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ABSTRACT

This paper investigates what, if anything, practitioners can learn from the literature modeling how households can use annuities to manage postretirement asset decumulation, and whether that literature reveals a need for innovative annuity products. This paper concludes that a desire to retain exposure to the stock market is not a justification for rejecting annuities since there are existing annuity products that offer equity exposure. Households would be better off purchasing longevity annuities than simply deferring annuitization. Whether longevity annuities are preferable to immediate annuitization depends on the household's level of risk aversion and need for liquidity, as well as the relative expense loads of the two products. Although annuities involve a loss of liquidity that may be valuable to households facing uncertain health-care costs, annuitization could nonetheless benefit these households because Medicaid treats annuities more favorably than unannuitized wealth.

The focus of the literature is on immediate and longevity annuities. However, most annuity purchases are of deferred annuities. The role of deferred annuities in retirement wealth decumulation has been under-researched and should be a focus of future research.

WHAT LESSONS, IF ANY, CAN PRACTITIONERS APPLY FROM ACADEMIC ECONOMISTS ABOUT THE ROLE OF ANNUITIES IN POST-RETIREMENT ASSET DECUMULATION?

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INTRODUCTION

In theory, annuities can enhance household financial well-being. Households facing the task of consuming wealth during retirement must trade off the risk of outliving their wealth against the cost of unnecessarily restricting their consumption. Most households that do not annuitize will die with unconsumed wealth. Annuities can enhance household well-being by reallocating this unconsumed wealth to households that survive.

In practice, the household's decision is more complex. Should the household annuitize all of its wealth or only part? Should it annuitize immediately, delay until the older ages at which annuity rates are more favorable, or purchase a longevity annuity? (A longevity annuity is purchased at or before retirement with benefits commencing at some advanced age.) Should the household purchase a fixed annuity or one with payouts linked to the performance of a stock fund? And how might the risk of incurring medical costs affect the calculation? This paper surveys the literature and attempts to answer these questions.

The remainder of the paper proceeds as follows: Section 1 explains how annuities can, in theory, enhance the financial well-being of households drawing down their wealth in retirement. Section 2 describes the economic model common to all the academic studies of the benefit of annuitization, and section 3 presents and critiques the literature. Section 4 considers whether innovative annuity products might increase the value of annuitization, and the paper ends with some concluding remarks.

I. HOW ANNUITIES ENHANCE FINANCIAL WELL-BEING

Annuities solve the decumulation problem by providing a lifetime income, thus insuring households against the bad financial outcome of living longer than expected. Insurers can provide households a higher income than they could obtain from similar unannuitized investments—for example, a bond—because money is reallocated from those who die young to those who live to an unusually old age. Annuities can provide an income starting immediately or at some advanced age. The latter type of annuity offers an even higher return relative to a bond because survival probabilities are even lower at advanced ages, so that more money is available for reallocation (Scott 2008).

II. THE ECONOMIC MODEL

The metric the academic studies use to value annuitization is annuity equivalent wealth, defined as the percentage by which the financial wealth at retirement of a household denied access to the annuity market must be increased so that the household is as well off (i.e., has the same expected utility) as it would have been if it had been given access to and undertaken the optimal annuitization strategy.

The studies proceed as follows. First, they make assumptions regarding household preferences, and assume that households gain utility from consumption but are averse to very low consumption in any period. The utility of consumption will be higher when the household is a married couple compared to a surviving spouse, and may vary with health status. Second, the studies make assumptions regarding the risks faced by households. In a simple model, the only risk will be the risk of not dying. Richer models may incorporate health-care costs and fluctuating investment returns. Third, they make assumptions regarding the range of annuitized and unannuitized investments available to the household. In a simple model, the household may have a choice between an immediate annuity and a risk-free bond. Richer models may also allow households to invest in risky stocks offering a higher expected return, to have access to variable immediate annuities with payouts linked to the performance of a stock fund, or to longevity annuities. Fourth, the studies calculate the household's optimal annuity purchase, asset allocation, asset drawdown strategy, and the expected present value of the household's expected utility of lifetime consumption, assuming the household has access to the annuity market.[1] Fifth, they close all or part of the annuity market and recalculate the household's optimal asset allocation and asset drawdown strategy and the household's expected utility of lifetime consumption. A rational household cannot be worse off by having access to annuities since it can always decline to purchase; if some level of annuitization is optimal, the household will be better off. Sixth and finally, the studies calculate by what percentage the wealth of a household at the point of retirement that is unable to access the annuity market must be increased so it has the same expected utility of lifetime consumption as a household that is able to access the annuity market. The literature defines this percentage, which cannot be less than zero, as annuity equivalent wealth.

