Longevity Insurance Annuities: Lessons From the United Kingdom

Recent U.S. Treasury Department proposals have focused attention on *longevity insurance annuities*. These are deferred annuities that begin payment at advanced older ages, such as the age of 82. While the United Kingdom has by far the world's largest annuity market, and some insurance companies used to provide longevity insurance annuities, currently no companies provide these annuities. The main reason for the change is that proposed European Union regulations will require insurance companies to increase their reserves for these annuities in recognition that there is no asset available to effectively hedge the risk of unexpectedly large improvements in life expectancy.

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Longevity insurance is a deferred annuity that starts paying benefits at an advanced age, such as the age of 82. Because these annuities provide insurance against running out of money at advanced ages, they have attracted interest recently as an important innovation in the way retirement income is provided. In order to encourage their use, in 2012 the Treasury Department released a proposed regulation designed to encourage 401(k) plans and similar employer-provided plans to offer a longevity insurance annuity as a form of benefit payout. The proposed regulation also applies to individual retirement accounts (IRAs) (U.S. Department of the Treasury 2012, Turner and McCarthy 2013).

The United Kingdom has experience with longevity insurance annuities. The U.K. pension fund industry is the second largest in the world by value, with assets of around 20% of those held in the United States. However, the U.K. lifetime annuity market is much larger than in the U.S., accounting for more than half of the world annuity market. Around 500,000 annuities are purchased each year at a cost of £12 billion ($18.8 billion), mainly as a result of the effective requirement to buy life annuities as part of defined contribution pension plan provision of annuities (Blake, Boardman and Cairns 2013a). However, currently no life insurance company in the U.K. provides longevity insurance annuities to individuals.[1]

This article explores the reasons why longevity insurance annuities would be desirable for some retirees, factors affecting the supply of longevity insurance annuities in the U.S., the reasons why they are no longer provided in the U.K. and the implications of those reasons for the U.S. It then provides

a proposal for longevity bonds provided by the government, which would facilitate the provision of these annuities. It concludes with a brief summary of the lessons for the U.S. from the U.K. experience.

Factors Affecting the Demand by Workers for Longevity Insurance Annuities

While all annuities provide retirees a degree of longevity insurance, in recent years the term *longevity insurance* has been used to refer to a particular type of deferred annuity, also known generically as *advanced life deferred annuities* or *longevity annuity contracts*, as well as by product names used by life insurance companies providing them. *Longevity insurance* is a deferred annuity that starts at an advanced age, such as the age of 82. This annuity is similar to buying car or home insurance with a large deductible, which optimally deals with catastrophic risk. By analogy, longevity insurance annuities provide insurance against outliving one's assets, but only when that risk becomes substantial at advanced ages (Milevsky 2005).

The risk of retirees outliving their assets (and failing to leave intended bequests) is increased when life expectancy is increasing, when people underestimate their life expectancies and when inflation-adjusted capital market returns are low. Retirees, however, also face the opposite risk of spending less than they otherwise could out of concern for having enough assets to pay for an unexpectedly long life (and as a result leaving unintended bequests). Unless they choose some type of annuity, retirees with 401(k) plans may face the difficult challenge of managing the spend-down of their assets over a retirement period of uncertain length.

With a longevity insurance annuity, the planning problem is greatly simplified. Instead of planning for an uncertain period, participants can plan for a fixed period—from the date of their retirement to the date at which they start receiving the longevity insurance benefit should they survive that long. Longevity insurance thus reduces uncertainty in planning. It changes the planning problem from one with an uncertain end point (date of death) to one with a certain end point (the date at which longevity insurance begins providing benefits). An additional advantage of longevity insurance annuities is that they provide an (imperfect) alternative to long-term care insurance for those who are unable to qualify for that insurance. With the decline in defined benefit plans, they also serve as an alternative to the annuities provided by those plans.

Webb et al. (2010) estimate that retirees could maintain level income throughout retirement by purchasing at the age of 60 longevity insurance providing for payments beginning at the age of 85 for a relatively small amount—15% of pension wealth. Thus, a further advantage of a longevity insurance annuity is that it clarifies to the worker that he has the option to partially annuitize his account balance, rather than making an all-or-nothing decision. It allows individuals to purchase an annuity without needing to give up a relatively large sum of money, which many retirees are reluctant to do.

