CHAPTER 5

Designing a More Attractive Annuitization Option: Problems and Solutions

by Anthony Webb

INTRODUCTION[1]

This chapter evaluates the role of annuities in the drawdown (decumulation) phase of a publicly sponsored retirement plan—whether a cash balance plan that guarantees a rate of return on contributions or an auto IRA—designed to meet the needs of private sector workers who do not have access to a pension through their employer. I assume that during the accumulation phase, plan members invest in a collective investment fund that will make funds available to them on retirement. The objective during the drawdown phase is to convert that plan balance into a lifetime income.

One way of achieving this objective is to purchase an annuity. In return for the payment of a lump sum, an insurer agrees to provide the purchaser with a lifetime income. Theoretical calculations demonstrate that annuities have the potential to increase the financial well-being of typical retired households. Households who do not annuitize face the challenge of managing wealth drawdown over an uncertain lifespan. If they spend their wealth too rapidly, they run the risk of outliving that wealth. Conversely, if they are excessively cautious, they unnecessarily restrict their consumption. Annuities solve this problem by providing insurance against outliving one's wealth. Resources are reallocated from those who die young to those who are unlucky enough to live unusually long. Money that would otherwise be "wasted" by passing as bequests is used to increase consumption.

Notwithstanding the above theoretical calculations, rates of voluntary annuity purchase (annuitization) in the individual market are vanishingly small. In 2009, sales of immediate annuities (products where, in return for a lump sum, the purchaser receives a lifetime income starting immediately) totaled only $7.5 billion.[2] Brown (2007) considers a variety of rational and behavioral explanations. He concludes that while there are undoubtedly rational explanations for some people choosing not to annuitize some part of their retirement wealth, behavioral biases likely contribute to the lack of demand.

These behavioral biases can be overcome by mandating annuitization, but at the cost of reducing the well-being of those who would rationally choose not to annuitize. Mandates also may improve annuity pricing by increasing the proportion of low-risk, high-mortality individuals in the

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risk pool. Opt-outs, referred to in the literature as defaults, enable those who would rationally choose not to annuitize to opt out. Although defaults have been shown to be effective at overcoming behavioral biases to participation in 401(k) plans, it is not clear that they would be equally effective at encouraging annuitization.

This chapter considers the distributional consequences of mandates and defaults, identifying potential winners and losers. The distributional consequences depend on both the terms on which the plan is able to offer annuitization and the value participants place on the longevity insurance annuities provide. The low-wage workers for whom the proposed plan is designed may differ from the population average in ways that affect the value of annuitization. They likely will have a shorter life expectancy. A large portion of their wealth already may be annuitized through Social Security. Both of the above factors will reduce the value of annuitization at any given price. But low-wage workers may well spend a larger-than-average portion of their income on necessities, resulting in their placing a higher-than-average value on insurance against both longevity and financial risk.

I show that there is potential for a publicly sponsored retirement plan to offer annuity rates that are substantially more favorable than those currently available in the individual market. An annuitization mandate would achieve this objective by reducing administrative costs and eliminating adverse selection within the plan. But it is still possible to achieve substantial improvements on the above rates even without resorting to mandates or defaults by adopting a low-cost distribution channel and using both the potential sales volume and the attractive risk profile of plan participants to negotiate favorable rates with insurance companies. Yet, further rate improvements might be achieved through longevity and investment risk sharing.

The remainder of the chapter is organized as follows. Section 1 reviews theoretical calculations of the value of annuitization to households managing wealth drawdown in retirement and considers their applicability to low-wage workers. Section 2 considers why households choose not to annuitize, and evaluates the merits of a mandate, a default, or an opt-in. Section 3 investigates ways in which the annuity rates offered to participants in the proposed plan could be increased relative to those obtainable in the individual annuity market. And Section 4 considers what type or types of annuity should be offered and what portion of accumulated wealth should be annuitized.

1. THEORETICAL CALCULATIONS OF THE VALUE OF ANNUITIZATION

Economists measure the value of annuities in terms of annuity equivalent wealth (AEW). They first calculate an optimal drawdown of unannuitized wealth, in which the household chooses a drawdown rate that trades off the risk of outliving its wealth against the cost of unnecessarily restricting its consumption. They then calculate AEW, defined in the literature as the factor by which unannuitized wealth must be multiplied so that the household is indifferent between undertaking an optimal drawdown and purchasing an actuarially fair annuity. An actuarially fair annuity is defined as one where the expected present value of the income stream, discounted by a rate of interest and population average annual survival probabilities, equals the premium paid. When AEW exceeds one, the household would be better-off if it could annuitize on actuarially fair terms; when it is less than one, the household would be worse-off.

In reality, annuities are less than actuarially fair, reflecting administrative expenses, the need for the insurer to hold reserves, and, importantly, adverse selection—the use of private information about risk type when deciding whether to purchase insurance. But calculations that assume actuarial fairness provide a benchmark that is informative of the potential value of annuitization and of the distributional consequences of mandates and defaults.

Mitchell, Poterba, Warshawsky, and Brown (1999) and Brown and Poterba (2000) among others, have shown that for plausible parameter values, AEW for households with population-average mortality is substantially in excess of one, and that, in theory, such households would be substantially better-off if they were able to annuitize on actuarially fair terms. The above calculations assume that households place no value on liquidity and lack a bequest motive. But different and perhaps more realistic assumptions would not necessarily result in lower estimates of AEW.[3] For example, households with a bequest motive should still annuitize wealth in excess of the amount they wish to leave as a bequest. Concerns about the risk of uninsured medical expenses might actually increase the demand for annuitization rather than the demand for liquidity because Medicaid typically treats annuitized wealth more favorably than an equivalent amount of unannuitized wealth.[4] At the same time, the above calculations make other assumptions that result in the potential gains from annuitization being understated. Specifically, they assume that households possess both the skills required to calculate an optimal drawdown strategy and the willpower required to adhere to it, and are able to earn the same returns as those achieved by the insurance company, while paying zero investment management expenses.

