

# **Pension Design and Structure**

New Lessons from  
Behavioral Finance

EDITED BY

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## Chapter 15

# **Perceptions of Mortality Risk: Implications for Annuities**

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*Matthew Drinkwater and Eric T. Sondergeld*

This chapter reviews recent research investigating how retirees and near-retirees perceive and manage mortality risks. Of particular interest are the implications of decision processes regarding mortality risk for annuity buying behavior. For example, if people assume that they will not live very long in retirement, they will be less motivated to convert a portion of their assets into guaranteed lifetime income, than if they were concerned about outliving assets. Understanding the decisionmaking process is important for at least two reasons. First, faulty decisions regarding mortality risk will stress the resources of family members, government programs, and society in general. Greater reliance on income annuities and other products could alleviate this burden (Bodie, Hammond, and Mitchell, 2000). Second, retirees themselves tend to report greater satisfaction when they possess guaranteed income sources, aside from social security (MetLife, 2002; Sondergeld, Drinkwater, and Jamison, 2002*b*; Panis, Chapter 14, this volume).

The primary mortality risk facing people during their working years is dying too soon, a fact that boosts the demand for traditional life insurance. For retirees, by contrast, the primary mortality risk is dying later than expected, or living longer than financial resources can support people's desired standard of living. Longevity risk can thus be defined as the possibility that a person will outlive his savings and be forced to reduce his living standard. A related concern for married retirees is spousal mortality risk, defined as the possibility that one spouse will die and cause a significant decrease in the surviving spouse's standard of living. This is, of course, a concern at any life stage but, married retirees may face particularly negative consequences when widowed compared to working age individuals. For example, especially for older women, the loss of a spouse can reduce social security benefits, pensions, and annuity income. Moreover, the death of a partner can also bring about the loss of non-financial benefits such as care-giving and other support.

To confront longevity risk, individuals can delay retirement to a later age if they believe that this decision could reduce their risk of outliving savings or increase their chances of maintaining a desired living standard during

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retirement. The insurance industry markets products designed to protect against both losses, due to earlier or later-than-expected death. To insure against the risk of living longer than expected, people can annuitize a portion of their assets, using employer-sponsored retirement plan assets, Individual Retirement Account (IRA) balances, or deferred annuity assets, or they can purchase lifetime annuities. Choosing a “joint and last survivor” annuity allows the income stream to continue (often at a reduced rate) upon the death of the first or pre-specified annuitant, thereby addressing spousal mortality risk. Along with annuities, life insurance can mitigate the financial impact of a spouse’s death by providing a tax-free lump sum payment, all or part of which could be converted into an annuity.

### Mortality Risk Perceptions

While it is straightforward to explain how individual insurance products help address mortality risk, it is difficult to measure how people recognize it and make decisions to handle it. As Weber (this volume) describes, this risk perception is often driven by affective processes which may ultimately lead to suboptimal risk management. It is therefore interesting that, on average, older people appear to be relatively good at predicting their life expectancy (Sondergeld, Drinkwater, and Jamison, 2002*b*). Depending on the mortality table chosen, retirees and those within 2 years of retirement mis-estimate their longevity only slightly (Table 15-1). Retirees were found to underestimate their life expectancy by 2.5 years when their estimates were compared to an actuarial mortality table developed for annuitants, but they overestimate by one year when compared to a general population mortality table. Women tend to be much less optimistic than men: Female retirees’ subjective estimates are as much as 5 years too low. Hurd and McGarry (1997) also demonstrate that subjective survival probabilities aggregate to life table averages.

Nevertheless, mortality remains a difficult concept for people to understand, one that many prefer not to contemplate. Consequently, consumers

TABLE 15-1 Subjective Longevity Expectations Less Actuarial Life Expectancy

<i>Mortality Table</i>		<i>Males</i>	<i>Females</i>	<i>All</i>
Annuity 2000 Basic	Near-retirees	0.1	-2.5	-1.2
	Retirees	-0.9	-5.0	-2.5
US (SSA AS 107) 1990	Near-retirees	3.4	-0.3	1.6
	Retirees	2.7	-1.5	1.0

*Notes:* Actuarial life expectancy determined using the Annuity 2000 Basic Table (Johansen, 1998) and Social Security Administration Actuarial Study (SSA AS107; Bell, Wade, and Goss, 1992). Near-retirees are aged 50–70 within 2 years of retirement; retirees are aged 55–78 and retired (self-defined).