The age of purchase and the length of the deferral affect the level of benefits provided. For example, a longevity insurance annuity purchased with $100,000 at the age of 70 would be expected to provide annual payments starting at the age of 85 of between $26,000 and $42,000 depending on the interest rate, whether a joint and survivor annuity was chosen and other factors. If the purchase was made instead at the age of 65 with the starting date at the age of 85, the $42,000 figure would increase to $51,000 (U.S. Treasury 2012). Alternative estimates indicate that an immediate annuity purchased with $100,000 and starting at the age of 65 would provide $6,950 a year for life, compared to the same purchase with benefits starting at the age of 85 yielding $63,990 for life (Tergesen 2012). These benefits would be subject to inflation risk, but some policies allow for lower starting benefits with an automatic escalation. The amount of benefit depends on the interest rates prevailing at the time of purchase, with a risk associated with these annuities being that the purchase occurs at a time when interest rates are low. A strategy to deal with that risk would involve making smaller purchases of longevity insurance annuities over a period of several years.

Horneff et al. (2007) use a simulation model to show that the percentage of resources that a person would optimally annuitize increases over time during retirement. People who have some financial resources invested in equity can benefit from the equity premium early in retirement, gradually re-

ducing their investment in equity, and increasing the amount that is annuitized. A longevity insurance benefit does not follow a gradual pattern of increasing the share of assets that is annuitized, but it does capture some of the benefit of that strategy. They find that most retirees optimally would avoid full annuitization until an advanced age, but by the age of 80 would fully annuitize their financial wealth, other than wealth used for bequests. Thus, this research provides an additional argument in favor of longevity insurance.

Longevity Insurance Annuities in the United States

While most U.S. life insurance companies do not currently offer this annuity, three that do are New York Life Insurance Company, Symetra Life Insurance Company and Northwestern Mutual Life Insurance Company (Tergesen 2012). New York Life is currently the largest seller of this type of annuity in the U.S. However, only 4% of the purchasers of these annuities purchase an annuity that is solely a longevity insurance annuity. Most purchase such annuities that also provide death benefits (New York Life 2012).

Prudential Supervision of Annuity Providers

Life insurance companies providing annuities are regulated in the U.S. at the state level. Purchasers of annuities in the U.S. are protected against default by state guaranty associations, but the dollar limit of the coverage varies considerably across states and can be as low as $100,000. The National Association of Insurance Commissioners (NAIC) sets solvency standards for adoption by states. A primary goal of NAIC is to harmonize rules across the country. However, states can use their own rules.

In 2012, NAIC approved new rules for determining reserve requirements that will generally reduce the amount of required reserves to be held by life insurance companies. Some state regulators, however, have argued that the new rules will leave life insurance companies underreserved. The change applies to future business and does not affect policies already in place, so its effect on reducing the total reserves of life insurance companies would phase in over time (Scism 2012). The new principle-based approach (PBA) to determining required reserves uses risk analysis and risk management techniques to capture underlying annuity risks more accurately than the current rule-based approach (American Academy of Actuaries 2013). With the new approach, state laws would establish principles on which the determination of reserves would be based, rather than using specific formulas, as is currently done. However, critics argue that the PBA requires a level of sophistication that many insurers and regulators do not possess. It is anticipated that the PBA would not become effective as NAIC standards before 2015 (Morris 2012). States were able to begin adopting the standards in 2013 (NAIC 2013).

Insurers providing longevity insurance must have sufficient reserves to ensure the provision of these benefits even if longevity substantially improves, for example, because of a medical breakthrough in gene therapy. The 2013 Trustees Report for Social Security (OASDI) lists three different mortality rate decline assumptions. The more costly assumption assumes that mortality rates will decline 50% more rapidly than does the intermediate assumption (Office of the Chief Actuary 2013).

The cost of this risk is greater in a low-interest-rate environment than in a high-interest-rate environment, because in a low-interest-rate environment the expected present value of possible future benefits is greater. Even in a high-interest-rate environment, the risk of lower interest rates in the future is a factor that affects the provision of longevity insurance annuities.

Government Policy Encouraging Use of Longevity Insurance Annuities

A proposed regulation by the Treasury Department in early 2012 deals with the issue of required minimum distributions in pension plans, which currently makes it difficult to purchase a longevity insurance annuity through a pension plan (U.S. Treasury 2012). The proposed regulation clarifies that purchase of a qualified longevity insurance annuity would not be prohibited by the required minimum distribution rules, which require that distributions start by the age of 70½, substantially earlier than distributions from longevity insurance annuities, and prescribes their minimum levels. Under the proposed amendments to these rules: "prior to annuitization, the participant would be permitted to exclude the value of a longevity annuity contract that meets certain

requirements from the account balance used to determine required minimum distributions." The percentage of the participant's account balance that could be used for this purpose would be limited to 25%. In addition, a maximum dollar amount of $100,000 would be set, which would be the maximum amount for all plans the participant had in which he purchased such an annuity.[2] The payment of the annuity must begin by the age of 85.[3]

The annuity would be permitted to have an acceleration option, so that payments increased over time to offset the effect of inflation. The requirements allow only a limited number of options to be available, in part in order to facilitate comparison across products. Other requirements would also apply in order for the annuity to be a qualifying longevity annuity contract.

