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The effects of age pension on retirement drawdown choices

Osei K. Wiafe[a,*], Anup K. Basu[b], John Chen[b]

[a] Department of Accounting, Finance and Economics, Griffith University, 170 Kessels Road, Nathan, QLD 4111, Australia
[b] School of Economics and Finance, Queensland University of Technology, Brisbane, Australia

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ABSTRACT

We compare alternative drawdown strategies in retirement to a life annuity benchmark when retirees have access to government means-tested Age Pension. By adopting Epstein-Zin utility preferences which enables disentangling relative risk aversion (RRA) from elasticity of intertemporal substitution (EIS), our results suggest that retirees possess RRA levels which are higher than the inverse of EIS. This is evidenced by their preference of phased drawdown strategies to annuitisation, providing an alternative explanation to the annuity puzzle.

1. Introduction

Wealth decumulation choices have become particularly important in recent years with baby boomers moving into retirement and the manifold growth in the number of defined Contribution (DC) plans over defined benefit (DB) plans around the world. In a typical DC plan, the benefits depend on the accumulated value of the participant's contributions and the investment returns. The participant has a choice to receive the benefits as a lump sum at retirement or annuitize. Using Health and Retirement Survey (HRS) data from the US, Hurd et al. (1998) and Brown (2001) find empirical evidence that the preference for lump sum pension settlements is very persistent. Aversion to annuities has been widely discussed in the literature, with reasons such as the actuarially unfair pricing of annuities (Friedman and Warshawsky, 1990), the presence of bequest motives (Bernheim, 1991), poor health (Brown, 2001; Finkelstein and Poterba, 2002) among others discouraging annuitisation. By self-annuitising, most participants effectively assume the responsibility of managing their own retirement assets to meet consumption needs over their remaining lifetime.

In this paper, we investigate alternative drawdown choices for Australian retirees in the presence of government pensions. Given the annuity aversion observed among retirees, we explore the desirability of following alternative decumulation plans, akin to self-annuitisation, vis-à-vis purchasing a life-annuity at retirement. The uniqueness of the Australian system

* Corresponding author.
E-mail address: o.wiafe@griffith.edu.au (O.K. Wiafe).

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is characterised by a universal, means-tested age pension. Unlike the pay-as-you-go Social Security system in the United States, the age pension in Australia is paid from general tax revenues and provides all citizens above 65 years of age with an income stream, the rate of which is determined by their income and asset level relative to certain thresholds. The influence of government sponsored pensions has hitherto, not been considered in decumulation drawdown choices by retirees (Blake et al., 2003; Horneff et al., 2008a; Dus et al., 2005).

Whereas previous studies addressing the issue of drawdown choice adopt the Constant Relative Risk Aversion (CRRA) utility, recent studies have shown that individuals prefer early resolution of uncertainty and have relative risk aversion (RRA) levels higher than the reciprocal of their elasticity of intertemporal substitution (EIS) coefficient (see Brown and Kim, 2013; Huang and Shaliastovich, 2014). The preference for early resolution to uncertainty may be exarcebated by reasons such as the need to reduce anxiety (Epstein, 2008; Wu, 1999). This finding is consistent with the predictions by recursive preferences such as the Epstein-Zin utility function. Retirees with Epstein-Zin (EZ) utility preferences will choose a smooth consumption and wealth pattern over a variable one and will derive utility in doing so. Whilst risk aversion relates to the retiree's desire to stabilize consumption across different states of nature in a given time period, the EIS measures the desire of the individual to smooth consumption over time. EZ preferences enable a separation between RRA and the EIS and we are able to measure the impact of each preference in the drawdown choice of retirees.

2. Data and model

All simulated returns are based on annual returns data on Australian stocks, bonds and bills from DMS Global Returns Data (Dimson et al., 2012) spanning 111 years over the period 1900 through 2011. We include asset returns from the World Indices which is our proxy for international investment for the retiree's portfolio. We use the Efron (1979) bootstrap simulation approach technique which involves resampling row vectors with replacement. Since the return matrices hold rows of the different asset class returns, we are able to preserve the cross-correlation between the asset returns. Within the asset classes, this approach assumes the asset returns follow a random walk; however, since the various row vectors are replaced after every selection, we are able to obtain a wide range of possible outcomes.

The bootstrap simulations are performed over three different portfolio allocation strategies. We set the baseline asset allocation to a balanced portfolio allocation of 50% stock allocation and the remaining to bonds and bills. We perform 10,000 iterations to generate future returns on the retiree's portfolio. This methodology overcomes the statistical problems of using overlapping multi-period returns. For government-sponsored pension income calculations, we refer to pension rates provided by Australia's Department of Human Services for a single female homeowner[1]. Stochastic lifetimes are modeled based on life expectation experiences from the Australian Life Tables 2008-2010 (2011) provided by the Australian Government Actuary.

Using the EZ utilities, investor's preferences are defined recursively over current consumptions and the certainty equivalent of the next period's utility. Previous use of this model in pension plans include works by Horneff et al. (2008a) and Blake et al. (2013). A retiree aged x, exhibits preferences defined by:

$$U_x = \left\{ (1-\beta) \times (C_x)^{1-\frac{1}{\phi}} + \beta p_x \times \left(E_x[(U_{x+1})^{1-\gamma}]\right)^{\frac{1-\frac{1}{\phi}}{1-\gamma}} \right\}^{\frac{1}{1-\frac{1}{\phi}}} \tag{1}$$

Where U_x is the level of utility at age x, C_x is the consumption level at age x, p_x is the one year survival probability at age x, and β is the individual's one-year discount factor, γ is the RRA level, ϕ is the EIS coefficient. The EZ utility is adapted to include the conditional survival probabilities as observed from the life tables which we truncate at age 100 years. We assume $p_{101} = 0$, and for individuals with no bequest motives, we obtain a recursive equation for the terminal condition as:

$$U_{100} = \left\{ (1-\beta) \times (C_{100})^{1-\frac{1}{\phi}} \right\}^{\frac{1}{1-\frac{1}{\phi}}} \tag{2}$$

Motivation for the modelling of bequest motives is discussed in Laitner (2002) and Gomes and Michaelides (2005). The EZ utility function when retirees have bequest motives is given by:

$$U_x = \left\{ (1-\beta p_x) \times (C_x)^{1-\frac{1}{\phi}} + \beta E_x \left[(U_{x+1})^{1-\gamma} + (1-p_x) b \frac{(W_{x+1}/b)^{1-\gamma}}{1-\gamma} \right]^{\frac{1-\frac{1}{\phi}}{1-\gamma}} \right\}^{\frac{1}{1-\frac{1}{\phi}}} \tag{3}$$

with the terminal condition being given as:

$$U_{100} = b \frac{(W_{101}/b)^{1-\gamma}}{1-\gamma} \tag{4}$$

Where b determines the strength of the bequest motive and W_x is the remaining wealth level at age x. All remaining parameters are as defined earlier.

[1] See details of pension rates in Appendix A.