Low-wage workers are arguably at higher risk of mismanaging the drawdown of unannuitized wealth than current 401(k) participants. They may either spend their wealth too rapidly, or go to the other extreme and be afraid to make any withdrawals. They may lack the financial skills required to invest in anything other than short-term deposits, which offer a low return that fluctuates considerably over time (Van Rooj, Lusardi, & Alessie, 2007).

In designing a publicly sponsored retirement plan, policymakers are likely to be particularly concerned about meeting the needs of low-wage workers who are least likely to have access to a workplace pension. These workers are likely to have higher-than-average mortality and would, therefore, on average, receive their annuity payments for fewer years. This significantly reduces the money's worth of the annuity—the expected present value of the income stream, divided by the premium paid. But Brown (2003) shows that the average individual in high mortality groups would still be willing to purchase an annuity on terms that were actuarially fair to individuals who have population-average mortality. This is because the high mortality household who chooses not to annuitize will still plan to set aside wealth to finance consumption in the event that it survives to advanced old age, even though that survival probability is lower than average.

The above authors assumed that either none or one-half of household wealth was held in pre-annuitized form. But most workers hold the majority of their wealth in pre-annuitized form through Social Security and defined benefit pensions, so that, given the above preference parameters, the above calculations will overstate the value of annuitization to typical households. Taking account of household-level variation in both mortality risk and proportion of pre-annuitized wealth, Gong and Webb (2008) show that 16% of all married-couple households would perceive themselves as being made worse-off if they annuitized on terms that were actuarially fair to a household with population-

average mortality.[5] Again assuming the above preference parameters, it is likely that an even larger percentage of low-wage workers would perceive themselves as being made worse-off because low-wage workers typically will have high mortality rates and very high proportions of pre-annuitized wealth.

The above theoretical calculations require assumptions to be made about households' capacity and willingness to bear risk. They assume that households exhibit constant relative risk aversion (CRRA). For a household with CRRA preferences, the terms on which it is willing to bear risk depend on the proportion of its wealth at risk, not on the dollar amount at risk. Given this assumption, the value of annuitization depends on the proportion of wealth that is not yet annuitized. But the use of this assumption may overstate the willingness of low-wage workers to bear risk, and correspondingly understate the value they might place on annuities. If low-wage workers spend a larger portion of their income on necessities, they arguably may be more averse to the risk of being required to cut consumption in the event that they live unusually long.

To summarize, the value of annuitization depends on households' risk preferences, mortality risk, the level of actuarial unfairness of annuities, and the alternative investment and drawdown options open to the household. A far-sighted and financially sophisticated household may be better-off not annuitizing its pension wealth, particularly if it has other sources of lifetime income. But low-wage households typically adopt very conservative investment allocations, investing in short-term deposits offering a low and uncertain income yield. If this is the alternative, then annuitization is likely to be preferable, even for high mortality households.

2. WHY DON'T HOUSEHOLDS ANNUITIZE AND WHAT ARE THE MERITS OF MANDATES OR DEFAULTS?

In this section, I consider why so few households choose to annuitize their retirement savings, and evaluate the merits of annuitization via mandate, default, or opt-in. I show that the desirability of mandates and defaults depends not only on why we believe households choose not to annuitize but also on our weighting of the welfare of various household types.

Brown (2007) evaluates a variety of rational and behavioral explanations for the almost complete absence of voluntary annuitization. Actuarial unfairness is prominent among the rational explanations. It is argued that although households might be willing to purchase an actuarially fair annuity, prevailing market prices are very far from fair.

While it is generally agreed that private market annuities are actuarially unfair, it is difficult to quantify the precise degree of actuarial unfairness. The estimate depends on whether one discounts the income stream using interest rates on Treasury bonds, arguing that annuities are backed by state level guaranty funds, or at the higher corporate bond interest rate, and whether one accounts for management fees on alternative non-annuitized investments.[6]

Using 1995 data, and assuming population average mortality and a corporate bond interest rate, Mitchell, Poterba, Warshawsky, and Brown (1999) estimated joint life annuity money's worth at 79.2%. Multiplying this money's worth by estimates of AEW for married couples suggests that full annuitization is marginally worthwhile for the average household (Brown & Poterba, 2000). But if

households are rational, and theoretical models capture relevant aspects of the annuitization decision, we still would expect those with better-than-average mortality to annuitize most of their wealth and for many others to annuitize at least a portion.

Other rational explanations include the presence of a bequest motive, that Social Security and defined benefit pensions already provide households with sufficient longevity insurance, and a desire for liquidity in the face of uncertain health care costs. These factors may explain why some households might choose not to annuitize part of their wealth. But it is hard to see how they can explain the almost complete absence of voluntary annuitization.[7]

The second category is explanations that attribute the lack of annuitization to behavioral factors. It is argued that annuities are too complex. While some annuities can be complex, the basic contract is extremely simple—the household hands over a lump sum and, in return, the insurance company issues a check every month for as long as the household lives.[8] Well-documented psychological biases are arguably of greater importance.[9] First, households find it hard to think of surviving to advanced old age as a bad outcome that they need to insure against, and instead frame the annuity purchase as a risky gamble that they will lose if they die young (Agnew, Anderson, Gerlach, & Szykman, 2008; Brown, Kapteyn, & Mitchell, 2010). Second, annuity valuation involves actuarial calculations that are almost certainly beyond the ability of most households. Households may resort to heuristics, leading them to systematically overvalue lump sums relative to income streams (Warner & Pleeter, 2001).

