MANAGING LONGEVITY RISK

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INTRODUCTION

While the need to manage investment risk has long been a focal point, there is now growing awareness of the need to manage longevity risk. This growing awareness is predicated on employers’ and individuals’ increasing exposure to longevity risk and their need to mitigate it. The increase in exposure is rooted in changing demographics, a shift in who bears the responsibility of sufficient retirement income, uncertainty of government benefits and economic volatility. Insurers’ experience with underwriting products exposed to longevity risk makes them a natural focal point, there is now growing awareness of the need to manage longevity risk. This growing awareness is rooted in changing demographics, a shift in who bears the responsibility of sufficient retirement income, uncertainty of government benefits and economic volatility. Insurers’ experience with underwriting products exposed to longevity risk makes them a natural focal point, there is now growing awareness of the need to manage longevity risk. However, this new growth opportunity also exposes them to additional risks and challenges that will need to be appropriately controlled. This article explores emerging solutions for longevity risk protection, including the driving factors behind and the regulatory concerns about these solutions.

WHAT IS LONGEVITY RISK?

Longevity risk refers to the risk that actual survival rates and life expectancy will exceed expectations or pricing assumptions, resulting in greater-than-anticipated retirement cash flow needs. For individuals, longevity risk is the risk of outliving one’s assets, resulting in a lower standard of living, or a return to employment. For those institutions that provide covered individuals with guaranteed retirement income, longevity risk is the risk of underestimating survival rates, resulting in increased liabilities to sufficiently cover promised payments. Institutions that face longevity risk include defined benefit pension plan providers, (re)insurance companies, the federal government and certain financial institutions.

DRIVERS OF LONGEVITY RISK PROTECTION DEMAND

Aging Population

A key driver in the growing need to address longevity risk is the increasing percentage of people that are approaching or entering retirement. Here in the U.S., the aging of our population is largely attributed to baby boomers (i.e., those born between 1946 and 1964). According to the U.S. Census Bureau, the oldest baby boomers began reaching retirement age in 2011. Moreover, those reaching retirement age are expected to grow considerably through 2050. The 65-and-older population is projected to make up one-fifth of the population by 2030 and will more than double from 2010 to 2050—jumping from an estimated 40.2 million to 88 million people. Figure 1 illustrates the growth of the elderly population from 1910–2050.

The older the U.S. population, the more resources that are needed to sustain retirement, health and other living needs. Presently, this need is magnified by the current economic volatility, low interest-rate environment and increasing longevity. From 2010 to 2030, the old-age dependency ratio is projected to rise from 22% to 35%. These statistics indicate that, for every senior, there are currently about five working-age citizens to support government system services, such as Social Security, Medicare and Medicaid, which will drop to roughly three working-age citizens in 2030. The result will place significant strain on the financing of these services.

Figure 1: Average Annual Growth Rate (in Percent) of the Elderly Population

![Figure 1: Average Annual Growth Rate (in Percent) of the Elderly Population](source: U.S. Census Bureau Statistical Brief (May 1995)).

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* Special thanks to Rob Esson and Larry Bruning for providing background information and edits to this article.


2 Ibid.


Mortality trends are an important factor in life expectancy. That is, as death rates decrease over time, life expectancy is improved. Mortality rates declined greatly in the first half of the 20th century as advances in public health saw the control of illness from microbes. In the latter half of the century, advances in the treatment of internal causes, such as biological degenerative and genic diseases, greatly increased life expectancies.

Shift in Who Bears Responsibility of Sufficient Retirement Income
The number of employees covered by defined benefit pension plans has been shrinking steadily in recent years. Three decades ago, most employees depended on annuity payments from their employer-provided defined benefit program and Social Security. Since that time, employers have made a gradual shift from defined benefit to defined contribution plans. From 1980 to 2008, private pension plan participants fell from 38% to 20% and private defined contribution plan participants increased from 8% to 31%. Additionally, many employers are freezing pensions as an initial step in phasing out defined-benefit pensions and replacing them with defined contribution plans.

