The construction of multiple decrement models from associated single decrement experiences

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The actuarial science texts contain topics about the Multiple Decrement Theory and are very efficient speaking about the random variables of the time until termination from a status and their probability distribution.

The texts are also clear with the associated Single Decrement Tables and the basic relationship between a multiple decrement table and its associated single decrement tables, where the single force of decrement is equal to the force for that decrement in the multiple decrement models.

But the texts and other papers that describe the building of the single tables like the Mortality Table, are not extended enough to describe the method used to separate each decrement when they are dependent.

It is important, in many actuarial cases and in specific in the calculation of the reserves on the subject of Solvency II, established on a long term life contract, need to include the actuarial present value of the expected Cash Values and Insurance Options, in addition to the mortality and disability.

Besides, if we want to process a stress test, moving the termination rates or the mortality rates it will be required to make a change in the original used rates.

After more than 100 years using tables of one decrement on the determination of benefit reserve, we change to a more realistic expression in order to create a reserve that include an estimation of all the future liabilities.

With this approach, this paper tries to present the circumstances to use these models of Multiple Decrement, because we need to be experts on elaborating and handling them in a correct form, using the statistics principles of the competing status.

Besides, this paper tries to state situations when it is incorrect the use of single decrement external rates that were constructed without eliminate other dependent rate.

Keywords: Decrement, reserve, models, tables, mortality, cash values, insurance options