In other contexts, for example the 401(k) participation decision, mandates and defaults usually are proposed as an antidote to behavioral biases, or as a means of overcoming ignorance and procrastination. The annuity market differs in that mandates and defaults likely will improve annuity prices by increasing the number of low-risk, high-mortality households in the annuity pool, potentially improving annuity rates for all participants. One can identify three household types: 1) those who would annuitize at the original rates; 2) those who would not annuitize at the original rates, but would at the more favorable rates made possible by the mandate; and 3) those who would prefer not to annuitize, even at the more favorable rates. The first two groups are made better-off by a mandate. The third group is made worse-off. If the third group was sufficiently small, one might favor mandates and defaults, even if one believed that households were acting rationally in choosing not to annuitize at current prices.

It is difficult to assess what proportion of plan participants might fall into this last category. As mentioned above, Gong and Webb (2008) estimated that 16% of the population would be made worse-off as a result of mandatory annuitization on terms that were actuarially fair to households who have population average mortality. Plan participants likely would have higher-than-average mortality, increasing the proportion that would be worse-off at any assumed level of actuarial unfairness. But it is unclear whether a mandate would result in terms that were more or less actuarially fair than those assumed by Gong and Webb (2008). Although plan members likely would be an attractive risk pool, this likely would be insufficient to offset the administrative and other costs faced by the insurer.

An alternative to an annuitization mandate is to default households into annuities. In theory, a default allows high mortality households to opt out of annuitization, eliminating the losses they would otherwise suffer, but at the cost of reducing the gains to the remainder of the participants, who no longer benefit from the participation of high-mortality households in the pool. In practice, if high-

mortality groups suffer from low levels of financial literacy, they may not understand the consequences of inaction, and may remain annuitized even when clearly disadvantageous. This problem could be addressed, at least in part, by allowing households defaulted into annuitization to opt out again within a specified period.

Both mandates and, to a lesser extent, defaults, have a further potentially significant disadvantage. If households are resolute in their opposition to annuitization, a mandate may reduce program participation.[10] Although defaults have been shown to be effective in increasing 401(k) participation rates, it may be unwise to draw parallels with the annuitization decision. Households likely understand that they ought to be saving for retirement, but suffer from procrastination and time inconsistent preferences. The behavioral impediments to annuitization may be quite different, with many households perceiving annuitization as financially disadvantageous.[11]

It is difficult to assess the likely effectiveness of an annuitization default. TIAA-CREF is unique among 401(k)/403(b) plan providers in giving prominence to annuities. But even it has not made annuities the default. Yakoboski (2010) reports that TIAA-CREF achieves an annuitization rate of 19%—far higher than zero, but also far lower than the annuitization rates theoretical models indicate might be optimal. It is possible that the framing of educational material also might affect the annuitization rate. Traditional 401(k) plans give prominence to the individual's account balance, often making little or no mention of the lifetime income that it can produce.

It might be better to give greater prominence to the individual's retirement income target, the proportion that can be satisfied from Social Security and past contributions, and the further proportion that can be satisfied from prospective contributions. To illustrate, the plan might offer a retirement financial planning tool in which the participant selected a contribution rate and a planned age of retirement. The tool would show projected retirement income, both in dollars and as a replacement, and the portions that would come from Social Security, past contributions to the plan, and projected contributions to the plan. Although the participant would be told the current value of his account, the focus of the tool would be on the replacement rate, not on current or projected retirement wealth.

To summarize, an annuitization mandate will reduce the impact of adverse selection, but at the cost of reducing the well-being of those who would rationally choose not to annuitize. A default will have a smaller impact on adverse selection. There is a risk that, on the one hand, the default may be over-ridden, rendering it ineffective, and on the other hand, that households may be defaulted into an inappropriate choice.

On balance, I favor a default. Although it may not be very effective, I think it is unlikely to do much harm. Where a mandatory annuitization requirement risks a significant number of workers choosing to not participate in the retirement savings plan, I think it unlikely that a default that allows people to opt-out of annuitizing their savings would significantly reduce participation rates. Although some households may be defaulted into an inappropriate choice, this must be weighed against the fact that households also may make inappropriate choices in the absence of a default.

3. HOW CAN THE COST OF ANNUITIZATION TO PLAN PARTICIPANTS BE REDUCED?

At prices currently prevailing in the individual annuity market, and depending on the mortality and risk characteristics of participants, annuitization may confer only a marginal benefit on the members of a state sponsored retirement plan for private sector workers. A key objective should be to improve prices, to increase the incomes of those who annuitize, justify the use of a default, and increase participation rates.

In this section, I consider three ways in which the cost of annuitization to plan participants can be reduced.[12] I first consider the role of distribution channels. I then consider the potential for the proposed plan to negotiate more favorable annuity rates as a result of the attractive socioeconomic characteristics of its prospective annuitants. Finally, I consider the potential for costs to be further reduced through annuitant participation in investment and aggregate mortality risk, the latter being the risk faced by the insurance company that mortality rates decline faster than expected.

Distribution Channel

Immediate annuities are standardized products. One might therefore expect to find substantial price competition, with households making price comparisons and the market being dominated by more competitively priced products.