Longevity Insurance Annuities in the United Kingdom

More than half the annuities sold in the world are sold in the U.K. (Singleton et al. 2010). The annuity market in the U.K. is the best developed annuity market in the world. At one time, longevity insurance annuities, referred to as *deferred annuities*, were sold in the U.K., but that is no longer the case. Currently, no life insurance company in the U.K. offers these annuities to individuals. This section examines the reasons for this change.

Prudential Supervision of Annuity Providers

The regulator of annuity providers (since 2013 the Prudential Regulation Authority) focuses on prudent investment strategy, prudent evaluation of assets, the relationship of assets to liabilities and the total amount of reserves needed (Daykin undated). Insurance companies must set aside reserves now for the liabilities they have taken on for future benefit payments. Their risks can be reduced by investing in assets that have payout patterns matching the payout requirements of their liabilities. To the extent that asset-liability matching is not possible, insurance companies need to maintain higher reserves to protect against higher than expected benefit payments. Problems arise both for risk management and reserving if it is not possible to match asset payouts to changes in the liability stream due to unexpected increases in longevity.

For determining required reserves for annuities, prudence means assuming that life expectancy will be higher than the best estimate of life expectancy. Since the most likely rate at which mortality will improve in the future is difficult to estimate, annuity providers need to make an allowance for the uncertainty surrounding life expectancy estimates. Another issue is that annuitants with larger annuity values tend to be wealthier and have higher life expectancies, requiring a further upward adjustment to reserves to account for these selection effects.

In the European Union (EU), a new regulatory regime affecting life insurance companies, Solvency II, is due to be introduced in 2016 (Institute and Faculty of Actuaries 2012). The current Solvency II proposals, if adopted, will require insurers to hold significant additional capital to back their annuity liabilities if longevity risk cannot be hedged effectively or marked to market. This regulatory approach is based on the use of economic principles to measure the risks of the assets and liabilities of insurers to make sure that the regulatory capital they hold is appropriately aligned to cover these risks.

The problem insurers face is that no assets currently available have returns that are correlated with longevity risk. For this reason, Solvency II requires that life insurers providing deferred annuities hold reserves substantially in excess of expected costs to back these annuities. This is to ensure that the insurers will have adequate resources to provide the promised benefits if life expectancy improves more than expected (i.e., by more than the best estimate) in the future.

In the absence of an effective hedge against life expectancy improvements, Solvency II requires that insurers hold sufficient capital to protect themselves against 199 out of every 200 likely scenarios of life expectancy improvements in excess of the best estimate over the course of one year (i.e., the capital is sufficient to cover 99.5% of likely cases of longevity increases).

This requirement has raised the cost of providing deferred annuities to the point that life insurance companies no longer offer them to individuals in the U.K. because they believe demand would be insufficient at the prices they must charge to cover their reserve costs. Another contributing factor affecting the lack of provision of longevity insurance annuities is the requirement since

the beginning of 2013 that these annuities be provided on a unisex basis. The cost difference between the genders in providing longevity insurance annuities is considerably greater than the cost difference in providing immediate annuities at retirement age (Turner and McCarthy 2013).

Under Solvency II, it is proposed that insurance liabilities are increased by the addition of a market value margin (MVM) reflecting the cost of capital to cover nonhedgeable risks. For annuity companies this is principally longevity risk. It is currently proposed that in the absence of a hedging instrument for longevity risk, EU insurers will have to charge a 6% cost of capital above the risk-free rate when calculating the MVM. As a consequence of the long duration of annuities, the Solvency II requirements could result in the amount of capital held for longevity risk approximately doubling from current levels. One-third of this increase is due to increased allowances for nonhedgeable longevity risk, and the remainder is due to other changes required by Solvency II. The resultant extra capital for longevity risk and other Solvency II impacts would have to be passed on to customers, and the money's worth of annuities could fall by up to 10%.