I note several limitations of the models. First, a full modeling of all the risks faced by—and investment options open to—households is beyond the capacity of even the most powerful computers, and so, of necessity, the models make simplifying assumptions. The concern is that models may omit relevant factors. Second, the benchmark against which annuitization is judged is an optimal drawdown of unannuitized wealth. In practice, households likely adopt suboptimal rules of thumb, by, for example, spending interest and dividends but preserving the capital. The models likely understate the value of annuitization relative to the suboptimal strategies that households follow in practice. Third, the models usually show that most households would enhance their financial well-being by annuitizing substantial shares of their financial assets. This finding stands in stark contrast to

1 Expected utility of lifetime consumption equals the expected utility of each period's consumption, multiplied by the probability of being alive to enjoy it and discounted by a rate of time preference.

data that show that households rarely annuitize, and those that do annuitize typically annuitize only small shares of their financial assets. The implicit assumption is that households are deterred from annuitizing by behavioral biases or that they lack the requisite degree of financial literacy. But we cannot rule out the possibility that models have omitted some relevant factor that reduces the value of annuitization.[2]

III. THE LITERATURE

The literature is large, and space does not permit me to discuss every significant paper, so I will identify two strands. The first attempts to build ever-more-sophisticated models of the risks and investment annuitization options facing the household. The concern with a complex model is that it can be unclear which feature of the model is driving the result. The concern with a simple model is that some omitted factor might yield a different result. So, everything should be as simple as possible, but no simpler.[3] The conclusion that I have reached—and I believe most economists would agree—is that, while it would rarely be optimal for households to annuitize all their wealth, households would improve their financial well-being if they were to annuitize more of their wealth. This annuity puzzle has produced a second and smaller strand of the literature that argues that the literature omits important aspects of household preferences and that households are, in fact, acting rationally when they do not annuitize.[4] A third strand, which I do not discuss here, attributes low levels of annuitization to behavioral biases. The focus of this paper is on investigating what households ought to do to maximize expected utility rather than on explaining what they actually do.

MODELS OF THE RISKS AND INVESTMENT OPTIONS FACING HOUSEHOLDS

Early models assumed households could invest in only a single risk-free bond, and that they faced a one-time choice at retirement of using all their financial assets to purchase an immediate annuity. Assuming prevailing expense loads and population average mortality, both single and married households were better off annuitizing (Brown and Poterba 2000; Mitchell et al. 1999).

In practice, households can defer annuitization and then annuitize only a fraction of their financial assets; in theory, both strategies could enhance financial well-being. Annual mortality risk is low in the early years of retirement; if insurance companies face costs of producing annuities, it might make sense for households to self-insure their consumption for a few years, switching to annuities at older ages when mortality risk and the rate of return advantage of annuities over bonds increases. Dushi and Webb (2004) showed that, at prevailing expense loads, married couples might be better off postponing annuitization until they are in their 80s. In practice, a disadvantage of this approach is that households face the risk that adverse changes in the insurer's interest and mortality rate assumptions may result in the household facing less-favorable annuity terms. But households might be even better off purchasing a longevity annuity: a longevity annuity will typically offer higher benefits than a strategy of investing the money for a period and then purchasing an immediate annuity because the premiums of those who die before the age at which benefits are scheduled to commence can be used to pay enhanced benefits to annuitants who survive. Longevity annuities were first proposed by Milevsky (2005). Later, Gong and Webb (2010) showed that, at prevailing expense loads, households should prefer longevity annuities to immediate annuitization, deferred annuitization, or an optimal decumulation of unannuitized wealth.[5] At lower expense loads and for higher levels of risk aversion, a shorter deferral period or even immediate annuitization may be optimal.