In reality, there is considerable price variation, both between companies and across distribution channels. Annuities are sold through four main channels: commissioned agents; a variety of annuity websites; mutual fund companies such as Fidelity and T. Rowe Price; and, finally, Income Solutions, a company offering what it terms "institutional" pricing to Vanguard investors, plan sponsors, and the clients of certain fee-only advisors. Not all insurance companies utilize all of the above distribution channels.[13]

Within the commission channel, prices vary substantially between companies. Mitchell, Poterba, Warshawsky, and Brown (1999) analyzed 1995 data and found that the average income on a typical annuity product—a joint life, two-thirds survivor nominal annuity, payable monthly in arrears, was 21% higher for the top 10 payout companies than for the bottom 10. More recent surveys have found a smaller, but still substantial, variation. *The Wall Street Journal* (2010) found, with one exception, an 11.4% variation among the top 20 insurance companies. This variation was largely unrelated to the carrier's perceived financial strength. Pechter (2011) conducted a similar analysis and found about a 10-percent price variation. I found it difficult and time-consuming to gather price data, and conclude from both my own efforts and the above research that price competition is weak within the commission channel, and that even financially sophisticated households would find it difficult to obtain the most competitive prices.[14]

Prices also vary substantially across distribution channels. Pechter (2011) reports that when the same company distributes through both the Income Solutions and commissioned channel, the Income Solutions price is consistently more favorable. But this comparison understates the potential price reduction. The Income Solutions platform facilitates price comparison by providing households with comparisons of price and insurer financial rating. Hueler (2010) estimates that a household using

Income Solutions might typically achieve a 6.4% increase in income over that obtainable through the commissioned channel, and potentially as much as 15%. Pechter (2011) further reports that the Income Solutions prices are more favorable than those obtainable on the annuity websites studied, and slightly more favorable than those quoted on the Fidelity website.

The above analysis treats annuities as standardized products that differ only to the extent that there is variation in the insurer's financial stability. In reality, annuities are sold in a package that includes financial advice. The quality of that advice may vary across distribution channels, as may the cost of provision. A potential concern with the Income Solutions and other Internet-based distribution models is that a significant portion of prospective participants may not be computer literate, may be unable to interpret the data provided, and may not even have Internet access. If an Internet-based distribution model is adopted, the pension plan may need to engage in education and outreach initiatives.

Obtaining Annuity Rates that Reflect Prospective Purchasers' Risk Characteristics

In contrast to other insurance products, and with the exception of a nascent market in impaired life annuities, annuity prices are based solely on age and gender. Brown, Liebman, and Pollet (2002) document very substantial socioeconomic differences in mortality. The average mortality rates of blacks, and non-minorities with less than a high-school education, are substantially higher than population averages. It seems plausible that participants in the proposed plan would likewise have higher-than-average mortality rates, particularly if the plan were to adopt an annuitization default, and that default resulted in a decrease in the level of adverse selection.

Kelli Hueler of Hueler Associates informs me that insurers participating in the Income Solutions platform have demonstrated a willingness to adjust their premiums if they believe that substantial sales volumes may result. She considers they also might be willing to adjust premiums based on mortality data.

Indications of the potential for price improvements based on mortality data can be obtained from life tables. The Society of Actuaries publishes two sets of relevant life tables.[15] Annuity 2000 is a set of tables designed to reflect the mortality rates of individual annuitants.[16] These tables do not vary with socioeconomic status, reflecting the paucity of data on individual annuitants, so that they are of limited applicability to annuitants in the proposed plan. RP-2000 is a set of tables designed to reflect the mortality rates of participants in employee pension plans. The RP-2000 mortality rates are higher, reflecting the fact that annuitization is mandatory, or at least widespread, in defined benefit pension plans. Although the RP-2000 tables include white-/blue-collar and small amount mortality adjustments, they may overstate the mortality rate of participants in the proposed plan if annuitization is voluntary.

I calculate an indication of the potential price improvement by comparing the expected present value of an annuity to a couple with RP-2000 mortality, and its expected present value to a couple with RP-2000 mortality, after the application of the blue-collar or small amount adjustment factors.[17] The expected present value is 1.6% lower for blue-collar annuitants, and 2.7% lower for those receiving small amounts.[18] The differences are surprisingly small. In contrast, Brown (2002) calculat-

ed an 8.2 percentage point difference between the expected present value of a joint life annuity to a white college-educated couple, and its value to a white couple with less than a high-school education, and a further 6.7 percentage point difference for black couples with less than a high-school education. I conjecture that the relationship between mortality and socio-economic status is non-linear, and that there is relatively modest socio-economic variation in mortality among the types of individuals who are covered by defined benefit pension plans.[19] The extent to which participants in the proposed plan will have higher mortality may depend on its ability to attract members of traditionally disadvantaged groups.[20]

Annuitant Participation in Investment and Aggregate Mortality Risk

Further price reductions might be achieved if annuitants were to participate in both investment and aggregate mortality risk. Insurance companies cannot perfectly hedge either of these risks. They face default risk on corporate bonds, and may be unable to match the timing of their anticipated annuity payments with that of bond interest and maturities. They also face the risk that annuitants may, on average, live longer than expected. Insurance companies hold reserves against the above risks. If they were to share these risks with annuitants, they might be able to offer more favorable annuity rates, reflecting reductions in both reserve requirements and the volatility of insurance company shareholder returns.

From the annuitant's perspective, the risk that he or she might survive beyond his or her life expectancy is far greater than the risk that the annuity payments might be reduced because people, on average, live longer than expected. Given the relatively conservative nature of insurance companies' investment portfolios, it is similarly unlikely that an annuitant would suffer a substantial income reduction as a result of poor investment returns.