Hedging Longevity Risk

The lack of a hedge against longevity risk in annuities raises their cost, and thus is part of the explanation of why relatively few people voluntarily purchase annuities. Because life insurance companies provide life insurance as well as annuities, it might be thought that the provision of life insurance would serve as a hedge against the risk of improving life expectancy. This is known as natural hedging across different lines of business. Losses in one line of business could be offset by gains in another line. To be most effective, this source of hedging would require that the company's life insurance and annuity lines were roughly equal in value, and that their new sales of annuities and life insurance were roughly equal in value, both requirements limiting the usefulness of the hedge.

The main reason why the provision of life insurance is a poor hedge for annuities, however, is that the population that purchases life insurance tends to be different from the population that purchases annuities. The population that purchases life insurance tends to have shorter life expectancies and to be younger than the population that purchases annuities. The correlation between the improvements in mortality for these two groups is sufficiently low that the provisions of these two products by the same company does not serve as a sufficiently effective hedge against life expectancy risk to significantly reduce the required reserves.

If regulations do not require full recognition of the mortality risk in determining reserves for longevity insurance annuities, the ability of a life insurer to pay for the annuities could be alternatively secured, at least to some extent, by cross-subsidization by purchasers of immediate annuities. Because longevity insurance annuities are a relatively small part of the business of the life insurance companies providing them, the reserve requirements for them could be moderately less strict than for major lines of business (Griebenow and Walker 2012). That approach, however, may be less than desirable because purchasers of longevity insurance annuities presumably have higher life expectancy and higher lifetime wealth than purchasers of immediate annuities.

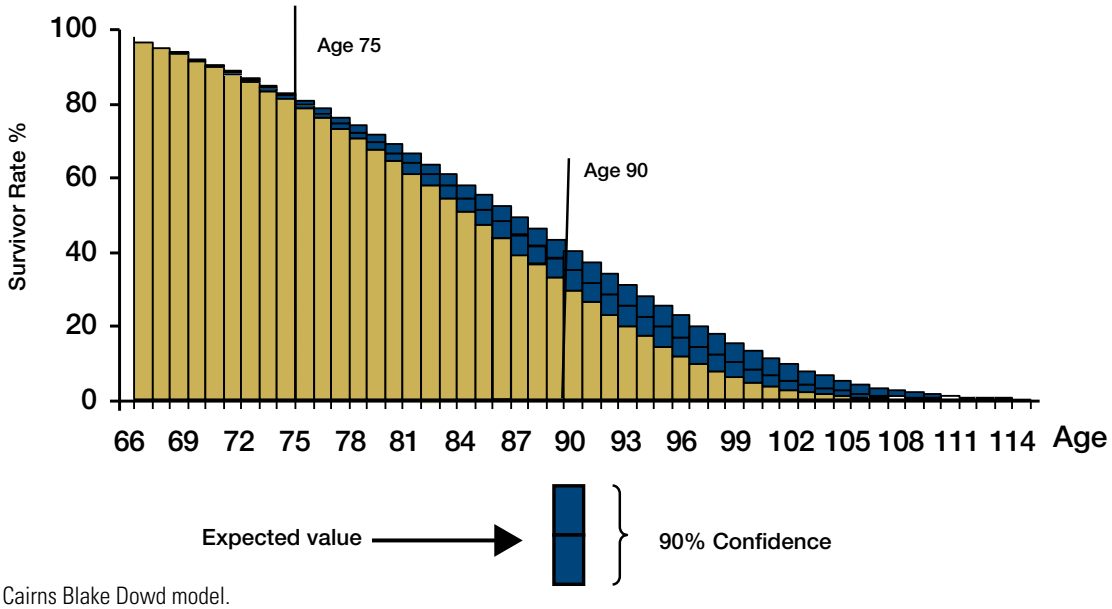
Longevity Risk

Unexpected improvements in life expectancy have a greater effect on the reserves required to back longevity insurance annuities than on the reserves for immediate annuities because of the substantial length of time before longevity insurance annuities begin payments. If longevity improvements depart from expectations in the same direction at all future ages, then the impact of these departures compounds over time.

