

## Application of Stochastic Models on the Portuguese Population and Distortion to Workers Compensation Pensioners Experience

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**Abstract :** This research was motivated by a project requested by AXA on the topic of pensions payable under the workers compensation (WC) line of business. There are two types of pensions: the compulsorily recoverable and the not compulsorily recoverable. A pension is compulsorily recoverable for a victim when there is less than 30% of disability and the pension amount per year is less than six times the minimal national salary. The law defines that the mathematical provisions for compulsory recoverable pensions must be calculated by applying the following bases: mortality table TD88/90 and rate of interest 5.25% (maybe with rate of management). To manage pensions which are not compulsorily recoverable is a more complex task because technical bases are not defined by law and much more complex computations are required. In particular, companies have to predict the amount of payments discounted reflecting the mortality effect for all pensioners (this task is monitored monthly in AXA). The purpose of this research was thus to develop a stochastic model for the future mortality of the worker's compensation pensioners of both the Portuguese market workers and AXA portfolio. Not only is past mortality modeled, also projections about future mortality are made for the general population of Portugal as well as for the two portfolios mentioned earlier. The global model was split in two parts: a stochastic model for population mortality which allows for forecasts, combined with a point estimate from a portfolio mortality model obtained through three different relational models (Cox Proportional, Brass Linear and Workgroup PLT). The one-year death probabilities for ages 0-110 for the period 2013-2113 are obtained for the general population and the portfolios. These probabilities are used to compute different life table functions as well as the not compulsorily recoverable reserves for each of the models required for the pensioners, their spouses and children under 21. The results obtained are compared with the not compulsory recoverable reserves computed using the static mortality table (TD 73/77) that is currently being used by AXA, to see the impact on this reserve if AXA adopted the dynamic tables.

**Keywords :** compulsorily recoverable, life table functions, relational models, worker's compensation pensioners

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