Dynamic Longevity Hedging in the Presence of Population Basis Risk: A Feasibility Analysis from Technical and Economic Perspectives

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Abstract

In this paper, we study the feasibility of dynamic longevity hedging with standardized securities that are linked to broad-based mortality indexes. On the technical front, we generalize the dynamic delta-hedging strategies developed by Cairns (2011) to incorporate the situation when the populations associated with the hedger's portfolio and the hedging instruments are different. Our empirical results indicate that dynamic hedging can effectively reduce the longevity exposure of a typical pension plan, even if population basis risk is taken into account. This conclusion is found to be reasonably robust with respect to the choice of simulation models. On the economic front, we investigate the potential financial benefits of a dynamic index-based hedge over a bespoke risk transfer. By considering data from a large group of national populations, we found evidence supporting the diversifiability of population basis risk. It follows that for hedgers who intend to completely eliminate their longevity risk exposures, it may be more economical to hedge the underlying trend risk with a dynamic index-based hedge and transfer the residual basis risk through a reinsurance mechanism.

Keywords: Delta-hedging; Population basis risk; q-forward; Standardization

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