*Source:* Sondergeld, Drinkwater, and Jamison (2002*b*).

often use life expectancies when retirement planning exercises. A recent study found that one-third of retirees, and 46 percent of near-retirees, assumed that they would live to a certain age when they were planning the details of their retirements (Sondergeld et al., 2003*b*). The problem is that using this benchmark exposes them to the risk of outliving their planning horizon. Indeed, 11 percent of the retirees surveyed had already outlived their earlier determined planning horizons. One reason consumers take this viewpoint is that prevailing retirement planning software programs virtually all use life expectancy as the default planning horizon (Sondergeld et al., 2003*a*). While some programs incorporate techniques (such as Monte Carlo simulation) that treat future investment returns as a stochastic variable, they still assume a retiree's date of death is deterministic. To counter such determinism, consumers must learn that life expectancy is only an average; but it is not terribly helpful for planning retirement needs. Illustrations that make use of survival probabilities for each year of retirement can be much more instructive in demonstrating the likelihood of an individual surviving to specific ages, and married individuals should understand that the chance of at least one spouse in the couple surviving to older ages is much greater.

Previous research has not examined how mortality risk is perceived by the general public, relative to other concerns faced by retirees and those near retirement. To evaluate how seniors perceive mortality risk, we surveyed near-retirees and retirees regarding a variety of retirement risks to determine the level of concern regarding each. We found that survey respondents were more concerned with health-related risks, and even financial and investment-related risks, as compared to mortality risks (see Table 15-2). Only one in five near-retirees expressed major concern about the impact that outliving assets could have on their living standard in retirement.

It appears that there are two explanations for this result. First, people tend to be more concerned with outcomes that could affect them in the short run, as compared to those of a more long-term nature (Selnow, this volume). Second, many people do not fully understand the implications or likelihood of living long, or at least beyond their life expectancies.

### **Decisionmaking and Judgment**

Psychological research has amply demonstrated that people are systematically biased in their assessments of future events, in such a way that the likelihood of negative consequences tends to be minimized (Taylor and Brown, 1988; Weber, Chapter 3, this volume). Moreover, this bias is most pronounced for estimates about one's self; not only will the future be good, it will be especially good for oneself in particular. For example, when asked to predict whether a specific negative event (e.g. becoming ill, becoming depressed, having an accident) might happen to them, people have a tendency to assign a lower chance of these events happening to them than their peers

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TABLE 15-2 Perceived Impact of Retirement Risks on Standard of Living

<i>Risk</i>	<i>Near-Retirees</i>	<i>Retirees</i>
Prescription drug costs (%)	47	48
Health care costs	45	37
Long-term care costs	37	35
Prolonged stock market downturn	36	29
Provide for spouse if you die	31	31
Tax increases	30	33
Inflation	29	32
Provide for you if spouse dies	22	22
Interest rate decline	20	25
Outlive your assets	20	16
Assistance which may be needed by other family members	14	13

*Notes:* Figures represent percent of survey respondents indicating “major concern” about the impact that each item could have on their standard of living in retirement. Near-retirees are aged 50–70 within 2 years of retirement; retirees are aged 55–78 and retired (self-defined).

*Source:* Sondergeld, Drinkwater, and Jamison (2002*b*).

(Fiske and Taylor, 1991). Similar results are obtained when the subject matter involves mortality estimates. In a recent study of retirees, more than six in ten believed it was likely they and their spouse would outlive the average life expectancy by more than 10 years (Society of Actuaries, 2002). Sixty-nine percent of retirees said it was “very likely” or “somewhat likely” that an average 65-year-old would have to spend at least some time in a nursing home before death. Yet, the percentage drops when retirees are asked about themselves: only 43 percent say it is “very likely” or “somewhat likely” that they will have to spend some time in a nursing home before death.

A tendency to positively distort information may promote mental health, but it can also have serious negative implications. For instance, if most people underestimate the chance that their spouses will die early in retirement, or that they or their spouses will live long enough to spend all of their assets, then they will be less likely to take action and delay retirement or insure against these risks. Furthermore, mortality estimates have been wrong in the past, and there is no absolute consensus on how human life expectancy might shift in the future (Bodie, Hammond, and Mitchell, 2000; Korczyk, 2002). Other research suggests that having more imprecise probabilistic beliefs can lead to overly conservative decisionmaking, which in turn can produce suboptimal financial asset allocations (Lillard and Willis, 2001).