A model for such a risk-sharing arrangement is the TIAA fixed annuity. TIAA prices its annuities by reference to an assumed prospective investment return and realized annuitant mortality, subject to a small adjustment to reflect prospective mortality improvements. The annuity comprises a fixed component and a "dividend," the latter being adjusted to reflect realized investment returns and mortality experience. It is difficult to compare TIAA annuity rates with those payable on fixed annuities. TIAA has a high-risk annuitant pool of long-lived university employees, but has historically benefited from high annuitization rates that may have reduced the effects of adverse selection. They also may adopt relatively conservative initial annuity rates, reasoning that households are averse to annuity income reductions.

But it is not clear that an annuity in which annuitants share investment and longevity risk will offer a higher expected return than one in which the income is guaranteed. The mortality assumptions upon which insurance companies base their annuity prices are not publicly available. If, as some actuaries believe, insurance companies are underestimating the pace of mortality improvements, insurance companies may be underpricing fixed annuities, and households might do better to lock in prices based on current mortality tables.

Hedging Interest Rate Risk

A significant risk faced by participants in the proposed plan is that they may retire at a time when interest rates are unusually low, and annuity rates are unfavorable. If annuitization is to be a

mandate or default, then this risk can be partially hedged by shifting participants' portfolio allocations into bonds in the years preceding retirement. If the proposed plan is to provide rate of return guarantees, then this risk could be further reduced by expressing those guarantees in terms of retirement income, as opposed to rates of return during the accumulation phase, enhancing the value of those guarantees, and potentially reducing their cost.

"Buying" Annuities from the Social Security Administration

Households that delay claiming Social Security benefits receive an increase in the amount of those benefits. A retired worker who delays claiming from age 66 to 70 currently receives a 32% increase in the amounts of his own retired worker benefit and his spouse's survivor benefit. He can be thought of as "purchasing" additional annuity income from the Social Security Administration with the benefits foregone.

Table 5.1 shows that for single individuals, and especially for married men, and assuming current mortality tables, the terms on which the Social Security Administration "sells" inflation indexed annuities are considerably more favorable than those obtainable from insurance companies.[21] A publicly sponsored retirement plan might therefore consider selling temporary annuities that would enable households to delay claiming Social Security. To illustrate, consider a household that was entitled to Social Security benefits of $1,000 a month at a Social Security Full Retirement Age of 66, and which had accumulated $250,000 in the proposed public pension plan and which planned to retire and claim benefits at age 66. This household would delay claiming Social Security benefits until age 70, at which age it would receive $1,320 a month from the Social Security Administration. At age 66, it would purchase a four-year annuity paying $1,320 a month, with payments ceasing at age 70, the age at which the household planned to claim Social Security, and would purchase a lifetime annuity with the remainder of its plan assets.

Table 5.1

Comparison of Annuity Rates with Returns from Delayed Claiming of Social Security

	Single Male		Married Couple	
Delay From	Social Security Benefits	Annuity	Social Security Benefits	Annuity
66 to 67	$80.00	54.65	$80.00	39.30
67 to 68	80.00	61.52	80.00	43.96
68 to 69	80.00	68.92	80.00	48.96
69 to 70	80.00	74.69	80.00	54.31

Notes: All amounts are in dollars per month. It is assumed that the husband is entitled to $1,000 a month retired worker benefit at age 66. The wife is assumed to be three years younger than the husband. The table compares the additional retired worker and survivor benefit obtained as a result of delay with the single or joint life inflation indexed annuity that could be purchased with an amount of financial assets equal to the Social Security benefits foregone. The calculations assume that delayed claiming of retired worker benefit does not result in any loss of spousal benefit. Annuity rates are provided by Income Solutions as of August 7, 2011.

4. WHAT TYPE OF ANNUITY SHOULD BE OFFERED?

In this section, I consider what type of annuity should be provided and what portion of retirement wealth should be defaulted into an annuity, in the event that a default is provided.

The overwhelming majority of immediate annuities provide benefits that are fixed in nominal terms. Even at a 2.5% inflation rate, the real value of the income will halve over 28 years. Assuming population average mortality, there is a 27% probability that one or both spouses turning 65 in 2011 will survive for at least 28 years.

It is unclear how well a gradual decline in income accords with household preferences. Medical expenses increase with age, reflecting both the effects of age and proximity to death, and medical cost inflation. But households may have a preference for larger income early in retirement.[22] One alternative to a fixed annuity is one that provides an inflation-protected income. Although the money's worth of the two annuity types are often similar (Gong & Webb, 2010), the inflation-protected annuity typically provides an initial income that is 30% lower than that provided by the nominal annuity.[23]

Poverty among the elderly is concentrated among widows (McGarry & Schoeni, 2005), and the inflation-protected annuity is therefore likely to be a more effective means of alleviating poverty. But the low initial income may discourage annuitization in the first place, while the shifting of income from younger to older ages will relatively disadvantage high mortality households.

Another alternative is a variable immediate annuity. This provides an income that fluctuates with the performance of an underlying investment portfolio. If the portfolio return exceeds a target rate, typically 3.5 or 5%, the annuitant's income increases by the amount of the excess return. If it falls short, the income is correspondingly reduced. In return for bearing this risk, the annuitant receives a higher current and prospective return. Both investment advisors and economic theory suggest that a mixed stock-bond portfolio is appropriate for households approaching retirement. If a mixed stock-bond portfolio is optimal immediately before retirement, the optimal annuitization strategy is likely to involve replacing the portfolio's bond portion with a fixed or inflation indexed annuity, and replacing the stock portion with a variable immediate annuity, with possibly some further rebalancing at older ages.

