Solving the annuity puzzle: a behavioral analysis*

Hal E. Hershfield & Craig R. Fox
UCLA Anderson School Of Management

Driven to do more.® ATHENE

* This manuscript was commissioned by Athene who provided guidance on its scope. The contents are based entirely on independent analysis by the authors.

21825 (06/19)

In the next decade, tens of millions of American adults born after World War II will retire.

One challenge faced by these new retirees is how to draw down retirement savings without knowing exactly how long they will live, what sort of spending they might engage in during their retirement, and what market returns they might realize in the meantime should they manage assets themselves.[1] The shift from defined benefit plans (which typically allow for a lifetime pension) to defined contribution plans (which do not have pensions built into them) places responsibility on a growing number of consumers to make complex decisions concerning decumulation of their retirement savings. Given how challenging most individuals find saving and planning for retirement,[2] and given that facility with numbers declines with age,[3] it is no wonder that most retirees experience difficulty figuring out how to manage their assets and spending after retirement. Meanwhile, ensuring lifetime income has never been more important, as life expectancy has been increasing over time: the average 65-year-old American can expect to live for approximately 19 more years.[4†]

The annuity puzzle: why do most consumers fail to purchase annuities?

Many scholars have observed that an efficient means to ensure guaranteed lifetime income is through the purchase of an annuity,[5,6] which allows individuals to exchange a portion of their retirement savings for guaranteed periodic payments over the remainder of their lives. Although there may be good reasons to hold back a portion of one's wealth at retirement such as illiquidity or desire to leave a bequest, experts widely recommend contributing some savings to annuities or purchasing "longevity annuities" (those that protect against long life expectancies).[7] Yet most consumers fail to do so. According to a recent report from the U.S. Government Accountability Office,[8] only six percent of workers with a defined contribution plan chose or purchased an annuity at retirement. And although 70% of respondents in a recent survey said that receiving a monthly paycheck during retirement was important to them, as of 2017, only 13% of working-aged Americans have purchased an annuity.[9]

The theoretical attractiveness of the annuity product coupled with the relatively low rate of actual purchase is referred to by scholars as the "annuity puzzle." In his Nobel Prize acceptance speech, economist Franco Modigliani[10] said, "It is a well-known fact that annuity contracts, other than in the form of group insurance through pension systems, are extremely rare. Why this should be so is a subject of considerable current interest. It is still illunderstood." More than thirty years later, researchers have made some headway in understanding what drives some consumers to take up annuities and others to shy away from them. But, many questions still remain regarding this so-called annuity puzzle.

In this article, we first briefly explore some "rational" reasons why many consumers may reasonably prefer not to purchase annuities, and reasons why these reasons cannot adequately explain the annuity puzzle. We next review a variety of psychological biases that may contribute to lower-than-rational annuity purchase rates. In so doing, we propose behavioral interventions designed to overcome these biases (some tested and some untested).

† Life expectancy at age 65 is higher than life expectancy at birth (which for the average American is 78.7 years). The reason for this discrepancy is that if one lives to 65, they have already avoided many of the events that could have caused an earlier death.

Rational explanations and critiques

Early research on annuity purchasing primarily focused on rational reasons why consumers might forgo such products. By "rational" we mean reasons that would seem logical and are consistent with the pursuit of a consumer's self-interest. Much of this work concludes that rational choice models cannot account for low annuity purchase rates. Below we briefly review prominent rationale that have been cited as potential causes for failure to purchase annuities, along with critiques of these arguments.

1. Belief that annuities are overpriced.

Argument: Low purchase rates of annuities may result, in part, from the tendency of consumers to view annuity pricing as actuarially unfair (i.e., the resulting payouts from annuities may be lower than what is actuarially fair: consumers who receive annuity payouts may ultimately receive less in payments than what they paid in premiums).‡

Critique: While it may be rational for consumers who believe themselves to have a relatively short life expectancy to forego purchase, this explanation cannot fully account for low rates of annuity purchasing. In a recent survey of consumers, approximately 60% of them preferred a lump-sum payment to an annuity, even when rates were set so that the trade-off in purchasing the annuity was actuarially fair, suggesting that more than just price sensitivity explains the annuity puzzle.[11] Further, being sensitive to annuity price loads might suggest that consumers should adopt a strategy of gradually purchasing more annuities over time, as the pricing becomes more actuarially fair. Nonetheless, many households do not follow such a strategy.

2. Risk-aversion concerning inflation.

Argument: Consumers may shy away from purchasing annuities that are fixed in nominal terms due to concerns about possible inflation, especially to the extent that they are risk averse.