The move away from defined benefit plans in favor of defined contribution plans has shifted the responsibility of ensuring a sufficient retirement income stream from employers to individuals (and, ultimately, as provider of last resort, governments). Additionally, individuals face uncertainty in the benefits that they can plan to receive in retirement from Social Security. As a result, individuals’ exposure to investment and longevity risks has increased at a time when market volatility has stressed retirement assets.

Defined Benefit Plan Underfunding and Rising Obligations
Facing increasing pension fund liabilities and funding deficits, many pension plans are increasingly looking toward risk-transfer mechanisms to reduce their pension obligations. Pension shortfalls during 2012 of $418 billion and $4.6 trillion have been estimated for the top 1,000 U.S. corporations and U.S. public pension plans, respectively. Additionally, many employers are freezing pensions as an initial step in phasing out defined-benefit pensions and replacing them with defined contribution plans.

Future funding needs appear to be on an upward trajectory, as low interest rates may force large private pension plans to ease funding deficits with an additional $400 billion from 2011 to 2015.

Additionally, stricter disclosure and funding rules from the federal Pension Protection Act of 2006 are expected to increase liability recognition and funding needs. Furthermore, new mortality improvement projection scales and base rate mortality tables are expected by 2015. The recognition of longevity risk, and any resulting increase in pension liabilities, as companies incorporate these new scales and tables, could put greater strain on liability funding needs. It could also expose companies to potential negative valuation assessments, thus increasing their desire to reduce exposure to longevity risk and seek mitigating solutions.

Longevity Risk Solutions

Longevity Risk Transfer Mechanisms for Institutions
The need for relief from liabilities exposed to longevity risk has created an emerging market with innovative market-based risk transfer solutions. There are three broad longevity risk transfer mechanisms: a buy-out, a buy-in, and a longevity swap. Additionally, securities (such as longevity bonds) and indexes may emerge to facilitate longevity risk hedging. A more complete description of these risk transfer mechanisms is included in the shaded box on page 16.

In general, pension plans de-risk their portfolios by transferring longevity risk through a buy-out, buy-in, or longevity insurance transaction with a counterparty. In this case, the pension plan would be a buyer of longevity risk protection and the counterparty (insurer or bank) would be a seller of longevity risk protection. Insurers also enter into agreements with reinsurers to assume part of their longevity risk. In this case, the insurer would be the buyer and the reinsurer would be the seller. Longevity swap participants usually include (re)insurers and banks as either buyers or sellers.

Sellers of longevity risk protection can limit the amount of longevity risk they assume from buyers of longevity risk protection by offloading it after purchase to the capital markets, to (re)insurers, or to both. This was done in 2011, when Rolls Royce transferred $3 billion in pension liabilities to Deutsche Bank who, in turn, transferred portions of it to a group of reinsurers. Additionally, sellers of longevity risk can hedge their longevity risk directly through capital market transactions. Hedging provides an effective way to reduce volatility within portfolio outcomes. Given the growing need for institutions to protect against longevity, the use of capital market solutions (such as forward contracts, longevity hedging, swaps and securitizations) are expected to increase.

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A buy-out involves the sale and transfer of all of a pension plan’s assets and liabilities in return for a single premium payment. Insurers usually issue a group annuity contract as part of a buy-out. This transaction provides the insurer with complete ability to control and manage the underlying assets. However, it also leaves the insurer exposed to all asset related risks, such as investment, credit, and inflation risk, as well as longevity risk.

A buy-in transaction allows for more flexibility in that the underlying assets remain with the pension plan manager, who pays a single premium in exchange for periodic payments that match those of its pension obligations. The insurance company issues an annuity that is kept on the pension plan’s financial books and provides the retirement income benefit. A buy-in provides for partial risk transfer, with the buyer retaining liability for ultimate payment to annuitants.