Even if individuals did have valid and reliable information regarding the probabilities and costs associated with future negative events, there is no guarantee that they could process it in a fully rational manner (Yaari, 1965).

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Indeed, recent research uncovering various cognitive biases and heuristics used during the decisionmaking process seems to imply that rational processing may not be the norm when retirement risks are involved (Kahneman and Tversky, 1979). Brothers (2002) describes how chosen retirement ages can be determined by anchor and adjustment heuristics. In that framework, the worker uses peers' retirement ages as a baseline, and adjusts his or her own, relative to his or her "anchor." Especially if a worker does not believe that he or she will live very long in retirement (or, alternatively, that he or she will not face catastrophic healthcare costs), later retirement may be seen as a "loss" and hence avoided. This may explain the recent survey of prospective retirees which showed that longer subjective life expectancies are not associated with older expected retirement ages; in fact, those with longer subjective life expectancies have lower expected retirement ages (Society of Actuaries, 2002).

People's retirement timing decisions could also be "incorrectly" chosen for other reasons. For example, subjective survival probabilities can embody individual information not reflected in a life table based solely on age and/or gender (Hurd, Smith, and Zissimopoulos, 2002). Even when observable covariates such as socio-economic status are controlled for, people may incorporate personal private information. Indeed, Hurd and colleagues have shown that subjective survival probabilities can predict actual measured mortality, and that people are less likely to claim early (i.e. reduced) social security benefits when they believe they have a high survival probability (Hurd and McGarry, 1997; Hurd, McFadden, and Merrill, 1999; Hurd, Smith, and Zissimopoulos, 2002). For example, using information from the Health and Retirement Study (HRS), Hurd and McGarry (1997) found that participants who had died between data collection waves had significantly lower subjective survival probabilities than those who survived. Related research has also shown that although fewer men delay the onset of social security benefits than would be expected from optimizing theoretical models, men with longer life expectancies tend to delay longer than men with shorter life expectancies (Coile et al., 2000).

The decision to delay the receipt of a lifetime benefit such as social security, however, cannot be equated with the decision to surrender a portion of assets for an income stream in the form of a payout annuity. Besides the difference in liquidity implications, usually the decision to annuitize also involves an additional choice between a lifetime, a joint and last survivor, or a non-lifetime payout. As will be discussed later in this chapter, lifetime payouts are not always a popular choice. However, as annuity-writing companies have long observed, the average life expectancy for a group of annuitants is generally longer than that of the general population (termed "adverse selection"; Mitchell and McCarthy, 2001). Clearly, people's knowledge of their own mortality plays some role in the decision to voluntarily annuitize.

Some research has demonstrated a rational link between key factors and annuitization decisions, even when the overall annuitization rate is less than

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what would be expected if people sought optimal solutions. Using the HRS, Brown (1999) showed that the decision to annuitize responds to mortality risk, marital status, risk aversion, and the presence of other annuitized wealth (e.g. Social Security benefits). Hence, annuitization should be more attractive for nonmarried individuals and those with higher longevity prospects, higher risk aversion, or fewer annuitized wealth sources. It is these individuals that will require more wealth than others to replicate the well-being achieved through annuitization (i.e. they have a higher “annuity equivalent wealth”). Brown found that, as annuity equivalent wealth increased, so did the plan to annuitize.

### *Planning Approaches*

Conventional advice regarding retirement income planning recommends that people select a finite time horizon (e.g. how long they expect to be retired; invest in a diversified portfolio subject to their risk tolerance, and, from that, determine how much they can “safely” withdraw annually to supplement their income. This advice mirrors the approach commonly used in accumulating assets for retirement, where the goal is to determine how much one must save each year to accumulate a desired asset level by the assumed retirement date. In retirement, the calculation is how much to take out, rather than put in, so that there are funds remaining at the “end of retirement.” In both cases, the individual is effectively solving for the payment of an annuity certain.<sup>1</sup>

Of course, risks associated with longevity are not the only factors retirees face: Other risk factors include health problems, disability, and death of spouse. Traditionally, these have been covered by employer provided insurance even after retirement, but such coverage has declined overtime. For instance, the percentage of employers offering retiree health insurance dropped from 50(44) in 1993 to 36(29) by 2000 for employees retiring early (for Medicare-eligible retirees; GAO, 2001). Twenty years ago, about 40 percent of the private sector workforce was covered by defined benefit (DB) pensions, but this figure has been halved today.