Figure 1's survivor fan chart is useful to an annuity provider for analyzing the mortality risk it faces. The chart shows the likely range of annuitants from a given birth cohort surviving to each age. If more survive to each age than was expected, the annuity provider has to make higher total annuity payments than was anticipated. A previous study constructed a fan chart showing the uncertainty surrounding projections of the number of survivors to each age from the cohort of males from the national population of England and Wales who were the age of 65 at the end of 2006 (Blake et al. 2008). The chart shows that there is little uncertainty out to the age of 75: We can be fairly confident that approximately 19% will have died by the age of 75. The uncertainty

FIGURE 1

Survivor Fan Chart—Males Aged 65



Source: Cairns Blake Dowd model.

peaks at the age of 93; the confidence interval band is widest at this age. The best estimate is that 36% will survive to the age of 90, but it could be anywhere between 30% and 41%. This difference is a large range.

Longevity Bonds

We now show how a longevity bond with the following characteristics can help to hedge systematic longevity risk and thus facilitate the offering by life insurance companies of longevity insurance annuities:

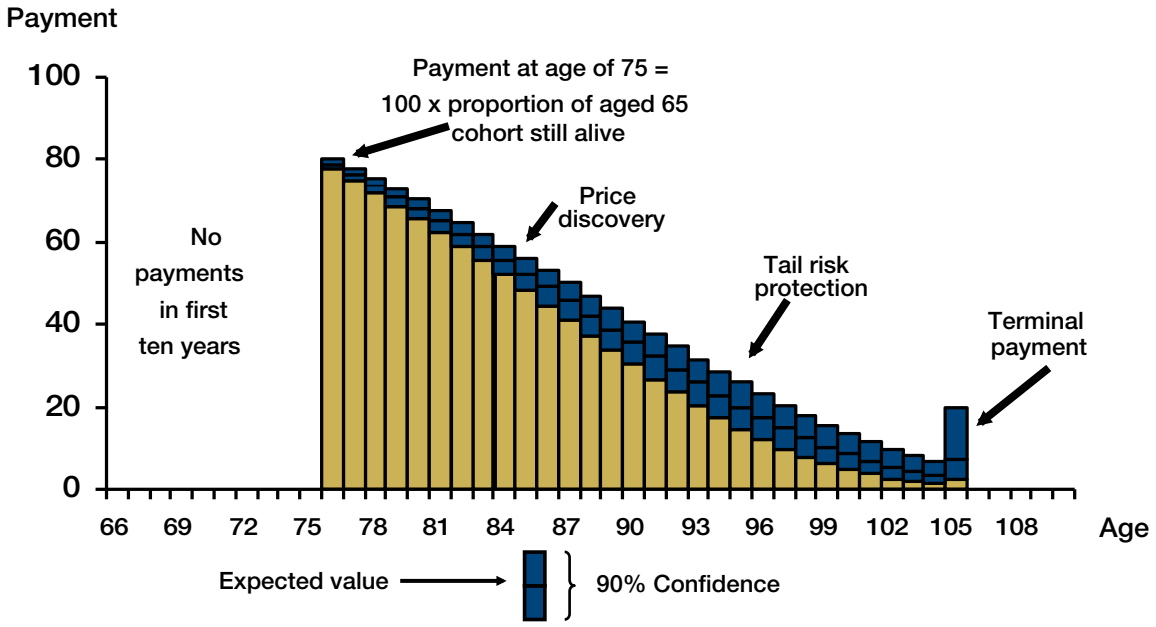
- The bond pays coupons that decline over time in line with the actual mortality experience of a cohort of the population, say 65-year-old males from the national population. So the coupons payable at the age of 75, for example, will depend on the proportion of 65-year-old males who survive to the age of 75. (See Figure 2.)
- Coupon payments are not made for ages for which longevity risk is low. So, for example, the first coupon might not be paid until the cohort reaches the age of 75 (such a bond would be denoted as a *deferred longevity bond*).
- The coupon payments continue until the maturity date of the bond, which might, for example, be 40 years after the issue date when the cohort of males reaches the age of 105.
- The final coupon incorporates a terminal payment equal to the discounted value of the sum of the post-105 survivor rates to account for those who survive beyond the age of 105. The terminal payment is calculated on the maturity date of the bond and will depend on the numbers of the cohort still alive at that time and projections of their remaining survivorship. It is intended to avoid the payment of trivial sums at very high ages.
- The bond pays coupons only and has no principal repayment.

Such a bond would provide a hedge for the systematic longevity risk faced by annuity providers. If population survivorship is higher at each age than expected, the bond pays out higher coupons. This is what annuity providers need to help match the higher than expected annuity payments they need to make in the case of a larger than an-

FIGURE 2

Deferred Longevity Bond for Male Aged 65 With Ten-Year Deferment

Longevity bond payable from age 75 with terminal payment at age 105 to cover post-105 longevity risk



Source: Cairns Blake Dowd model.

ticipated increase in longevity. If, on the other hand, survivorship is lower at each age than was expected, the bond pays out lower coupons. But the annuity payments are also likely to be lower.