A potential concern is that annuities might not be appropriate for households with higher mortality risk, meaning those who might not survive to enjoy the benefits. This risk is overplayed because few high-mortality-risk households can be certain of dying on schedule. Brown (2002) showed

2 A limitation of the literature is that it does not permit readers to test the sensitivity of the results to the authors' assumptions. Milevsky (2020) has made computer programs available that permit readers to model drawdown and annuity valuation. Although the programs do not permit the sophisticated analyses undertaken in the more recent academic literature, they could nonetheless help users understand how assumptions affect drawdown strategies.

3 This aphorism is attributed to Albert Einstein.

4 The annuity puzzle refers to the fact that few people choose to annuitize even a portion of their accumulated savings even though they have many good and rational reasons to do so.

5 Horneff, Maurer, and Mitchell (2020) also explore the value of longevity annuities. But their menu of investment options does not include immediate annuities so their study does not tell the reader whether longevity annuities are preferred over immediate annuities.

that individuals with the average mortality of high mortality groups—for example, Black men with less than a high school education—would still benefit from annuitization. Gong and Webb (2008) investigated the distributional effects of an annuitization mandate or default. A mandate would reduce both adverse selection and the cost of annuities. Gong and Webb (2008) calculated mortality tables for each participant in the Health and Retirement Study (Institute for Social Research n.d.), a large nationally representative dataset of older Americans, and showed that almost all participants would benefit from an annuitization mandate. A second potential concern is that longevity annuities expose annuity suppliers to substantial longevity risk: those suppliers are insuring only the payments at very advanced ages, and not the virtual certainty that a policyholder will live from age 65 to age 66. Policy expense loads are high (Gong and Webb 2008), but it is unclear to what extent this reflects greater divergence between annuitant and population survival at older ages, or the suppliers' required risk premium on the reserves they must commit to the policy. Maurer et al. (2013) show that, for plausible assumptions regarding that risk premium, households would be better off with longevity annuities in which policyholders participated in investment and aggregate longevity risk. Unfortunately, these products are unavailable because, although Internal Revenue Service (IRS) regulations exempt Qualified Longevity Annuity Contracts (QLACs) from retirement account required minimum distribution rules, those regulations prohibit QLACs from offering equity-linked benefits. I consider the justification for the restriction to be weak (see IRS 2014).

One argument that is sometimes advanced against annuitization is that, at least at younger ages, households are better off investing some of their financial assets in equities. For households able to tolerate risk, at younger ages the value of the equity premium (the excess return on equities over risk-free assets) exceeds annuity mortality credits (the excess return of annuities over similar unannuitized assets), resulting in the reallocation of wealth from the dead to the living. This argument is fallacious, however, because households can obtain the benefit of both longevity insurance and the equity premium by purchasing a variable immediate annuity. In a variable immediate annuity, income payments are linked to the performance of an underlying mutual fund. If the fund return exceeds a predetermined amount, typically around 3%–5% a year, income payments are increased proportionately. If the fund return falls short of target, income payments are reduced. Horneff et al. (2010) show that access to variable immediate annuities can substantially increase retiree financial well-being. Irrespective of age, most households benefit from allocating a portion of their financial assets to equities, and benefit still further if their equity returns are boosted by mortality credits. Even so, researchers continue to build models that omit the option to purchase a variable immediate annuity; as a result, those models understate the value of annuitization (e.g., Horneff et al. 2008).

A disadvantage of annuities is that they involve a loss of liquidity. Liquidity permits households to buffer spending shocks, thereby increasing financial well-being. Healthcare costs are a major uninsured risk for many retirees; Reichling and Smetters (2015) argue that these costs are of sufficient magnitude to reduce the optimal level of annuitization to zero for most households. But this and similar analyses focus on single individuals. Care costs affect the finances of the surviving spouse and likely substantially increase the optimal annuity share for married couples because Medicaid spousal protection rules favor annuitized over unannuitized wealth (Webb forthcoming).