### **Insurance Products for Mortality Risk**

As discussed earlier, the responsibility for addressing mortality risks has increasingly fallen on individuals rather than companies or the government. Next we explore the use of individual insurance products to protect against these risks.

#### *Annuities*

The main financial product for managing mortality risk is the annuity, which transfers longevity risk from the individual to a private insurer.<sup>2</sup> The main reason people offer for buying these products involve their tax-deferral

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characteristics and investment growth potential, besides the lifetime payout aspect (Brown et al., 1999; Sondergeld, Tumicki and Terry, 1999). For example, when asked why they bought an annuity, 41 percent of recent buyers cited the savings or favorable tax features; but only 12 percent mentioned retirement income. In fact, fewer than a quarter of recent buyers understood that their annuity had the ability to create a lifetime income stream! Moreover, much of the growth in annuity assets reflects investment gains in variable annuities, much of which has evaporated due to the recent decline in stock prices; assets in fixed annuities were mainly level over the past 5 years. In short, the individual annuity market has grown, but this growth may not reflect increased attention to the risk-management features of annuities.<sup>3</sup> Indeed each year, roughly one percent of deferred annuity assets are annuitized; the vast majority of contract terminations result from surrenders and exchanges (Beatrice, Drinkwater, and Sondergeld, 2002; Drinkwater, Sondergeld, and Terry, 2002). Sales of immediate annuities have increased somewhat but they remain a small fraction of total annuity sales and retiree wealth.

Other consumer surveys also point to an under-utilization of payout features. Individuals who retired 1998–2001 and had the opportunity to take a lump sum distribution from their employer-sponsored retirement plans were asked: Whether their plan had an annuity option available, and whether they elected to receive an annuity (Sondergeld, Drinkwater, and Albrycht, 2002*a*). Among retirees with a DB plan (including those who additionally had defined contribution, DC plans), only 49 percent were aware that an annuity payout option existed in their plans, and 17 percent were “not sure” if this option was available. Among retirees with only a DB plan, just 34 percent knew that their plans had an annuity option. Among retirees who said that an annuity option was available, 21 percent chose the option. However, among this same group, only half of those who had only a DB plan chose the annuity payout option. Twenty-two percent of those with both a DB and DC plan took an annuity; only 10 percent of those with only a DC plan chose an annuity. The presence of a DB plan—even one that offered lump sum distributions—thus appeared to promote annuitization. With a continued decline in the popularity of DB plans, it seems plausible that the overall annuitization rates will fall further, unless people become aware of and take advantage of annuity offerings in DC plans.

When annuitization does not occur directly from the employer plan itself, it could happen after assets are transferred to some other retirement portfolio such as a deferred annuity. Among the 51 percent of retirees who chose to rollover the funds or take cash distributions, 14 percent said that they invested the funds in an annuity. While it is unclear what type of annuity these funds were invested in, given the small proportion of immediate relative to total annuity sales we suspect the vast majority was invested in deferred, not immediate, annuities.

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Another point is that even when individuals convert their assets into income, they are not obliged to choose a lifetime payout. For annuitizations of deferred annuities, a lifetime payout feature is chosen by only one quarter of annuitants according to a recent LIMRA study (Drinkwater and Sondergeld, 2003). Ameriks (Chapter 13, this volume) explains how increasing numbers of participants in one large DC plan have elected to delay or avoid lifetime income payouts, in favor of systematic withdrawals and minimum required distributions. The percentage of buyers choosing lifetime income among immediate annuities has remained steady at approximately 60 percent from 1997 to 2001. Meanwhile, the proportion of married couples choosing joint and last survivor coverage—which can help to address spousal mortality risk—is also low (around 30 percent in 2001).

In sum, ownership of an annuity product is not synonymous with mortality risk transfer. Against the backdrop of falling traditional pension plan coverage such evidence indicates that people are becoming less protected over time from mortality risk.

### *Life Insurance*

Another source of protection against mortality risk is life insurance. During the retirement years, in-force life insurance can represent an additional source of income, either from cash value withdrawals (from permanent policies), or from conversion of the tax-free benefits following a spouse's death. Depending on the situation, individual life insurance or first-to-die policies can be purchased on either or both spouses. Though many people have this protection during their working years, life ownership drops off as people retire from jobs and leave group coverage behind. Concomitantly, retirees may find their individual term insurance policies expire, or they may be unwilling (or unable) to keep up with scheduled premium increases. Life insurance ownership among married people is more prevalent at ages 46–55 with 81 percent owning group or individual policies in 1998 compared to age 66 or higher with 63 percent owning (Terry and Bryck, 1999). At older ages, individually underwritten policies are likely to be prohibitively expensive. This fact helps to explain the miniscule proportion of buyers over the age of 60: among married individuals who bought individual life insurance policies in 2001, only three percent were over 60 (unpublished data, LIMRA International). When married people without life insurance die early in retirement, this can expose surviving spouses to substantial hardship when income sources are also cut off or sharply reduced.