Longevity insurance (longevity swap) replaces the unknown cost of future obligations with the purchase of a known liability. The buyer of longevity risk protection (pension plan or (re)insurer) pays a fixed periodic premium based on mortality assumptions to the swap counterparty (an investment bank or (re)insurer). The swap counterparty in turn pays a floating premium to the buyer of longevity risk protection based on the difference between actual and expected mortality experience. An index swap is an emerging type of longevity swap in which mortality rates are based on the experience of an index rather than the portfolio.

Longevity bonds are a future possibility and would be used by pension plans and (re)insurers to hedge their portfolios against longevity risk. The bonds would be correlated to an index of a given population. The buyer would receive a higher coupon payment when survivorship in the population is high, thereby offsetting its higher obligation payments.

Longevity transfer mechanisms have, to date, mostly been in the United Kingdom due to that jurisdiction’s specific longevity risk capital charge. However, some transactions are beginning to surface in the United States and elsewhere. In 2012, U.S. automaker General Motors entered into a pension buy-out transaction with Prudential Financial. The deal transferred $26 billion of future pension obligations for GM salaried employees who retired before Dec. 1, 2011. U.S. communications company Verizon also entered into a pension buy-out transaction with Prudential Financial in 2012. As part of the deal, the company’s pension plan transferred $7.5 billion of its future pension obligations and purchased a single premium group annuity contract.

In the same year, Dutch insurer Aegon sought to hedge its annuities by transferring €12 billion in longevity risk to Deutsche Bank through a longevity swap. The company cited the size of the transaction in its decision to use the capital markets instead of reinsurance, implicating insufficient insurance capacity for the size of its transaction. The transaction was unique not only in its size, but also in that it used an index-based modeling approach that proved to be appealing to capital market participants looking to diversify their sovereign or corporate credit risk holdings.

Longevity Risk Solutions for Individuals

Insurers provide the majority of products designed to help individuals manage the risk they will outlive their assets. Individuals without defined benefit plans can ensure lifetime income by purchasing annuities within their defined contribution plans and personal retirement accounts. They can also purchase a single premium immediate annuity by taking a full or partial distribution from their defined contribution plan upon retirement or through other lump sum savings.

However, it should be noted that until 2012, when the U.S. federal government issued new regulations, plan participants had to choose between annuitizing their full distribution or not annuitizing at all. The new rules also relax minimum distribution age requirements to encourage retirement plans to offer longevity annuities (deferred annuities) among their investment plan choices. Additionally, employees will now be able to purchase annuities sold in their employer’s pension fund with funds from their defined contribution plan. The flexibility and ease of access afforded under the new federal regulations are expected to increase annuity demand and supply.

Insurers have introduced many new product designs to accommodate the growing demand for lifetime income. Over the past decade, most of this innovation came from adding variable annuity living benefit riders, such as guaranteed minimum income benefits (GMIBs) and guaranteed lifetime withdrawal benefits (GMWBs). These products have the advantage of providing income protection and investment flexibility. In 2008, contingent deferred annuities (CDAs) were introduced to the market as a way to isolate the longevity risk protection. Their benefits are similar to variable annuities with guaranteed lifetime withdrawal benefits. 

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(GLWBs) in that they provide protection against outliving ones assets. CDAs allow investment managers to protect their investments against longevity risk without actually purchasing a variable annuity. Unlike variable annuities, the underlying investment funds (or covered assets) linked to CDAs are not held in an insurance company’s separate accounts. Therefore, individuals retain ownership and greater control over their invested assets.

Insurers market CDAs to advisors of mutual funds, separate managed accounts and brokers of fee-based products. Given the large volume of funds coming through these accounts, the CDA market has the potential to significantly boost insurers’ sales volumes. However, advisor interest in CDAs has been weak, due in part to the uncertainties that come with an emerging product. Insurance companies and regulators are still working toward creating a regulatory and operating framework that establishes clear guidelines for supervisory authority, applicable regulations and information transparency.

