The Longevity Annuity: An Annuity for Everyone?

Jason S. Scott*

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Jason S. Scott
Financial Engines, Inc.
1804 Embarcadero Rd.
Palo Alto, CA 94303
T: 650-565-4925 ● F:650-565-4905
E-mail: jscott@financialengines.com
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Abstract

As of 2005, individuals had an estimated $7.4 trillion invested in IRAs and employer-sponsored retirement accounts. Given these investments, many retirees will face the difficult problem of turning a pool of assets into a stream of retirement income.

Purchasing an immediate annuity is a common recommendation for retirees looking to maximize retirement spending. However, the vast majority of retirees are unwilling to annuitize all of their assets. This paper demonstrates that a new type of annuity, a longevity annuity, is optimal for retirees unwilling to fully annuitize. For a typical retiree, allocating 10%-15% of wealth to a longevity annuity creates spending benefits comparable to an immediate annuity allocation of 60% or more.

Keywords: Annuity, annuitization, pensions, longevity risk, insurance, Social Security

JEL Classifications: D11, D91, E21, H55, J14, J26
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1 Introduction

The aging of the US population and the demise of the defined benefit plan are two major trends reshaping the retirement landscape. As of this writing, the oldest of the Baby Boomers has already turned sixty. The aging of the Baby Boomers will create an unprecedented explosion in the retiree population. The assets available to these new retirees are also undergoing substantial change. The last two decades have seen a substantial shift from defined benefit plans towards a reliance on individual accounts to fund retirement. As of 2005, individuals had approximately $7.4 trillion dollars invested in IRAs and employer-sponsored defined contribution plans compared to $1.9 trillion contained in employer-sponsored defined benefit plans.¹ This shift has raised a critical question for many newly-minted retirees: “How can I convert accumulated assets into retirement income?”

An immediate annuity is a common recommendation from practitioners and academics alike to maximize retirement income from a given pool of assets. In a typical immediate annuity contract, an insurance company promises to make regular monthly or annual payments for the life of the individual in exchange for a one-time premium payment. It has been over four decades since economic theory first concluded that individuals looking to maximize guaranteed spending in retirement should convert all available assets to an immediate annuity.² However, in stark contrast to the predictions of economic theory, very few retirees allocate any dollars to an immediate annuity, much less fully annuitize.³ Given retirees’ reluctance to make large annuity purchases, this paper extends the theory by answering the question: “Which annuity should I buy with a minority of my assets?”

¹ Investment Company Institute [2006]
² See Yaari [1965]
³ For example, LIMRA [2006] estimated fixed immediate annuity sales of $5.9 billion for 2006.
The gulf between prediction and behavior is so wide that numerous academic studies have analyzed this “annuity puzzle.”\(^4\) Importantly, virtually all of the previous analysis assumes the fundamental annuity contract available is an immediate annuity. Recently, a new type of annuity contract, referred to here as a “longevity annuity,” has been introduced.\(^5\) Longevity annuities are essentially immediate annuity contracts without the initial payouts. That is, a longevity annuity involves an upfront premium with payouts that begin in the future. For example, an age 85 longevity annuity can be purchased at age 65, but payouts only commence when and if the purchaser reaches age 85. As we will see, longevity annuities are an extremely efficient form of longevity insurance. In fact, the spending benefit a retiree could achieve with a ten percent allocation to a longevity annuity typically exceeds the benefit from a fifty percent allocation to an immediate annuity. Enticing a retiree to annuitize half their portfolio could prove very challenging. However, a ten percent longevity annuity allocation which provides a similar benefit level may look much more attractive. Given their large benefits per premium dollar, longevity annuities, especially those that start payouts late in life, likely qualify as an annuity for everyone.