In theory, annuity manufacturers could enhance household financial well-being by offering annuities that provide enhanced payouts in circumstances in which the marginal utility of consumption was particularly high—for example, the Spillman, Murtaugh, and Warshawsky (2003) proposal for a life care annuity, which is a combination annuity and long-term care insurance product. Theoretical calculations indicate that suppliers might experience lower levels of adverse selection on a combination product than they do on stand-alone products, permitting more-favorable prices. The rationale is that, even if individuals who live unusually long lives have the same care needs as those who die at younger ages, their long-term care costs are incurred at older ages and are subject to greater time discounting. In practice, the industry has taken a different route, and offers long-term care insurance riders on variable annuities. Further research is needed on the value and efficacy of such riders, and I suggest directions for that research in section 4.

HOUSEHOLD BEQUEST PREFERENCES

The models just described assume away preferences regarding bequests, the justification being that a household with a

specified bequest preference would ring-fence that amount and undertake an optimal drawdown of the remainder of their wealth, annuitizing as appropriate. Lockwood (2012) argues, however, that people with plausible bequest motives are likely to be better off not annuitizing any wealth at available rates. His results depend on his assumption that beneficiaries might be close to risk neutral over the amount of the bequest, a reasonable assumption if, as is often the case, the bequest is small relative to the beneficiary's lifetime financial resources. Beneficiaries are willing to gamble on receiving a large amount should the testator die young, versus receiving a small amount or nothing at all should the testator live exceptionally long. But if the testator wants to leave a bequest of a specific amount, the optimal strategy might be to set that amount aside and annuitize any remaining wealth since the testator otherwise runs the risk of living longer than expected and so of being forced to consume the intended bequest. More research is needed on the strength, and more importantly the nature, of households' bequest motives.[6]

IV. THE NEED FOR INNOVATIVE ANNUITY PRODUCTS

I identify two areas in which product innovation could increase the value of annuitization—tontines and variable immediate annuities—and one area in which further research is required—variable annuities.

TONTINES

Insurance companies face the risk that their annuitants might live longer than expected. Idiosyncratic risk can be hedged by holding a sufficiently large pool of annuitants. But insurers cannot similarly hedge the risk that their annuitants live, on average, longer than expected, perhaps due to some unanticipated medical breakthrough. Insurers must hold and earn a return on the financial reserves required to hedge against this latter risk. An alternative approach is to transfer this latter source of risk to annuitants, adjusting their payouts should the insurer's aggregate mortality experience prove better or worse than expected. In a simple tontine, an insurer invests money on behalf of a pool of annuitants. Each month or each year, depending on the tontine, some of the investments are liquidated and distributed among surviving annuitants in agreed shares. The liquidation formula is designed to provide a level income if the insurer's investment returns and mortality experience match actuarial projections. Since the role of the insurer is solely to administer the program, the insurer faces zero investment or mortality risk. From the point of view of an individual annuitant, idiosyncratic mortality risk, or the risk that they will live longer than expected, far exceeds the risk that they will experience a significant reduction in income resulting from an insurer experiencing lower-than-expected mortality in their annuitant pool (Milevsky and Salisbury 2015). Research is required to determine the extent to which aggregate mortality risk increases the cost of annuities.

VARIABLE IMMEDIATE ANNUITIES

Almost all immediate annuities provide an income that is fixed on nominal terms, providing a bond-like return. Given plausible assumptions about household preferences and the distribution of investment returns, only the most risk-averse retired households should hold all their financial assets in bonds, and most should have exposure to risky equities, an asset class offering a higher expected return. But sales of variable immediate annuities are negligible;[7] the industry should promote variable immediate annuities more widely. Manufacturers should be encouraged to offer longevity annuities by relaxing regulations that effectively prohibit their purchase with money in retirement accounts.

VARIABLE ANNUITIES

Immediate annuities represent a small part of the annuity market. Most annuity assets—$2.8 trillion at the end of 2019—are held in variable annuities, an investment product that grows on a tax-deferred basis and contains insurance features, such as the ability to turn the account into

6 For example, survey data indicating that most households anticipate leaving a bequest tell us little about whether the bequest is intended in the sense that the household would be willing to sacrifice current consumption to protect it. The household might anticipate leaving a bequest because it is unaware of annuities and fears outliving its wealth.