نتו classified as an insurance product. However, advisors are working with the SEC regarding the adequacy of current disclosure rules, especially given the significant impact that policyholder behavior has on CDA benefits and costs. Similar concerns exist for variable annuities with living benefit guarantees.

The U.S. Securities and Exchange Commissioner (SEC) is currently accepting CDA filings, as securities and insurers are already filing CDAs with the SEC. State insurance regulators are working with the SEC and the Financial Industry Regulatory Authority (FINRA) to create a better understanding of their review process and how they view their respective regulatory roles. They are also working in tandem with the SEC and FINRA to evaluate the adequacy of current disclosure rules, especially given the significant impact that policyholder behavior has on CDA benefits and costs. Similar concerns exist for variable annuities with living benefit guarantees.

Other federal regulatory activities include developing strategies to increase the use of annuities in defined contribution plans. The new federal guidelines make it easier for individuals to purchase annuities. However, retirement plan sponsors are reluctant to offer annuity products due to concerns over their fiduciary responsibilities for selecting an annuity provider under the federal Employee Retirement Income Security Act (ERISA). To calm apprehensions, the White House Council of Economic Advisors (CEA) and the U.S. Department of Labor (DOL) have asked state insurance regulators for assistance in providing employers with the information necessary to substantiate the soundness of annuity providers under the DOL safe harbor rule. State insurance regulators will be working through the NAIC Retirement Income (A) Working Group to see what the states might be able to provide that would help employers meet their fiduciary obligations.

As new products designed to provide protection against longevity roll out, regulators will need to gain a deep level of understanding of the inherent risks. Concerns on the

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ability of participants to adequately control their exposure to a risk that is difficult to quantify and mitigate will need to be addressed. Below is a list of some of the issues and risks inherent in the longevity risk market and their implications on the regulatory structure of the insurance industry.

**Difficulty Quantifying Longevity**
How to accurately predict mortality rates has been a widely debated and contentious subject. Many experts predict the rate of mortality improvements to moderate in the future. They point out that survival rates for the younger populations may have reached their upper boundaries, although all such prior predictions have been wrong. Nonetheless, given this and the significant advances in limiting mortality from extrinsic activities, many experts argue that continued mortality reductions would need to stem mostly from mitigating intrinsic causes of the biological process of aging.

Although advances in such activities as stem cell research and cloning biological parts hold promises to do just that, they are in their infancy and are not expected to impact longevity in the near future. Other experts predict a sharp increase in life expectancies, with a predicted life expectancy at birth of 100 in the year 2060. Still others argue that there are limits to a human’s life span and question whether these limits have been met.

**Capacity and Capital Adequacy**
The longevity risk market is currently in its infancy. However, given the level of current pension obligations, it has the potential to reach enormous proportions. Global longevity exposure from pension funds (90%) and insurance contracts (10%) has been estimated at $21 trillion of asset protection. Regulators are concerned that the potential enormity of longevity exposure could be beyond the capacity of the insurance industry.

There are also concerns that longevity risk products, if improperly sold and priced, could exhaust the capacity of state guaranty funds or not qualify for protection under certain state laws. To this effect, the National Organization of Life and Health Insurance Guaranty Associations (NOLHGA) has been examining if certain state laws in many jurisdictions tend to be based on aggregated population data that lack pertinent demographic and socioeconomic data.

U.S. statutory risk-based capital (RBC) models also fail to adequately account for longevity risk, as they lack a charge specific to this risk. As such, state insurance regulators are now looking into adding such a charge to the NAIC RBC calculation. A longevity risk charge would help ensure that insurers keep sufficient capital to account for the longevity risk embedded in their contracts. It also forces insurers to assess their capacity limits for taking on additional longevity risk.

