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## **Optimal hedging of demographic risk in life insurance and pensions**

### ***Abstract***

A Markov chain model is taken to describe the development of a multi-state life insurance policy or portfolio in a stochastic economic-demographic environment. It is assumed that there exists an arbitrage-free market with tradeable securities derived from demographic indices. Adopting a mean-variance criterion, two problems are formulated and solved. First, how can an insurer optimally hedge environmental risk by trading in a given set of derivatives? Second, assuming that insurers perform optimal hedging strategies in a given derivatives market, how can the very derivatives be designed in order to minimize the average hedging error across a given population of insurers? The talk comes with the caveat *emptor* that market operations should not be seen as the resolution to environmental risk in life and pensions insurance: they should rather be seen as a last resort if certain guarantees embedded in the contracts prove unsustainable.