7 Private communication from the Life Insurance Marketing and Research Association (LIMRA), 26 October 2020.

a stream of periodic payments (Insurance Information Institute n.d.).[8] In contrast to immediate annuities, variable annuities have a surrender value, and in contrast to fixed annuities, variable annuities enable annuitants to benefit from equity returns. The price of having a surrender value is that, other things being equal, variable annuities will provide a smaller income than an immediate annuity without a guarantee period.

Variable annuities provide potentially valuable insurance protecting both income and capital against unfavorable stock market returns and often offer the ability to purchase riders that provide increased income in specified circumstances, for example when the participant receives long-term care. In theory, these riders may be welfare-enhancing by providing additional income in circumstances when the marginal utility of consumption is unusually high. But variable annuities sometimes have high expense loads that can eat into investment returns.

One study estimates the cost to the insurer of providing variable annuity riders (Milevsky and Salisbury 2006), one study investigates the optimal initiation of a guaranteed living benefit rider (Huang, Milevsky, and Salisbury 2014), and two studies value such a rider (Horneff et al. 2015; Steinorth and Mitchell 2015), but I know of no study that estimates the value of these riders to risk-averse households that are facing both financial and health-care-cost risks. Estimating the value of such riders is computationally challenging because it requires an intertemporal optimization model that incorporates both these sources of risks and allows households to choose how and when to activate the riders. An additional challenge is that options vary from product to product, so that findings may not generalize. Nonetheless, I consider this to be an important direction for research, given the growth of the market.

CONCLUSIONS

Most academic studies conclude that many households would increase their financial well-being if they were to annuitize at least part of their wealth. This finding stands in sharp contrast to the observed low levels of voluntary annuitization. A potential explanation is that the studies have omitted some important aspect of the household's decision and that households are acting rationally when they reject annuities. A few studies claim to have found such an explanation and to have solved the annuity puzzle. I am unpersuaded by such claims.

The question then arises: If households are making a mistake by not annuitizing, how should policymakers and financial advisors and institutions respond? A related literature has identified cognitive and behavioral biases against annuitization. It is unclear to me to what extent these biases could be remedied by financial education. If financial education is deemed ineffective, policymakers and retirement plan sponsors might need to consider more emphasis on default settings.

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8 For a nontechnical description of variable annuities, see U.S. Securities and Exchange Commission (SEC; n.d.).

REFERENCES

Brown, Jeffrey R. 2002. "Differential Mortality and the Value of Individual Retirement Account Annuities." In The Distributional Aspects of Social Security and Social Security Reform, edited by Martin Feldstein and Jeffrey B. Liebman, 401–40. Chicago: University of Chicago Press.

Brown, Jeffrey R., and James M. Poterba. 2000. "Joint Life Annuities and Annuity Demand by Married Couples." Journal of Risk and Insurance 67 (4): 527–53.

Dushi, Irena, and Anthony Webb. 2004. "Household Annuitization Decisions: Simulations and Empirical Analyses." Journal of Pension Economics and Finance 3 (2): 109–43.

Gong, Guan, and Anthony Webb. 2008. "Mortality Heterogeneity and the Distributional Consequences of Mandatory Annuitization." Journal of Risk and Insurance 75 (4): 1055–79.

<3M>. 2010. "Evaluating the Advanced Life Deferred Annuity: An Annuity People Might Actually Buy." Insurance: Mathematics and Economics 46 (1): 210–21.

Horneff, Vanya, Raimond Maurer, and Olivia S. Mitchell. 2020. "Putting the Pension Back in 401(k) Plans: Optimal versus Default Longevity Income Annuities." Journal of Banking and Finance 114 (May): 1–14.

Horneff, Vanya, Raimond Maurer, Olivia S. Mitchell, and Ralph Rogalla. 2015. "Optimal Life Cycle Portfolio Choice with Variable Annuities Offering Liquidity and Investment Downside Protection." Insurance: Mathematics and Economics 63 (July): 91–107.

