Selected methods of mortality analysis focused on adults and the oldest age-groups

Abstract

Questions about human life span, longevity and mortality in general are natural to almost everyone. This Doctoral Thesis deals with one central question – whether some limit of human life span or of its improvements exists. It is rather a methodological work, therefore its aim is to introduce not only relevant theories but above all the methods usable in the mortality analysis focused on adults or the oldest-old. At the beginning the most important theories and opinions of scientist dealing with mortality are introduced. In the first half of the analytical part mainly the traditional and basic approaches are included. The theme of life tables is opened by an analysis of its construction in the Czech Republic, together with its possible modifications. As a result the independent macro code for the SAS software is attached in the electronic Appendix. This macro enables to calculate the unknown parameters of selected mortality laws by the method of weighted non-linear least squares and to produce the smoothed and extrapolated values of mortality rates. Using the individual life durations, life tables according to education attainment were constructed (also attached in the electronic Appendix).

In the second half of the work, there are several more sophisticated methods introduced. The first of them is analysis of the rectangularization process which is closely related to the life tables. The process is studied through several defined indicators. Many of them show the stagnation of their values during the latest years. Based on the results, the terms “derectangularization” and “shifting” were distinguished clearly. The process of mortality shifting was analyzed more in depth. Existence of this process is also the most important assumption in the analysis of tempo effects. In this work also the situation when this assumption does not hold was solved. Finally, the last methodological chapter was devoted to the frailty models, a concept related more to cohort data.

Only several methods were incorporated to this Thesis, those using period data. That opens the themes for future research in this field, oriented more on cohort and also more detailed or even individual data. All the methods in the Thesis were also applied to real data. Where possible, data from Eastern as well as Western or Northern European countries were used.

Key-words: mortality analysis, graphical methods, mortality laws, life tables, rectangularization process, tempo effect, frailty models, SAS