Age-Period-Cohort Model and its Application to Taiwan Mortality Rates by Marriage Status

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Summary

The life expectancies have been increasing significantly since the start of 20th century and the trends of mortality improvement are likely to continue in the 21st century. Because most the life insurance products are based on fixed mortality rates, the prolonging life expectancy becomes a major concern in designing life annuity products. The dynamic life tables and mortality models are one of the possible ways for dealing with the longevity risk. The Lee-Carter (LC) model is one of the popular mortality models, and several modifications have been proposed. Many modifications are based on modeling the differences of mortality risks with respect to effects of age, cohort, and period. But unlike the LC model, there are not many discussions regarding the estimation of the three effects. In this paper, we use computer simulation to evaluate the estimation methods of the age-period-cohort model, which is a frequently used method in epidemiology, and give suggestions to the estimation method of including the cohort effect into the LC model. In addition to the simulation, we also use the Taiwan mortality data by marriage status as a demonstration.

Keywords: Longevity Risk, Mortality Improvement, Age-Period-Cohort Model, Marriage Status, Simulation