The bond, however, provides a perfect hedge for the systematic longevity risk faced by annuity providers only if the annuitants have exactly the same mortality experience over time as the cohort underlying the bond. If the annuitants have a mortality experience that differs from that of the national population, this introduces basis risk. In practice, there always is some basis risk. One reason for this is that annuity providers have far fewer members than the national population and therefore experience greater random variation risk than the national population. The greater random variation risk is likely to cause the mortality experience of a subpopulation to diverge from that of the national population over time, even if that subpopulation has the same mortality profile at the outset. Despite the imperfect nature of the hedge that longevity bonds would provide, industry insiders estimate that their absence raises the price of an annuity by 3% (Blake et al. 2013, footnote 13). The effect would be larger for longevity insurance annuities because of their long deferral. With £12 billion annual sales of annuities in the U.K., this implies a cost to every new annual cohort of retirees in the U.K. alone of £360 million.

For three reasons, the government should consider sharing longevity risk with the private sector and be the provider of these bonds. It:

- Has an interest in ensuring there is an efficient annuity market
- Has an interest in ensuring there is an efficient capital market for longevity risk transfers
- Is best placed to engage in intergenerational risk sharing, such as by providing tail risk protection against systematic trend risk.

The government has a hedge against its increased cost in providing these bonds if longevity increases. That hedge occurs when people work longer, and thus pay more taxes,

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as a response to longer life expectancy. Government policy can encourage this relationship by increasing the social security retirement age in line with increases in life expectancy, which is being done in the U.K.

As well as the government providing longevity bonds to facilitate the private offering of annuities of all types, the government could provide longevity insurance annuities, for example, as a benefit receivable at advanced older ages through the social security program (Turner 2013). This benefit would improve the targeting of social security benefits to older persons and to persons with contemporaneous low incomes.

Conclusions

Recent U.S. Treasury Department proposals have focused attention on longevity insurance annuities. These are deferred annuities that began payment at advanced older ages, such as at the age of 82. While the U.K. has by far the world's largest annuity market, and some insurance companies used to provide longevity insurance annuities, currently no companies provide these annuities. The main reason this change has occurred is that proposed EU regulations will require insurance companies to increase their reserves for these annuities in recognition that there is no asset available to effectively hedge the risk of unexpectedly large improvements in life expectancy.

While both the U.S. and the EU are moving toward the use of more sophisticated risk measures for annuity providers, they are moving in opposite directions concerning reserve requirements for annuities. The proposed EU regulation Solvency II suggests that the purchase of longevity insurance annuities by pension participants and others may be relatively risky in the U.S. since regulations concerning reserve requirements are more lenient, which increases the chance that a U.S. insurer could become insolvent. U.S. insurers, like U.K. insurers, do not have an asset to hedge against unexpectedly large increases in life expectancy. Purchasers of annuities in the U.S. are protected against default by state guaranty associations, but the dollar limit of the coverage varies considerably across states and can be as low as $100,000. Purchasers of annuities in the U.K. are protected against default by a national program (the Financial Services Compensation Scheme).

The issue of U.S. versus EU regulation raises the question of the trade-off between the reduction of risk through the provision of adequate reserves versus the increase in cost of providing deferred annuities and the loss to retirees of the insurance protection this type of annuity provides. In the complex area of life insurance reserve requirements, we do not address what the appropriate trade-off is, or whether the Solvency II requirements in Europe are too stringent or the U.S. requirements too lenient.

The lack of a hedge against longevity risk is one factor raising their cost to provide and thus may be part of the explanation of why few people voluntarily purchase annuities. This article proposes that the U.S. and U.K. governments, and other governments, provide such an asset for hedging longevity risk in the form of a longevity bond. Providing such a bond would improve the effectiveness of the retirement income system by facilitating the provision of annuities at lower cost. BQ

Endnotes

1. They do provide deferred annuities as part of derisking programs (called *buy-ins*) for corporate pension plans that began in the U.K. in 2007 (Blake et al. 2013b), but they do not provide longevity insurance annuities for corporate pension plans or individuals.
2. The maximum dollar amount would be adjusted with respect to increases in the consumer price index, in increments of $25,000.
3. The maximum age can be adjusted by the commissioner of the Internal Revenue Service, for example, through revenue rulings, to take into account improvements in life expectancy.

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