RESEARCH BRIEF

Betting on Death and Capital Markets in Retirement: A Shortfall Risk Analysis of Life Annuities versus Phased Withdrawal Plans

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Mandating annuitization after a phased withdrawal period can be quite appealing in terms of risk. This is of particular interest since this approach has recently been implemented in both the UK and Germany; some annuitization has also been recommended by the US Commission to Strengthen Social Security

How might retirees consider deploying the retirement assets accumulated in a defined contribution pension plan? One possibility would be to purchase an immediate annuity. Another approach, called the "phased withdrawal" strategy in the literature, would have the retiree invest his funds and then withdraw some portion of the account annually. Using this second tactic, the withdrawal rate might be determined according to a fixed benefit level payable until the retiree dies or the funds run out, or it could be set using a variable formula, where the retiree withdraws funds according to a rule linked to life expectancy.

Using a range of data consistent with the German experience, we evaluate several alternative designs for phased withdrawal strategies, allowing for endogenous asset allocation patterns, and also allowing the worker to make decisions both about when to retire and when to switch to an annuity. We show that one particular phased withdrawal rule is appealing since it offers relatively low expected shortfall risk, good expected payouts for the retiree during his life, and some bequest potential for the heirs.

We also find that unisex mortality tables if used for annuity pricing can make women's expected shortfalls higher, expected benefits higher, and bequests lower under a phased withdrawal program. Finally, we show that delayed annuitization can be appealing since it provides higher expected benefits with lower expected shortfalls, at the cost of somewhat lower anticipated bequests.

The European Model

Retirees often face the issue of how to draw down assets that they have accumulated over their worklives. While economists often recommend that they purchase a life annuity, which covers them against longevity risk, these financial instruments have some disadvantages. A buyer faces loss of liquidity and control over his assets, and in many cases annuities do not leave money for bequests. By contrast, in some European countries, policymakers have permitted alternative income withdrawal patterns for asset pools dedicated to old-age consumption. This paper focuses on rules similar to those adopted in Germany under the so-called "Riester plans," where some portion of the funds can be taken as a lump-sum and some other portion must be annuitized. Similar rules are in place in the UK and in Canada.

A key aspect of the retiree's decision during the payout phase is how to invest his or her retirement plan assets, and also how payouts should be structured so as to balance consumption flows versus bequest intentions without running out of money. We explore an alternative strategy to buying a life annuity called a "self-annuitization" or phased withdrawal approach. Here the retiree allocates his funds across various asset categories (e.g. equity, bonds, cash) and periodically withdraws a portion of the invested funds for

consumption purposes. The advantage of such a phased withdrawal strategy, as compared to a life annuity, is that it offers greater liquidity, the possibility of greater consumption while alive as well as the possibility of bequeathing some of the assets in the event of early death. Yet relying on income from assets without any insurance provides no pooling of longevity risk. Consequently, if the retiree constantly consumes an equal amount from his account, he could outlive his assets before his uncertain date of death, particularly in the event of long-run low investment returns. We develop several alternative withdrawal rules that rely not on some fixed amount per period, but rather on consuming a specified fraction of the remaining fund wealth each period. This altenrative approach avoids the risk of outliving one's total assets, as long as the benefit-to-wealth ratio is lower than one. Nevertheless, due to stochastic investment returns, the value of the pension accounts assets change over time implying that the periodically withdrawn amount must vary in tandem – and it could be substantially lower or higher than the benefit payable under a life annuity.

Whereas previous studies have focused on the probability of consumption shortfall as the operative risk measure, we extend the literature in several directions. First, we examine the risk and return profiles of several variable self-annuitization strategies that provide payments according to predetermined benefit-to-wealth ratio. Second, we address a major shortcoming of the shortfall-probability risk measure, namely that it ignores the size of the possible loss that may be experienced. In practice, of course, both theoretical and empirical arguments suggest that investors take both the probability and the amount of a possible shortfall into consideration.

Our contribution is to go beyond prior work by looking not only at the probability of a consumption shortfall, but also consider the size of the shortfall when it occurs. Third, we examine

how the results change if a mandatory annuitization rule were imposed akin to those in the recent German and UK pension regulation. Fourth, we evaluate the impact of allowing the annuitization date to be endogenous, along with the asset allocation decision. We illustrate how the risk of a consumption shortfall and return profiles of fixed and variable phased withdrawal strategies compare to the life annuity, and indicate what dominant strategies might be.

Our analysis shows that a phased withdrawal strategy paying the same benefit as the annuity exposes retirees to the risk of outliving their assets while still alive. A phased withdrawal plan using a fixed benefit-to-wealth ratio avoids the risk of running out of money, since benefits fluctuate in tandem with the pension fund's value. But a fixed benefit withdrawal rule affords lower risk than variable withdrawal rules, if one uses a mortality-weighted shortfall-risk measure (which includes both shortfall probability and magnitude of loss). We also show that mandatory deferred annuitization with a fixed withdrawal rule can enhance expected payouts and cut expected shortfall risk but at the cost of reduced expected bequests, as compared to no annuity. For a variable withdrawal plan, a simple deferred annuitization may not reduce risk: rather, it requires optimization of the benefit to wealth ratio.

We further explore using an $1/E(T)$ phased withdrawal rule, which offers relatively low expected shortfall risk, good expected payouts for the retiree during his life, and some bequest potential for his heirs. But if mandatory annuities are combined with this phased withdrawal plan, we find the $1/E(T)$ rule to be less attractive. We also find that the optimized $1/T$ rule and the fixed benefit rule both have appealing risk characteristics, particularly when combined with a mandatory deferred annuity.

Conclusion

Relevant to policymakers is our finding that mandating annuitization after a

phased withdrawal period can be quite appealing in terms of risk. This is of particular interest since this approach has recently been implemented in both the UK and Germany. A degree of mandated annuitization has also proposed for the US by the recent Commission to Strengthen Social Security in the US context. The present paper also implies that a government mandate requiring that unisex tables be adopted for annuity pricing (as in the UK) exposes women who elected a phased withdrawal plan to greater risk. Finally, our results have implications for the asset mix retirees will optimally want to hold: later annuitization (say, at age 85) would imply a larger fraction of the financial assets would be held in bonds.

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