurance products. This prohibition prevents the use of the usual actuarial fairness principle used to price life insurance products, with an evident negative effect on pricing efficiency. As a result, insurance companies aim first at solvency requirements, and then at competitiveness. According to current actuarial practice, unisex prices are calculated with a simple weighting rule that uses the quotes of insurance portfolio as weights. Up to our knowledge, there seems to be no unisex mortality models in the actuarial literature. In this paper we try to fill in this gap. Using fairness principles, we provide and calibrate a unisex stochastic mortality model for the mortality intensity that is underlying the pricing of a life portfolio of females and males belonging to the same cohort. We find that the weighting coefficient between the males' and females' own mortalities depends mainly on the age, the type of insurance product, the quote of portfolio relative to each gender. We investigate the impact of the correlation among the two mortality intensities on the weighting coefficient, and address the safety loading issue. Adoption of a proper unisex mortality model should result in improved competitiveness of insurance companies.

**Keywords.** Stochastic mortality, doubly stochastic processes, affine processes, cohort-based mortality intensity, EU Gender Directive, actuarial fairness.

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