

A Generalized Graphical Risk Metric for Natural Hedging

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Abstract:

Under a natural hedging approach, life insurers can internally manage their longevity risk exposure between life insurance and annuities. Researchers have developed a variety of natural hedging strategies through the consideration of different mortality models, calibration methods and product types. Nevertheless, there has not been a universal risk metric that can aid hedgers to evaluate and compare the performance of different natural hedges. Adapting the graphical population basis risk metric developed for index-based longevity hedges, we propose a generalization to the graphical risk metric for natural hedging. Our generalized graphical risk metric is constructed by a series of adjusted joint prediction regions that represent the uncertainty underlying a certain product mix. It can not only be used to visually assess the level of basis risk between life insurance and annuity products, but also be utilized as an interpretable approach to compare different hedge calibration methods and analyze model risk in natural hedging. We apply the proposed graphical risk metric to different natural hedging strategies to illustrate its universal use in selecting the most appropriate hedge.

Keywords: Longevity risk management; Graphical risk measure; Basis risk; Product mix; Model risk

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