The question of how the household should optimally allocate its wealth between fixed and variable annuities is part of the larger question of how the household should allocate its portfolio between stocks and bonds over the life-cycle. One view might be that low-income households cannot afford to take risks with their savings. A contrary view is that as low-income households hold larger proportions of their wealth in low-risk assets such as Social Security and housing equity, they should actually invest their financial assets less conservatively.[24] The optimal allocation will vary from household to household, depending on financial situation and risk preferences, but is likely to comprise some combination of inflation-protected and variable immediate annuities. There is a risk that this may overly complicate the design of the annuitization stage, discouraging annuitization. The optimal strategy might therefore involve a single product, comprising a fixed nominal annuity and a variable immediate annuity. **Figures 5.1 and 5.2** show the expected monthly income that a married couple household would receive from a variable immediate annuity, an inflation-protected annuity, and a combined product invested 75% in an inflation-protected annuity and 25% in a variable immediate

Figure 5.1

Comparison of Monthly Income on Variable and Inflation Protected Immediate Annuities
3.5% Assumed Return, $100,000 premium

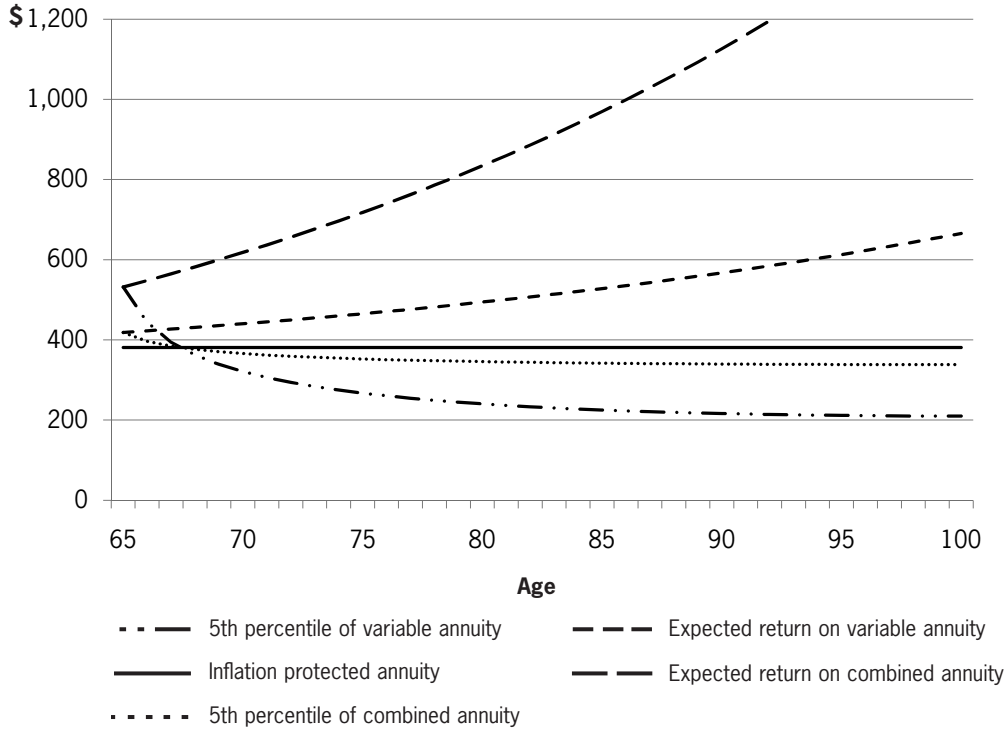
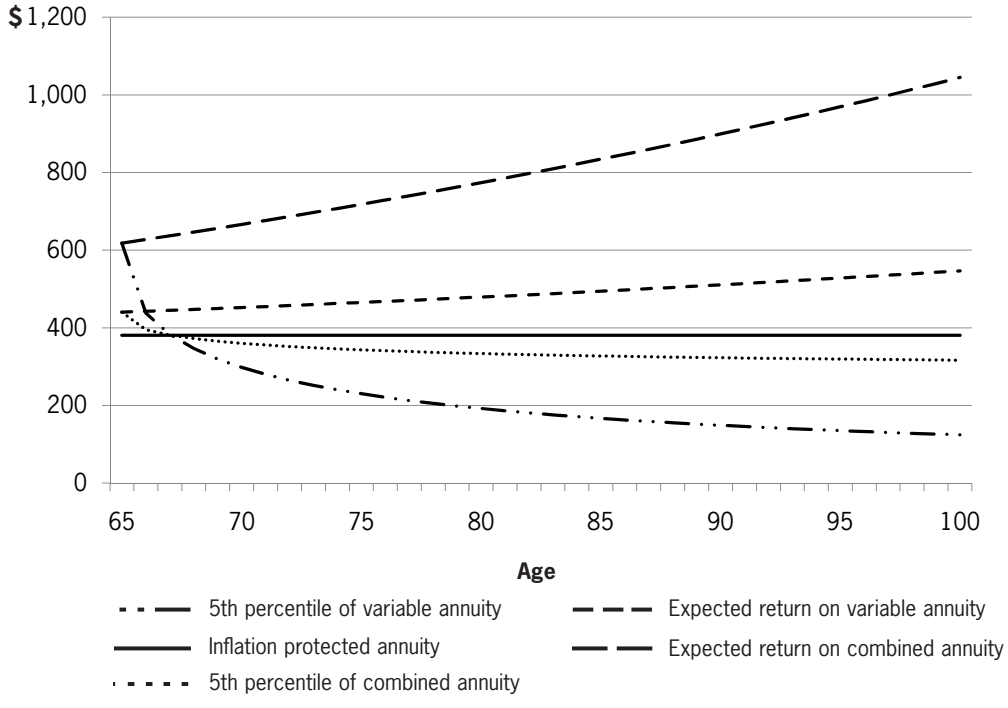


Figure 5.2

Comparison of Monthly Income on Variable and Inflation Protected Immediate Annuities
5% Assumed Return, $100,000 premium



annuity, assuming retirement at age 65 and a $100,000 investment. The dashed lines indicate the levels below which the income from the variable and combined annuities would be expected to fall 5% of the time, and the dotted line the floor below which the income on the combined annuity would never fall. Although the variable immediate annuity offers the prospect of an income that will increase in real terms, there is significant risk of suffering substantial income declines, particularly at older ages. The combined product places a floor below which the household's income can never fall, yet offers some potential for the household's income to increase in both nominal and real terms.