The intuition behind and the arguments for the desirability of longevity annuities are developed over the next four sections of this paper. Section 2 asks “what makes insurance valuable?” and develops a useful metric for evaluating potential insurance purchases. Section 3 examines various strategies retirees can utilize to turn assets into income. Section 4 builds on the analysis in Section 3 to demonstrate that longevity annuities deliver higher levels of spending increases per premium dollar compared to immediate annuities. Section 5 conducts a robustness analysis to confirm that the longevity annuity advantage is robust to various pricing, mortality and interest rate assumptions. Importantly, Section 5 also confirms the longevity annuity advantage using actual bond investments and annuity contracts available in the marketplace.

\(^4\) See Brown and Warshawsky [2004] for a summary of explanations for the “annuity puzzle” including: a bequest motive, the influence of Social Security, annuity pricing, irreversibility of the annuity purchase, etc. However, the full annuitization prediction is robust to most of these explanations. Hu and Scott [2007] explore behavioral barriers to annuitization.

\(^5\) Longevity annuities are alternatively referred to as “delayed payout” annuities owing to the fact that annuity payments are delayed relative to an immediate annuity.
Before diving into the issue of longevity risk and annuities, we start with a basic question: “What makes insurance valuable?” We begin by answering this question in a simplified setting. Consider a driving enthusiast who absolutely must have a car. Further, suppose our driver has no access to insurance to replace the car if an accident occurs. Without insurance, our driver will set aside enough money for a replacement car if an accident were to happen. This is money our driver can not spend. Access to car insurance completely changes the situation. Now our motorist only has to set aside the cost of insurance. Any remaining dollars can now be safely spent on other things. The size of this windfall depends crucially on the insurance cost relative to the replacement cost.

For example, assume the car has a replacement cost of $20,000. Suppose our driver has an excellent driving record, and only has a five percent chance of making an insurance claim. If insurance were sold at cost, then the car insurance price would be only $1,000.\(^6\) In this case, purchasing insurance allows $19,000 in additional spending relative to self-insurance. At this price, car insurance provides nineteen dollars of additional spending per insurance premium dollar.

What happens if our driver has a history of wrecking cars? The chance of totaling the car is now much higher, so the price for car insurance would also be much higher. Suppose the chance of an accident has increased five-fold to twenty-five percent. The cost of insurance would likewise rise five-fold to $5,000. Now purchasing insurance only allows $15,000 in additional spending. The spending improvement per premium dollar has been reduced to just three dollars. While insurance still makes sense, the benefit relative to self-insurance is less compelling. In an extreme case, a reckless driver with a ninety-five percent chance of totaling the car may find insurance costs have risen to a staggering $19,000. The spending benefit per premium dollar has shrunk to a paltry five cents. If insurance prices are cost plus a profit premium, insurance costs could actually exceed replacement costs for this type of driver.

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\(^6\) Assuming the insurance company sold a similar policy to numerous drivers with comparable risk profiles, the average cost of a policy would equal $20,000 * 0.05 or $1,000.
Analyzing the spending improvement per premium dollar helps individuals select from competing insurance contracts. Suppose an individual had an additional dollar she was willing to allocate to insurance. What insurance contract should she select? When the alternative is self-insurance, the answer is simple. She should allocate the extra insurance dollar to the insurance contract that frees up the most spending. In other words, she should select the insurance product with the highest spending improvement per premium dollar. To simplify the exposition, this quantity will be referred to as the Spending Improvement Quotient and be abbreviated by Q. More specifically:

\[ Q = \frac{\text{Self-Insurance Costs} - \text{Insurance Costs}}{\text{Insurance Costs}} \]

In the car insurance examples, the insurance cost was simply the car replacement cost reduced to reflect the chance of an insurance payout. If we denote the probability of an insurance payout by P, then the Spending Improvement Quotient simplifies to:

\[ Q = \frac{\text{Self-Insurance Costs} - \text{Insurance Costs}}{\text{Insurance Costs}} \]
\[ = \frac{\text{Self-Insurance Costs} - P \times \text{Self-Insurance Costs}}{P \times \text{Self-Insurance Costs}} \]
\[ = \frac{1 - P}{P} \]