The incorporation of dynamic assumptions and variables under principle-based stochastic models is expected to provide better capital estimates, but, in the specific instance, would need to incorporate explicit longevity assumptions. Insurance contracts issued in and beyond 2015 will likely be subject to principle-based reserving (PBR). PBR reflects a paradigm shift from a strictly formulaic method to a more dynamic method that will require companies to use experience studies in their reserving analysis. It will also mandate that insurers share their experience data with statistical agents who compile the data for use by the Society of Actuaries in their published experience tables.

**Counterparty and Concentration Risk**
As the recent financial crisis demonstrated, counterparty risk can present significant dangers. Longevity risk-transfer mechanisms allow pension plans, re( insurers) and investment banks to “de-risk” their portfolios, but add counterparty default risk. The ability to ensure the strength of

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counterparties (potentially over extended periods), the sufficiency of collateral posted for security and the transparency of secondary trading transactions is of key concern to state insurance regulators. Reliance on third-party investment management, particularly in partial risk transfers, also presents concerns about market risk and the ability of the counterparty to accurately reserve for future obligations. Requirements that assets be kept as a segregated fund or that an agreed-upon investment strategy be followed can help to mitigate these risks.

Additional state insurance regulatory concerns include insurers’ ability to project appropriate withdrawal rates to protect against policyholders withdrawing too much money. This is of particular concern with buy-in transactions, as they involve a full transfer. Regulators also have concerns that insurers’ fees from buy-in transactions (such as CDAs) are sufficient to support their guarantees. Careful review of policies by regulators when they are filed, together with the appropriate capital charges, will help to secure appropriate pricing and product design.

Investment banks participating in the longevity risk market typically offload their assumed risks through securitizations sold to (re)insurers and investors looking to diversify their portfolios. Although it is not completely clear yet exactly who these investors will be, it is likely to include large fund managers and brokers. There is potential for these large players to unknowingly create interconnected counterparty risk or concentration risk by redistributing the very same risk to those that sought to divest from it, thereby creating a spiral effect. Counterparty exposure to tail risk from sudden increases in mortality rates, as would occur in a longevity swap, could also pose an unforeseen risk.

**Basis Risk**

The ability to quantify and manage residual basis risk that results from actual portfolio mortality trends is also of concern to state insurance regulators. Basis risk is the residual risk from two offsetting risks that are not perfectly matched. Life (re)insurers can hedge large books of mortality-based business with longevity risk, as unanticipated increases in death claims would be expected to be offset by a lack of claims from unanticipated increases in longevity. The hedge is imperfect, however, as populations are not homogeneous between books of business, leaving the insurer exposed to basis risk.17

The insurance industry also faces basis risk in the difference between the mortality trends of national and industry indices and the actual mortality and longevity experienced in their book of business. This discrepancy arises from the use of selection criteria insurers use to accept policyholders. Likewise, the variance between actual mortality trends and those of aggregated indexes would expose investors to basis risk and create opaqueness in the assumptions insurers use for hedging strategies. Additionally, the likelihood that those pension plans seeking longevity relief would be experiencing longer mortality rate trends than their counterparties exposes (re)insurers and investment banks to adverse selection when entering risk-transfer agreements.

**CONCLUSION**

Life insurers’ experience with managing life contingent products and their natural hedge against longevity risk make them an obvious player in the search for longevity solutions. However, the potential enormity of this exposure could have significant consequences for the industry if not controlled. Risk sharing with reinsurers and capital market participants may be inevitable. This brings additional concerns that the continual transfer of longevity risk between capital market participants from a wide array of institutions and sectors could create significant regulatory challenges in the insurance sector and, in the worst cases, the wider financial system. These challenges can be mitigated through regulations already in place that restrict hedging and other investment activities, as well as through transparency and future limits on distribution. Capacity and capital adequacy concerns will need to be managed by state insurance regulators by ensuring appropriate longevity risk charges and modeling assumptions. Furthermore, third-party risks can be managed by mandating transparent liability data and investment strategies. Finally, regulators must ensure that insurers use appropriate risk control mechanisms and suitable product design.

17 Ibid.