The Special Case of the Advanced Life Deferred Annuity

Annuities are particularly effective as a means of financing consumption at advanced ages. Annuities are able to provide higher returns than equivalent unannuitized investments by reallocating wealth from those who die young to those who live unusually long. Suppose that at age 65, the probability of surviving to age 66 is 99%, and that the probability of surviving to age 100 is 1%, and that the real rate of interest is 3%. An individual can finance consumption of $100 at age 66 by placing $97.08 in a bank account and withdrawing it one year later. An insurance company, with zero expenses and facing a large annuitant pool, 99% of whom will survive to age 66, can charge $96.11. But even with a small 1-percent sales load, the insurance company will have to charge $97.08 and will be uncompetitive with self-insurance.

The cost of self-insuring a single $100 payment at age 100 is $35.54. At a 3% rate of return, this will grow to $100 by age 100. But the insurance company, knowing that only 1% of its customers will live to age 100, can charge only $3.55, and will still be competitive, even if it applies a heavy sales load.

Scott, Watson, and Hu (2007) show that households who wish to annuitize only part of their wealth are better-off purchasing annuities that pay out at advanced ages, termed an advanced life deferred annuity (ALDA) by Milevsky (2005). Gong and Webb (2010) show that, at currently prevailing levels of actuarial unfairness, the ALDA dominates both immediate annuitization and an optimal drawdown of unannuitized wealth. As the level of actuarial unfairness decreases, immediate annuitization becomes relatively more attractive and the immediate annuity comes to dominate both alternatives.

Although the ALDA is attractive in theory, it is unclear whether households would be willing to purchase. If households frame the annuitization decision as a risky gamble that they will lose if they die young, they may regard the ALDA as particularly risky, given the high probability that they will die before payments commence.

What Proportion of Retirement Wealth Should be Annuitized?

Theoretical calculations (Yaari, 1965) show that full annuitization is optimal when annuities are actuarially fair. Given commonly assumed preference parameters, the value of additional purchases declines as the portion of wealth that is annuitized increases, so that when annuities are actuarially unfair, it may be optimal to annuitize only part of one's wealth or sometimes none at all. As mentioned previously, a desire for liquidity in the face of uncertain medical expenses might further reduce the value of annuitization.

But, as also mentioned, it is possible that the above preference parameters overstate the risk tolerance of households on low incomes. If the objective of the pension is to keep households out of

poverty, regardless of how long they live or how much they spend on medical costs, then it might be better to default households into annuitizing sufficient wealth to lift their total income, inclusive of Social Security, to a certain multiple of the poverty line. Precedent for this approach is the proposal by the United Kingdom government to incent individuals to annuitize sufficient defined contribution wealth to raise their income, inclusive of Retirement Pension, to £20,000.[25]

At What Age Should the Annuity be Provided?

A married couple that delays retirement and annuity purchase from age 62 to 70 increases the income provided by an inflation-indexed annuity by 30.8%. A worker who delays claiming Social Security benefit from age 62 to 70 increases the amount of that benefit by 76%. The above percentages understate the returns to delay because they do not take account of additional pension plan contributions.

But many of the participants in the proposed plan may be unable to delay retirement, due to ill-health or lack of employment opportunities. For others, the disutility of work may be sufficiently high or their remaining life expectancy sufficiently short to justify early retirement. For yet others, in marginal employment, it may not be even meaningful to speak of retirement. So while the plan should stress the benefits of delay, it will probably be appropriate to give considerable flexibility.

5. CONCLUSION

Theoretical calculations show that for plausible preference parameters, annuitization can substantially increase the well-being of many retired households. However, rates of voluntary annuitization remain extremely low. Although it may be rational for some households not to annuitize, it seems likely that behavioral biases contribute to the lack of demand.

One solution is to mandate annuitization. This not only overcomes behavioral impediments to annuitization, but also improves annuity prices by overcoming adverse selection. But it suffers from two important disadvantages. First, it reduces the well-being of individuals who would rationally choose not to annuitize even at the more favorable rates made possible by a mandate. Second, it may deter individuals from participating in the plan. I therefore favor an appropriately designed default.

I consider there is potential for a publicly sponsored retirement plan to offer considerably more favorable annuity rates than those obtainable in the individual annuity market. First, participants could be provided with an Internet-based annuity price comparison service. I estimate that this might increase annuity payouts by 6.4%, relative to the average payout obtainable in the voluntary market. Second, plan participants are likely to experience higher mortality rates than current annuitants. Based on plausible assumptions about the socioeconomic characteristics of plan participants, this might justify a further 2 to 6% increase in annuity rates. Depending on sales volumes, it might take a considerable time for participant insurers to make appropriate rate adjustments. This process might be expedited if the administrator of the plan gathered data on participant risk characteristics.

I analyze alternative annuity products, and propose a combined inflation protected variable immediate annuity that provides an inflation-indexed guaranteed minimum level of income, with the potential for income to increase during the course of retirement, depending on the performance of the stock market.