### **Market Implications**

We have argued that for many people approaching retirement, mortality risks seem to rank low on a list of issues that includes more immediate concerns such as prescription drug costs and plunging stock values. People

tend to have difficulty envisioning their life, health situation, and finances far into the future, and when they do not think that risks will befall them, they may not be motivated to address these issues.

Of course, these challenges are not new for the annuity industry. To the extent such biases are a natural feature of human decisionmaking, they have been present for many years. Nevertheless, in the past, these risks were covered by public (Social Security) and private (DB pension) sources. In the future, both of these sources will recede, leaving people increasingly exposed to mortality risks. As a result individuals are increasingly burdened with the responsibility of protecting themselves.

In the United States, at least, the annuity industry has done a good job emphasizing the asset accumulation phase. The next test for annuity providers will be to emphasize the product's ability to convert assets into a lifetime income stream. Yet, an explanation of product features, by itself, will not necessarily boost annuity sales or greater rates of annuitization. Companies must also learn how their customers frame decisions involving mortality risks, such as when to retire, whether to allow their life insurance policies to lapse, whether to purchase life insurance or modify existing coverage, and whether to annuitize a portion of their assets. Furthermore, they must understand how other retirement risks are perceived and prioritized. Other challenges for providers include compensation and product design. With the shift from accumulation to distribution, companies may need to consider innovative techniques to reward distribution partners who encourage annuity owners to annuitize. To address other objections to annuitization, providers should explore creative product designs. Already, more providers are promoting the liquidity features of their immediate annuities. New product designs may combine long-term care insurance with income annuities which can help to offset adverse selection pressures. Income annuities with inflation-indexed payouts should also be considered, which would not only mitigate the longevity risk but inflation risk as well (Brown, Mitchell, and Poterba, 2002).

### **Future Research**

Further investigation is needed on conditions in which consumers tend to insure against mortality and other retirement risks. There is no general agreement yet regarding the optimal method of educating different types of consumers, but research could help determine education techniques which increase general subject knowledge and influence behavior (Clark et al., Chapter 10, this volume; MacFarland, Marconi, and Utkus, Chapter 6, this volume). For example, focus group participants that initially reacted negatively to the concept of annuitization warmed to the concept after discussing it for some time (Sondergeld, Drinkwater, and Jamison, 2002*b*). During the focus groups, participants reacted to a series of scenarios of

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future income with and without annuitization. Graphic illustrations, showing how saving can be drained over the course of a retirement may have been instrumental in changing attitudes to annuitization. It would also be useful to learn how consumers would prefer to plan for retirement. As MacFarland, Marconi, and Utkus (Chapter 6, this volume) describe, retirement education programs should reflect the heterogeneous nature of peoples' planning preferences. The financial services industry will then be in a better position to find ways to effectively use insurance products to manage retirement risks.

### Notes

<sup>1</sup> In accumulating a desired amount,  $L$ , by retirement, one needs to solve for the annual contribution,  $p_1$ , such that  $L = p_1 * s(n_1, i_1)$  where  $s(n_1, i_1) = [(1 + i_1)^{n_1} - 1]/i_1$  and is the future value of an  $n_1$  period annuity certain that earns  $i_1\%$  per period. Upon retirement, the payment,  $p_2$ , is solved for and is the amount of income that can be created from the accumulated amount  $L$ , such that  $L = p_2 * a(n_2, i_2)$  where  $a(n_2, i_2) = [1 - (1 + i_2)^{-n_2}]/i_2$  and is the present value of an  $n_2$  period annuity certain that earns  $i_2\%$  per period.

<sup>2</sup> For an overview of life annuities' importance in retirement security, see Mitchell, 2002.

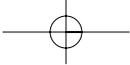
<sup>3</sup> Many annuity providers added enhanced death benefits, living benefits, and other risk management features to their annuity products in recent years. It is not known whether these new features are responsible for the majority of increases in annuity sales.

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