The Simple Analytics of a Pooled Annuity Fund

John Piggott, Emiliano A. Valdez and Bettina Detzel
Faculty of Commerce and Economics
The University of New South Wales

20 October 2003

Abstract

This paper provides a formal analysis of payout adjustments from a longevity risk-pooling fund, an arrangement we refer to as Group Self Annuitzation (GSA). The distinguishing risk diffusion characteristic of GSAs in the family of longevity insurance instruments is that the annuitants bear their systematic risk, but the pool shares idiosyncratic risk. This obviates the need for an insurance company, although such instruments could be sold through a corporate insurer. We begin by deriving the payout adjustment for a single entry group with a single annuity factor and constant expectations. We then show that under weak requirements a unique solution to payout paths exists when multiple cohorts combine into a single pool. This relies on the harmonic mean of the ratio of realized to expected survivorship rates across cohorts. The case of evolving expectations is also analyzed. In all cases, we demonstrate that the periodic benefit payment in a pooled annuity fund is determined based on the previous payment adjusted for any deviations in mortality and interest from expectations. GSA may have considerable appeal in countries which have adopted national defined contribution schemes and/or in which the life insurance industry is non-competitive or poorly developed.

* This abstract is prepared for presentation at the 3rd Actuarial Studies Research @ UNSW Symposium, November 2003.