This result is intuitive. To evaluate the potential insurance benefit, simply consider the likelihood of a payout. If an insurance payout is very unlikely, generally insurance is cheap relative to self-insurance, and insurance can provide substantial benefits. Alternatively, when insurance payouts are highly likely, insurance cannot be provided at much of a discount to self-insurance. Under these conditions, insurance provides little benefit. These fundamental concepts apply to all insurance contracts including longevity insurance. Focusing on high value, or high Q, insurance will be the key to maximizing the benefit per premium dollar.
3 The New Retirement Problem: Turning IRAs into Income

With the dramatic increases in IRA and 401(k) plan balances, a common problem facing retirees will be turning those assets into income. To illustrate how insurance concepts apply to the retirement income problem, we will analyze the problem faced by a newly-retired individual. Our retiree is 65 years old, and has a sizeable $1 million IRA available to fund retirement spending. Before tackling the full retirement problem, consider a simpler problem of funding spending for a single year 20 years in the future. For our retiree, this would correspond to funding spending at age 85. If our retiree wants a guaranteed payout in 20 years time, an obvious investment choice would be a zero-coupon bond. The price today for $1 in 20 years would depend on the prevailing interest rates. Assuming prevailing interest rates are 2.5% at all maturities⁷, spending in 20 years would cost:

\[ B_{20} = \frac{1}{(1.025)^{20}} \]

\[ = \$0.61 \]

Each dollar our retiree wants to spend at age 85 could be initially secured for a sixty-one cent investment in a 20 year zero-coupon bond.

Securing spending with bonds is analogous to setting aside the full replacement cost of the car. With self insurance, the money is set aside whether or not the insurance event occurs. Similarly, the dollar from the zero-coupon bond is available whether or not our retiree actually lives to spend it. An alternative to bonds is an annuity contract. Suppose there was an annuity contract that could be purchased today that had a one-time payout in twenty years. The annuity contract differs from the bond in that the payout is contingent on survival. Given the similarities in payout structure, we denote this single payment annuity as a zero-coupon annuity.

How much does a one dollar payout in twenty years cost using a zero-coupon annuity? Just as in the car insurance example, the price for longevity insurance depends on the probability of a payout. For longevity insurance the payout probability is the

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⁷ This roughly corresponds to the real rate of interest as of this writing.
chance our retiree survives twenty years to qualify for the payout. If we let $S_{20}$ be this twenty year survival probability, then the zero-coupon annuity price would be:

$$A_{20} = \text{Price today of a zero-coupon annuity which pays out$1 in 20 years, if alive.}$$

$$= S_{20} \times B_{20}$$

Assuming our retiree is male, the twenty year survival probability appropriate for annuity pricing would be about fifty-one percent.\(^8\) Even with some insurance market related frictions, a zero-coupon annuity is offering spending in twenty years at nearly a fifty percent discount to self-insurance in the bond market. Just as in the car insurance example, we can calculate a spending improvement quotient for the twenty year zero-coupon annuity. In this case, the improvement would be:

$$Q_{20} = [\text{Self-Insurance Costs} - \text{Insurance Costs}] / [\text{Insurance Costs}]$$

$$= (B_{20} - A_{20}) / A_{20} = (1 - S_{20}) / S_{20}$$

$$= 0.94$$

The spending that costs $1.94 to secure in the bond market only cost $1.00 in the annuity market. Thus, every annuity dollar allocated to fund spending at age 85 frees up $0.94 cents for additional spending.

The above analysis indicates that annuity-based spending at age 85 can be secured at a substantial discount to bond-based spending. There is nothing particularly special about age 85 spending. In fact, we can repeat the analysis to calculate the potential insurance benefit for each age between 65 and 100. The $Q$ analysis for each year from 65 to 100 is displayed in Figure 1. The range of spending improvements is surprising. The potential insurance benefit for spending at age 66 is a paltry one cent per dollar invested. Given the previous examples, the reason for this result is obvious. People that purchase annuities at age 65 almost always live to collect the payment at age 66. In this situation, potential insurance benefits are extremely limited. In contrast, the age 100 payment has a $Q$ value of 31.79. Funding spending at age 100 costs just pennies on the dollar using the

