

 Mortality and Longevity

 Aging and Retirement

A Value-Based Longevity Index for Hedging Retirement Income Portfolios





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Abstract

The availability of a longevity index that closely tracks the value of longevity-linked liabilities has the potential to significantly lower the costs and improve the efficiency of index-based longevity hedging techniques relative to standard mortality rate indices currently referenced in financial markets. This paper presents a universal value-based longevity index constructed from US economic and population data. To construct the index and examine its effectiveness in hedging retirement income portfolios, a multi-population affine term structure model for mortality evolution is adopted, along with a dynamic Nelson-Siegel model for the dynamics of interest rates. We present numerical experiments demonstrating that the proposed hedging framework generates a material reduction in basis risk relative to indices based purely on mortality rates. Beyond longevity risk, the paper notes that interest rate and inflation risks can also materially influence the value of longevity-linked liabilities. Finally, the paper bridges the literature gap between continuous-time and discrete-time multi-population mortality models and notes that the two modelling frameworks suggest relatively comparable hedging outcomes.

Keywords: Value-based longevity index, longevity risk, interest rate risk, inflation risk, longevity basis risk, longevity hedging

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