Horneff, Wolfram J., Raimond Maurer, Olivia S. Mitchell, and Ivica Dus. 2008. "Following the Rules: Integrating Asset Allocation and Annuitization in Retirement Portfolios." Insurance: Mathematics and Economics 42 (1): 396–408.

Horneff, Wolfram J., Raimond H. Maurer, Olivia S. Mitchell, and Michael Z. Stamos. 2010. "Variable Payout Annuities and Dynamic Portfolio Choice in Retirement." Journal of Pension Economics and Finance 9 (2) 163–83.

Huang, Guan-Ying, Moshe A. Milevsky, and Nikolic B. Salisbury. 2014. "Optimal Initiation of a GLWB in a Variable Annuity: No Arbitrage Approach." Insurance: Mathematics and Economics 56 (May): 102–11.

Institute for Social Research. n.d. "Health and Retirement Study." Institute for Social Research, University of Michigan, Ann Arbor, MI. https://hrs.isr.umich.edu/.

Insurance Information Institute. n.d. "Facts + Statistics: Annuities." Insurance Information Institute, New York. https://www.iii.org/fact-statistic/facts-statistics-annuities#top.

Internal Revenue Service (IRS). 2014. "Employee Plans: T.D. 9673 page 212." Internal Revenue Bulletin 2014-30, July 21. Internal Revenue Service, Washington, DC. https://www.irs.gov/pub/irs-irbs/irb14-30.pdf.

Lockwood, Lee. 2012. "Bequest Motives and the Annuity Puzzle." Review of Economic Dynamics 15 (2) 226–43.

Maurer, Raimond, Olivia S. Mitchell, Ralph Rogalla, and Vasily Kartashov. 2013. "Lifecycle Portfolio Choice with Systematic Longevity Risk and Variable Investment-Linked Deferred Annuities." Journal of Risk and Insurance 80 (3): 649–76.

Milevsky, Moshe A. 2005. "Real Longevity Insurance with a Deductible: Introduction to Advanced-Life Delayed Annuities (ALDA)." North American Actuarial Journal 9 (4): 109–22.

<3M>. 2020. Retirement Income Recipes in R: From Ruin Probabilities to Intelligent Drawdowns. New York: Springer.

Milevsky, Moshe A., and Thomas S. Salisbury. 2006. "Financial Valuation of Guaranteed Minimum Withdrawal Benefits." Insurance: Mathematics and Economics 38 (1): 21–38.

<3M>. 2015. "Optimal Retirement Income Tontines." Insurance: Mathematics and Economics 64 (C): 91–105.

Mitchell, Olivia S., James M. Poterba, Mark J. Warshawsky, and Jeffrey R. Brown. 1999. "New Evidence on the Money's Worth of Individual Annuities." American Economic Review 89 (5): 1299–318.

Reichling, Felix, and Kent Smetters. 2015. "Optimal Annuitization with Stochastic Mortality and Correlated Mortality Costs." American Economic Review 105 (11): 3273–320.

Scott, Jason S. 2008. "The Longevity Annuity: An Annuity for Everyone?" Financial Analysts Journal 64 (1): 40–48.

Spillman, Brenda C., Christopher M. Murtaugh, and Mark J. Warshawsky. 2003. "Policy Implications of an Annuity Approach to Integrating Long-Term Care Financing and Retirement Income." Journal of Aging and Health 15 (1): 45–73.

Steinorth, Petra, and Olivia S. Mitchell. 2015. "Valuing Variable Annuities with Guaranteed Minimum Lifetime Withdrawal Benefits." Insurance: Mathematics and Economics 64 (Sept.): 246–58.

U.S. Securities and Exchange Commission (SEC). n.d. "Variable Annuities." Introduction to Investing, Investment Products, U.S. Securities and Exchange Commission, Washington, DC. https://www.investor.gov/introduction-investing/investing-basics/investment-products/insurance-products/variable-annuities.

Webb, Anthony. Forthcoming. "How Does the Risk of Incurring Out-of-Pocket Medical Costs Affect the Value of Annuities?" Policy Brief, Retirement Income Institute, Washington, DC.