

In this thesis we focus on modeling stochastic mortality and parameter risk in assessing mortality. We explore two mortality stochastic models for modeling the number of deaths in portfolio which consist of one or more than one cohort. We define the term mixture of distributions and introduce Beta-Binomial and Poisson-Gamma model. We address immediate life annuities and we apply Bayesian Poisson-Gamma model to quantify longevity risk on data. The obvious increasing trend of average lifetime leads insurance companies to greater protection against longevity risk. We show how to deal with solvency rules by internal models designed consistently with the requirement in the standard formula of Solvency II.