Demand and adverse selection in a pooled annuity fund

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Abstract

In this paper, we construct a model for examining the demand for annuities together with the possible implications of adverse selection when an individual consumer has access to both a private annuity market and a market with a pooled annuity fund. An earlier paper by Piggott et al. [Piggott, J., Valdez, E.A., Detzel, B., 2005. The simple analytics of a pooled annuity fund. J. Risk Insur. 72, 497–520] provides a formal analysis of the payout adjustments from a longevity risk-pooling fund, an arrangement referred to in the paper as Group Self Annuitization (GSA). In such a pooled arrangement, the annuitants will bear their own cohorts' systematic risk, but the cohort will share the idiosyncratic risk. The resulting return on the pooled annuity fund can be expressed as the product of a return from an ordinary annuity multiplied by a random variable that accounts for the adjustment that is due to deviations from expectation of mortality and investments. As demonstrated in this paper, a simple analysis of economic choice provides that it is possible to reduce the implications of adverse selection in a pooled annuity fund. It is well-documented that empirically, individuals do not find private annuity funds an attractive form of investment despite the potential welfare benefits that can be drawn from annuitization. A pooled annuity fund is an alternative to the conventional private annuity fund that may be considered more cost-effective.
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Keywords: Annuities; Group self-annuitization; Adverse selection

1. Introduction

It is well documented in the aging literature that the uncertainty of an individual's lifetime together with the attitude to risk affect his or her consumption level, investment behavior and demand for annuity and life insurance. Decision making is further complicated by the fact that we are observing unprecedented longer lifetimes across the globe. The risk of outliving available resources is of prime concern among retirees today, and the early literature (Yaari, 1965) showed that the risk of longevity can be completely hedged with actuarially fair life annuity products. This work by Yaari has been extended by Davidoff et al. (2003) in a more general setting which also shows that complete annuitization, under certain conditions, is optimal. Yet it remains a puzzle among experts as to why there continues to be very little demand for annuities, where even among the elderly, there appears to be an extremely low level of

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voluntary annuitization. In the United States, for example, some surveys have indicated that among retirees, as little as 1.5% have income derived from private annuities.

Some of the more commonly cited reasons for this low level of demand are: (1) poor historical yield performance (Friedman and Warshawsky, 1990); (2) large loadings and profits from private issuers (Mitchell et al., 1999); (3) bequest motives (Kotlikoff and Summers, 1981; Hurd, 1989; Bernheim, 1991); (4) pre-existing annuities from government pensions (Bernheim, 1991); and (5) actual design which sometimes discourages full annuitization (Yagi and Nishigaki, 1993).

Milevsky and Robinson (2001) develop analytical techniques that can be used by individuals at retirement who face the choice between voluntary annuitization and self-annuitization, but based on fixed annuity products. Specifically, they show that one can use the concept of a ruin probability when assessing how much to self-annuitize. Self-annuitization provides greater liquidity than voluntary annuitization; however it does so at the cost of possibly outliving resources. Other interesting work includes that of Albrecht and Maurer (2002), who extended the previous work of Milevsky and Robinson, which demonstrates how to evaluate that risk by calculating a personal probability of consumption shortfall and shows that it is substantial, particularly for high entry ages.

As recommended in Piggott et al. (2005), a possible response is to separate the systematic from the idiosyncratic risk. The idea is to form groups or cohorts in order to pool idiosyncratic risk where payouts could be conditioned to the mortality experience of the group within a clear framework with specified legal rights and obligations. The term Group Self-Annuitization (GSA) is used to describe a group self-annuity plan which will allow retirees to pool together and form a fund to provide for protection against longevity. See also Martineau (2001) and Wadsworth et al. (2001). There are still implementation issues associated with developing such products, but if properly designed and implemented, GSA products may provide a less expensive form of insurance against the risk of longevity. Although the product appears to obviate the need for an insurance company, it may be sold through a corporate insurer who may act simply as an administrative agent. There are similarities of the GSA products being considered here, the annuities issued by the Teachers Insurance Annuity Association (TIAA) through its companion organization College Retirement Equities Fund (CREF), and also "participating annuities" that have been discussed in the early actuarial literature (see Duncan (1952)).

Piggott et al. (2005) provided a formal treatment of how benefit adjustments in a GSA plan should be calculated and what conditions these adjustments should satisfy. These benefit adjustments provide the means of pricing for the product, and it has been shown that under some regularity conditions, the ratio of the expected to actual proportion of survivors is central in the adjustment calculations. This pricing adjustment is used in the model developed in this paper for evaluating demand and the possible presence of adverse selection in the GSA plan. The objective of this paper is to further expand that analysis by considering an economic choice model for the consumption and investment behavior of a consumer. Specifically, using a micro-economic utility maximizing framework, we assess and analyze the consumption behavior of a rational individual choosing between a conventional annuity product or a pooled annuity fund, that is, a GSA account. We also analyze and compare the implications of adverse selection in the conventional annuity and in the pooled annuity fund. There is the presence of possible adverse selection in the annuity market because individuals use privately known survival probabilities to alter their demand for the product. The presence of the pooled annuity fund does not completely eliminate adverse selection, however, we find that for certain classes of utility functions, the presence of the pooled annuity fund reduces adverse selection. Individuals adversely select against the pooled annuity fund to a lesser extent than against a conventional annuity. This can be intuitively explained by the fact that there is additional randomness in the rate of return expected from the pooled annuity fund which is derived from the real outcome of the mortality or survivorship probabilities of the pooled individuals. This uncertainty in the payout makes it more difficult to exercise adverse selection. Because of a spiraling effect of adverse selection, conventional annuities are generally considered expensive, and if adverse selection can be reduced as in the case of a pooled annuity fund, this may help lower the cost of annuity. The downside, of course, in a pooled annuity account, is being unable to hedge aggregate mortality risk; the systematic portion is borne by the consumer. The true cost of bearing this risk can be quantified over time; such is not the concern of the current paper.

The paper is organized as follows. First in Section 2, we discuss the mechanics of the pricing or benefit calculations in a pooled annuity fund. This has been well developed in Piggott et al. (2005) but herein redundantly discussed to justify the premium form of the pooled annuity fund. In Section 3, we examine models using a utility framework to assess demand and adverse selection when there is a market allowing the consumer access to both a conventional annuity and a pooled annuity fund. These are extensions of Abel (1986) and Sinha (1989) who developed an economic