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\(^8\) Social Security population average mortality tables indicate a 40% survival probability. The 51% is based on GAR-94 mortality tables (with generational adjustments). The annuity pricing survival rate is higher for two reasons. First, annuity purchasers are generally healthier than average. Second, insurance companies have to cover the cost of doing business. Given the reserves and adjustments built into the GAR-94 table, it should be a reasonable choice for estimating annuity prices.
annuity market compared to the bond market. For this individual, the insurance benefit of the age 100 zero-coupon annuity is approximately twenty-five hundred times the insurance benefit provided by the age 66 zero-coupon annuity.

Abstracting from the details of Figure 1, the message is clear. Longevity insurance provides substantial benefits for late-life spending, but much smaller benefits for near-term spending. This observation explains both the problem with immediate annuities and the potential of longevity annuities. Both immediate and longevity annuities can be thought of as bundles of zero-coupon annuities. An age 85 longevity annuity, for example, bundles together each of the zero-coupon annuities from age 85 onward. Similarly, immediate annuities represent a bundle of all the zero-coupon annuities. While longevity annuities concentrate more dollars on high value insurance, immediate annuities add near-term, low-value annuity payments to the bundle. The resulting blended average Q-value for the immediate annuity is 0.56. In contrast, the Q-value for the age 85 longevity annuity is more than five times higher at 2.93.

4 Longevity Annuities: Optimal Insurance to Maximize Spending

For each dollar our retiree shifts from bonds to immediate annuities, $0.56 is available for additional spending. If all assets were shifted to an immediate annuity, spending would increase by 56% relative to a bond-based spending program. But what if our retiree is uncomfortable with a 100% allocation to annuities? How should they allocate the dollars they are willing to annuitize? Figure 1 provides the basis for an answer. For the very first dollar annuitized, the best spending improvement can be had by purchasing the age 100 zero-coupon annuity. It is tempting to put all annuity wealth into the age 100 annuity. After all, look at the spending boost! However, our retiree needs spending in every year, not just at age 100. Even though our retiree cannot exclusively focus all spending on age 100 annuities, the first bonds that should be substituted with annuities should be bonds earmarked for age 100 spending. Assuming

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9 The Q value for immediate annuities can be calculated by comparing a bundle of zero-coupon bonds to a bundle of zero-coupon annuities. Purchasing $1 of spending each year in retirement using bonds costs $B_0 + B_1 + ... + B_{35} = $1 + $0.976 + ... + $0.421 = $24.15. Purchasing $1 of spending each year in retirement using annuities costs $A_0 + A_1 + ... + A_{35} = $1 + $0.9636 + ... + $0.0129 = $15.47. The spending improvement achieved by shifting bond-based to annuity-based spending is thus 0.56.
our retiree wishes to allocate more dollars to annuities, the next highest surplus producing annuity will be the age 99 annuity followed by the age 98 annuity.

The optimal bundle of zero-coupon annuities to purchase thus depends on the amount of assets our retiree is willing to annuitize. However, since optimal strategies entail sequentially adding earlier and earlier zero-coupon annuities, all optimal bundles are longevity annuities. If our retiree were only willing to annuitize a few dollars, then the longevity annuity that begins payments at age 100 would be optimal. If more dollars are available for annuitization, a longevity annuity that begins payouts at age 99 would be in order. The start date for the longevity annuity would continue to be reduced until the annuity allocation is exhausted. Surprisingly, only retirees interested in fully annuitizing their assets should select an immediate annuity. All other retirees should opt for the longevity annuity that exhausts their willingness to annuitize.

