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Yu Lin, Xiaoming Liu

Dynamic Population Structure with Stochastic Mortality and Fertility Rates

Yu Lin[1] *and Xiaoming Liu*[2]

[1]University of Western Ontario, London, Canada; ylin287@uwo.ca
[2]University of Western Ontatio, London, Canada; xliu@stats.uwo.ca

The impact of a stochastic population structure on the labour force stability is very important for pension risk management and investigated in this study. We propose a stochastic population structure model based on the Leslie matrix, in which we use a Lee-Carter model framework to describe the future mortality and fertility changes. This population structure model is then combined with investment return models to examine the impact of a Defined Contribution (DC) pension systems on the labour force stability, if the population follows the current changing patterns in mortality and fertility rates. U.S. population data from 1933-2008 is used to validate the population projection and dependency ratio (the ratio of retirees to workers) is calculated to illustrate the labour force stability over time.