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# Forecasting Mortality in Related Populations Using Lee-Carter Type Models: A Comparison

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The level of mortality rates determines several aspects of our society. As a matter of fact, the private and public retirement systems, as well as other components of the social security system, are planned and modified according to the values assumed by mortality rates. A great number of models were proposed for evaluating mortality tables in future years. One of the most in influential model is that of Lee and Carter, which has received a great deal of attention and has been extended in several directions.

In this work the Lee-Carter model is taken as starting point for the mortality modelling of multiple populations. As the considered populations share some common characteristics, it is expected that the corresponding rates will display a similar behaviour. However, different populations have dissimilarities between them due for instance to economical, social and geographical factors. Therefore the selected populations should be considered linked but not equal, and a forecasting mortality model incorporating both the effect of common and specific factors is needed.

We test and compare ten mortality forecasting models for related populations. More precisely, we consider extensions of the standard Lee-Carter approach, where either the central death rates or the corresponding improvement rates are modelled. The models include common and population specific time indices and/or combinations of them. We apply this range of models to the Italian regions and perform a thorough comparison analysis. Finally, an actuarial application is presented.