Figure 2 illustrates the difference between allocating dollars to immediate annuities versus longevity annuities. Allocations to immediate annuities result in a constant $0.56 additional spending per dollar annuitized. Thus, the available spending using an immediate annuity increases linearly from a base of $41,416 with a pure bond portfolio to a maximum of $64,645 with a 100% annuity allocation. The curve corresponds to the spending achievable with longevity annuities. The longevity annuity curvature stems from the fact that the initial dollars are spent on high-Q, age-100 payments. Additional dollars are then spent on successively lower-Q payments. Diminishing returns causes the slope of the longevity annuity curve to gradually flatten as the annuity allocation increases.

The longevity annuity spending curve shares both the beginning and ending points with the immediate annuity spending line. The two strategies emanate from the same point, since 0% annuitized corresponds to bond-only income for both. With 100% annuitized, a longevity annuity has a payment start date that is immediate. Thus, the two annuity options share the 100% annuitized point as well. However, at every point between 0% and 100% annuitized, the longevity annuity provides higher spending levels per dollar annuitized.

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10 Interested readers can refer to Scott, Watson and Hu [2006] for more details on optimal annuitization.
To illustrate the leverage available from longevity annuities, consider the age 85 longevity annuity (i.e. the longevity annuity that begins to make payments at age 85).\textsuperscript{11} Suppose our retiree optimally funds spending prior to age 85 with bonds, and funds spending after age 85 with a longevity annuity. Using the bond and annuity prices derived above, our retiree would find that an 11.5% allocation to an age 85 longevity annuity would generate annual payouts of $55,385 starting at age 85. Allocating the balance of the portfolio to zero-coupon bonds generates $55,385 in annual income prior to age 85. Thus, annual spending throughout retirement has increased 33\% relative to a bond-only portfolio. If an immediate annuity was used instead, the same 11.5\% annuity allocation would only increase spending by 6.5\%. To achieve a comparable spending increase with immediate annuities, our retiree would have to allocate more than 60\% of their portfolio to annuity purchases. Convincing a retiree to annuitize 60\% of assets could be extremely challenging irrespective of the potential benefit. However, annuitizing 11.5\% of assets may prove much more palatable, especially if this modest allocation allows guaranteed spending to increase by over a third. The ability of longevity annuities to deliver a majority of the annuitization benefits for a relatively small portfolio allocation makes them a powerful tool to help retirees effectively turn assets into income.

5 Robustness Analysis: Mortality, Interest Rates and Real World Pricing

The preceding analysis made three key assumptions in order to evaluate the relative efficiency of longevity annuities. Those assumptions were the mortality rates for our retiree, the prevailing interest rates for bond investments, and the formula by which insurance companies turn mortality and interest rates into annuity prices. This section explores the impact of altering these key assumptions.

The robustness analysis consists of analyzing six cases each with a different set of core assumptions. The results for each case are reported in Table 1. Case 1 assumes the retiree is male, prevailing interest rates are 2.5\%, and annuity prices are determined using the theoretical model described in the preceding paragraphs. Thus, Case 1 corresponds to the situation previously explored in detail. Given those assumptions, we determined that

\textsuperscript{11} This longevity annuity is highlighted since it is the latest starting readily available longevity annuity.
an 11.5% allocation to an age 85 longevity annuity provided more than five times the spending improvement compared to the immediate annuity (33.7% vs. 6.5%). All of this information is reported in first column of Table 1.

Case 1 assumed our retiree was male. However, women have very different mortality rates compared to men. Given mortality plays a critical role in annuity pricing, Case 2 repeats the analysis assuming our retiree is female. Improved mortality has increased the annuity costs in general. However, longevity annuities still provide substantial benefits relative to immediate annuities. For this situation, the spending increase for our retiree is 4.35 times as big with a longevity annuity compared to an immediate annuity.

Case 1 and Case 2 assume an interest rate of 2.50%. As of this writing, this interest rate corresponds to the real rate of interest available from government inflation-indexed bonds. If the dollars our retiree is trying to secure each year in retirement are inflation-indexed dollars, then this real interest rate is appropriate for the calculations. Some retirees may prefer fixed spending that does not increase with inflation. For this situation, nominal interest rates would be appropriate. As of this writing, nominal interest rates are approximately 5.00%. Case 3 and Case 4 repeat the analysis using the nominal rate of interest. While the specific numbers have changed,\textsuperscript{12} the relative strength of longevity annuities remains. For these cases, the spending improvement for the longevity annuity relative to the immediate annuity increased by a factor of 6.61 and 5.52, respectively.