* * *

Endnotes

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[2] http://www.annuityfyi.com/blog/2011/01/immediate-annuity-stats/. Sales of deferred annuities were substantially greater. But these are not very annuity-like in that they provide substantial death and surrender benefits that reduce the amounts that can be paid to survivors.

[3] A disadvantage of more complex and realistic models is that they often obscure the relationships between preference parameters and annuity valuation.

[4] Annuities are able to offer a higher return than similar unannuitized investments because of the "mortality credits," the reallocation of wealth from those who die to the pool of survivors. These credits increase with age. Medical costs may actually increase the value of annuitization if they result in households preferring greater consumption at older ages, when mortality credits are higher.

[5] Brown (2003) calculates AEW for individuals. Brown and Poterba (2000) show that marriage reduces the value of annuitization because the household benefits from longevity risk pooling, so the average married couple in high mortality groups would have somewhat lower AEW. In contrast, Gong and Webb (2008) calculate AEW for married couples.

[6] The term structure of interest rates is usually upward sloping in the sense that bonds with longer maturities have higher yields. Bonds can be "stripped," decomposed into the individual coupon payments and eventual return of principal. The literature uses the yields on bond STRIPS to arrive at a term structure of interest rates that can then be used to calculate expected present values. There is no market for Treasury Inflation Protected Securities STRIPS, and Sun and Webb (forthcoming) recover a STRIPS term structure from the term structure of TIPS yields.

[7] One explanation that is sometimes offered (Pang & Warshawsky, 2007; Milevsky & Young, 2007) is that households should delay annuitization to take advantage of the equity premium. But households can invest in variable immediate annuities, products that provide the benefits of annuitization while also providing exposure to equity markets. Uncertainty about health care costs might actually increase the value of annuitization because most such costs are incurred in advanced old age, and the additional return provided by annuities, relative to equivalent unannuitized investments, is greatest at such ages.

[8] Deferred annuities can be highly complex, with many riders and benefits. But these products are not the subject of the current analysis.

[9] Many low-income and minority households have a sometimes justified mistrust of financial institutions that may make them reluctant to undertake transactions that they fear they may not fully understand, and which require the financial institution to fulfill its obligations into the far-distant future.

[10] The Investment Company Institute (2010) reports that 70% of Americans are opposed to an annuity mandate.

[11] My analyses of a 2008 Health and Retirement Study module indicates that older households regard having a regular income in retirement as important, but also attach importance to control over their investments and having access to their savings.

[12] Defined benefit pension plans are prohibited from using gender to determine annuity rates (U.S. Supreme Court, 1988). I assume that the proposed plan would not be similarly prohibited.

[13] Income Solutions has negotiated prices with insurance companies, and arrives at a retail price by applying a 2 -percent markup to those prices.

[14] I discovered that it was almost impossible to collect price data over the phone. I was almost invariably referred to a local commissioned agent.

[15] A more radical approach would be to charge annuity prices based on the household's health status and other risk characteristics. Fong (2011) calculates pricing schedules. This would add to administrative costs, but might reduce adverse selection by making annuitization attractive to low risk households. Although she shows that insurance companies would be justified in offering low-risk households substantially more favorable annuity rates, it is possible that the incomes of many of these households might be too low for them to participate in the proposed plan. It is not clear whether the Income Solutions model could be adapted to incorporate medical underwriting.

[16] Both the Annuity 2000 and RP-2000 tables are period tables. They reflect the mortality rates of individuals alive in a particular year. They can be converted into cohort tables, reflecting the mortality rates of people born in a particular year, using a projection scale, typically Projection Scale AA.

[17] "Small amount" is defined as under $6,000 a year. Mortality rates are projected using Projection Scale AA.

[18] The SOA does not report data for the combined effects of small annuity sizes and blue-collar. The effects may well not be multiplicative.

[19] Dushi and Webb (2006) document a non-linear relationship between mortality rates and wealth deciles.

[20] A Society of Actuaries individual annuity experience study finds that mortality rates among individuals with annual annuity incomes of less than $2,500 were substantially higher than those predicted by the Annuity 2000 table. Society of Actuaries 2000-04 Individual Payout Annuity Experience Report, April 2009. http://www.soa.org.

[21] Spousal benefit can only be claimed once her (or his) spouse has claimed retired worker benefit. A worker who delays claiming retired worker benefit may reduce the value of his spouse's spousal benefit. A worker who has attained his full retirement age can "claim and suspend" thereby enabling his spouse to obtain her spousal benefit. Sun and Webb (forthcoming) show that even if households do not claim and suspend, it is almost invariably optimal to delay claiming Social Security, financing consumption during the interval between retiring and claiming by drawing on financial assets.

[22] Leisure activities may be more enjoyable when in good health, or when one's spouse is there to share them.

[23] In July 2011, the rates quoted by Income Solutions for nominal annuities with income payments increasing by 3% a year (somewhat above consensus estimates of the anticipated long-run rate of inflation) are significantly more favorable than those for inflation-indexed annuities. This appears to reflect both the smaller number of companies offering inflation-indexed annuities and an inflation risk premium. The attractiveness of the inflation-indexed product therefore depends on the value placed on insurance against an unanticipated upsurge in inflation.

[24] Although housing wealth is a risky asset in that its market value fluctuates, it provides valuable insurance against fluctuations in rents. Low-income households may face greater labor market risks, justifying a more conservative allocation of financial assets.

[25] Under current United Kingdom law, individuals who do not annuitize their pension wealth by age 75 are subject to punitive taxation. The government is proposing to allow individuals who can

demonstrate that they have adequate annuitized income additional flexibility in the drawdown of their remaining pension wealth (HM Treasury, "Removing the Requirement to Annuitize By Age 75." July, 2010).

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