Logistic Regression for Insured Mortality Experience Studies

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ABSTRACT

Insured population mortality estimation is essential to (re)insurers' developing liability expectations and maintaining required solvency capital. In practice, insured mortality measurement needs to deal with a broad range of data and analytical challenges. In this paper, we introduce a logistic regression-based modeling approach for analyzing the U.S. insured mortality experience, including at advanced ages where less credible experience data are available. As a validation, we create a version of industry basic experience tables based on the model-estimated mortality and compare them to standard industry experience tables produced by the Society of Actuaries (SOA). The conclusion is that properly designed logistic modeling processes can more efficiently utilize available data to deliver solutions for multiple needs, including: a) testing mortality drivers' statistical significances in explaining mortality variations; b) estimating normalized mortality slopes and mortality differentials such as how mortality increases by duration or varies between underwriting classes while product and attained-age distributions are controlled; and c) addressing analytical challenges such as extrapolating for ultimate mortality, smoothing between select and ultimate estimations, and constructing multidimensional basic experience tables.