The analysis up to this point has been somewhat theoretical to help pinpoint the key reasons why longevity annuities provide substantial advantages. However, it is important to realize that benefits from longevity annuities can be readily achieved by current retirees. As of this writing, there are at least two insurance companies that offer longevity annuities. MetLife introduced longevity annuities in 2004 under the product name Retirement Income Insurance. In March of 2006, The Hartford also introduced a longevity annuity product called The Hartford Income Security.

\textsuperscript{12} Fixed nominal payments imply our retiree is spending more during early retirement and less during late retirement. The initial spending level is higher, but is eroded by inflation over time. Since less wealth is used to fund spending after age 85, the amount optimally allocated to an age 85 annuity decreases.
Actual bond and annuity prices can be obtained to assess the validity of the preceding analysis in the real world. In July of 2006, MetLife provided a longevity annuity price quote for a 65 year old wishing to purchase an age 85 longevity annuity. In addition to annuity prices, bond yields are required to perform the analysis. Treasury yield data were obtained on July 13, 2006. At that time, the yield curve for government securities ranged from 5.00% to 5.27%.

Case 5 and Case 6 report the results when using actual bond and annuity prices. For a male retiree, a modest 7.9% longevity annuity allocation allows spending to increase by 21.5%. A comparable allocation to an immediate annuity only increases spending by 3.1%. For this real world case, the spending improvement from longevity annuities was 6.91 times the spending improvement achieved with immediate annuities. The results using actual prices are very comparable to those achieved with theoretical pricing assumptions (Case 3 and Case 4). If anything, actual prices suggest the size of the longevity annuity advantage is slightly underestimated with the theoretical pricing model.

The robustness analysis considered the influence of three critical assumptions: mortality rates, interest rates and annuity pricing formulas. While the particulars of the analysis do indeed depend on these three factors, the advantage of longevity annuities was robust across all of these permutations. In some sense, the robustness is not surprising. The key to longevity annuity benefits is the realization that purchasing income conditional on survival must get cheaper as the chance of survival declines. Since cheaper insurance corresponds to more valuable insurance, longevity annuities allow retirees to concentrate their annuity dollars on high-value insurance. This fundamental advantage of longevity annuities should be robust across virtually all scenarios.

For a male retiree, a $100,000 premium purchased monthly payments of $7,730. Given this price quote, each dollar of annual income starting at age 85 costs approximately $1.10 (assuming no within-year mortality and 5% interest rates). An age 67 longevity annuity price quote implied a per dollar annuity cost of $10.24. The price per dollar spending using an immediate annuity was estimated by taking the age 67 longevity annuity and adding $1 and $0.94 to account for the age 65 and age 66 payments, respectively. Higher levels of adverse selection with immediate annuities is consistent with the increased longevity annuity benefit multiple.
6 Conclusion

Trillions of dollars have accumulated in IRA and employer-sponsored retirement accounts with trillions more expected over the ensuing decades. Millions of retirees will face the problem of translating their accumulated assets into retirement income. Immediate annuities are a typical recommendation from academics and practitioners alike to increase guaranteed spending from a given pool of assets. Unfortunately, the theoretical foundation for immediate annuities relies on the willingness of retirees to fully annuitize their assets. In practice, virtually no retiree will voluntarily annuitize their entire portfolio. This paper extends the theory by answering the key question: “Which annuity should I buy with a minority of my assets?”

The answer to this question is somewhat surprising. By focusing on the fundamental properties that make insurance valuable, we demonstrate that longevity annuities maximize guaranteed retirement spending per dollar annuitized. Only retirees willing to fully annuitize will find an immediate annuity optimal. All other retirees should prefer some form of longevity annuity. In fact, the first few dollars annuitized with a longevity annuity provide such substantial benefits that the vast majority of retirees should find these annuities desirable. A sample calculation, using actual annuity prices, found that a 65 year old male retiree could increase his guaranteed spending by over twenty-one percent by allocating less than eight percent of his portfolio to an age 85 longevity annuity. This spending improvement was almost seven times the spending improvement from a comparable immediate annuity allocation.

This paper’s title asks “is the longevity annuity an annuity for everyone?” The answer is a qualified “yes.” Many individual-specific considerations are important to the annuitization decision. The desire to leave behind a large estate could motivate some retirees to avoid annuities. Likewise, some retirees may have such uncertain future spending needs that locking in a spending level with an annuity is undesirable. However, at some point the benefit per premium dollar grows so large that this form of insurance makes sense for most people. Since longevity annuities, especially those that start payouts late in life, offer substantial benefits per premium dollar, almost every retiree would likely benefit from at least a modest allocation of assets to a longevity annuity.
References


Appendix A: Longevity Annuity Policy Considerations

A straightforward economic analysis demonstrates the desirability of longevity annuities. However, large scale adoption of longevity annuities may depend critically on public policy decisions. This appendix highlights two important policy decisions that could increase longevity annuity utilization rates. First, the current rules regarding required minimum distributions (RMDs) create a barrier to the adoption of longevity annuities. Longevity annuities that began payouts after age 70 currently run afoul of the RMD rules. One example of the issue would be an age 65 retiree that uses their IRA to purchase an age 85 longevity annuity. This retiree cannot make the RMD at age 70 since no annuity payments are scheduled until age 85. Even if only a portion of the IRA was used to make the longevity annuity purchase, future market declines or withdrawals could still result in insufficient funds to make the RMDs. Recognizing this issue, insurance companies do not currently accept qualified dollars to purchase longevity annuities with late life start dates. IRA assets currently must first be withdrawn and taxed prior to a late dated longevity annuity purchase. This is a substantial barrier to adoption of a very valuation annuitization option.

The second policy issue relates to the role inertia currently plays in the utilization of employer sponsored pension plan features. With the recent Pension Protection Act (PPA), Congress signaled a willingness to be more proactive in helping individuals effectively use their employer-sponsored retirement plans. The underlying principle was to encourage employers to create plan defaults that were in the best interest of participants. Assuming inertia causes many employees to retain the defaults, overall retirement outcomes should be improved. Examples of newly defaulted decisions include: automatic enrollment, automatic savings escalations, and automatic investment or management. However, the PPA was silent on ways to automate the income phase of the 401(k). It is not surprising that the PPA was silent given the lack of consensus around an income solution that is appropriate as a default for all participants. Longevity annuities offer an intriguing possibility. Since the benefit per dollar annuitized is dramatic, at least for the later dated longevity annuities, a longevity annuity with a sufficiently late start date may be an ideal default candidate. The cost would only be 5%-15% of assets, but the longevity protection benefit would be substantial.
Figure 1
Spending Improvement Quotient (Q)
Zero-Coupon Annuity Payments

Figure 2
Spending Longevity Annuity vs. Immediate Annuity
$1,000,000 Assets, Age 65, Male
Table 1
Robustness Analysis: Interest Rate, Mortality, and Annuity Pricing Assumptions
Age 85 Longevity Annuity vs. Immediate Annuity

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Age 85 Longevity Annuity Results

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Immediate Annuity Results

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Longevity Annuity Benefit Multiple

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<td>6.61</td>
<td>5.52</td>
<td>6.91</td>
<td>5.84</td>
</tr>
</tbody>
</table>

1 Treasury yield curve on 07/13/06 ranged from 5.00% to 5.27%
2 Annuity allocation required to equalize income across all retirement years. Income from age 65 to 84 is bond-funded. Thereafter annuities fund income.
3 Immediate annuity prices estimated from age 67 longevity annuity prices
4 Ratio of longevity annuity spending improvement to immediate annuity spending improvement