Critique: A natural solution to this problem is to purchase inflation-protected annuities. However, demand for annuities did not drastically increase when such products were introduced to the market (e.g., TIAA-CREF's inflation-linked bond account or Vanguard's CPIindexed annuity). And, inflation-linked annuities represent a small portion of the market of annuities in the UK.[12]

3. Risk-sharing with families.

Argument: Consumers may pool their resources (within family) to essentially mimic a formal annuity market. Sharing risk in this way may obviate the need to purchase an annuity.

Critique: If risk-sharing among couples were an adequate explanation for the annuity puzzle, then we should expect to see higher purchases of annuities among single consumers than married ones. However, available data suggests that single adults and married adults are equally likely to choose a lump sum versus the Social Security annuity payout.[11] Furthermore, if risk sharing among couples provided an adequate explanation, then we would also expect to see more consumers choosing to purchase an annuity after the death of their spouse, but this pattern is also not observed.

4. Bequest motives.

Argument: Many consumers may wish to leave part or all of their money after death to loved ones or charities. If an annuity has no value after one's death, then it is obviously an unattractive product to such consumers.

Critique: The Health and Retirement Survey found that the strength of bequest motives could not explain the self-reported intention to purchase an annuity or not.[13] Second, consumers who have children (who would presumably be recipients of bequests) are not more likely to purchase an annuity than those who do not have children.[14] Third, consumers with a bequest motive could divide savings into an annuity and other funds that can be left to heirs, yet only a small proportion of retired consumers have invested any money in annuities.

‡ Researchers refer to the difference in pricing between annuity payouts made and premiums paid as the "load," and a recent body of work in economics has attempted to better understand both how extreme this load is, as well as its origin (e.g., one older paper found that annuity payouts per dollar of annuity premiums to randomly chosen individuals from the pool of consumers who purchase annuities is approximately 90 to 94 cents.[60] As Mitchell et al.[60] note, "The differential between the premium cost and the expected payouts must cover marketing costs, corporate overhead and income taxes, additions to various company contingency reserves, and profits, as well as the cost of adverse selection."

5. Insuring against longevity through other means.

Argument: Consumers may decide not to purchase annuities because they may have already insured against increased longevity through other means. For example, payments from the U.S. Social Security system represent an annuity, in that payments are guaranteed through the end of one's life.

Critique: It is true that Social Security payments may represent a sufficient hedge against outliving one's savings, but only among consumers at the lower end of the wealth spectrum for whom social security payments are adequate. For the higher income individuals, however, social security payments cannot be expected to provide full income replacement on their own.

Behavioral biases underlying the annuity puzzle and possible solutions

None of the potential rational explanations for the annuity puzzle, reviewed above, can account for low rates of annuity purchase. It seems therefore that most consumers are failing to act in their rational self-interest when they forego annuity purchases. This should not be surprising given the technical demands of such decisions. In recent decades, numerous scholars have observed that decision makers frequently fall short of the Olympian standards of rationality, in systematic and predictable ways.[15,16] In particular, many scholars have suggested that psychological biases may contribute to failures to purchase annuities in situations where it is in a consumer's rational self-interest to do so.[1,7,17§] The decision whether or not to purchase an annuity is, from a cognitive standpoint, highly complex because it requires consumers to assess several forms of uncertainty. This uncertainty can be paralyzing and lead many consumers to take the path of least resistance, which generally means avoidance of annuities. In this article we focus on four sources of uncertainty that reflect four questions most people entertaining the purchase of annuities may ask themselves:

Unpacking these four principal sources of uncertainty – and associated behavioral biases – can help point us toward possible interventions for overcoming consumer resistance to purchasing annuities, and so we review them in some detail below.

Longevity Uncertainty	Spending Uncertainty	Investment Outcome Uncertainty	Decision Uncertainty
"How long will I live?"	"How much money will I need to cover that amount of time?"	"How would I do with an annuity compared to other investments?"	"Am I understanding this all properly?"

§ Beginning with Nobel Laureate Herbert Simon,[61] many scholars have suggested that people are "boundedly rational,"[62] capable of maximizing self-interest only up to the limits of their highly constrained attention, memory, and information processing capabilities. Thus, they tend to rely on decision-making shortcuts or "heuristics." Although such heuristics save time and can often lead to reasonable decisions, they can also result in decisions that may appear "irrational" in systematic and predictable ways.

** Research shows that individual differences in longevity expectations do predict differences in actual mortality,[63] but on average people underestimate their probability of living to around age 80 and overestimate their probability of living to ages beyond that.[23]

1. Longevity uncertainty: How long will I live?

A first source of uncertainty affecting annuity purchase decisions concerns the question of how long the beneficiary will live. As noted earlier, some theorists have suggested that this is the central question driving annuity purchase decisions. If a consumer believes that he or she will have a longer-than-average life, then figuring out how to have guaranteed income in retirement is an important problem to solve.** We discuss two biases that amplify this sense of uncertainty: ***avoidance and extreme risk aversion.***

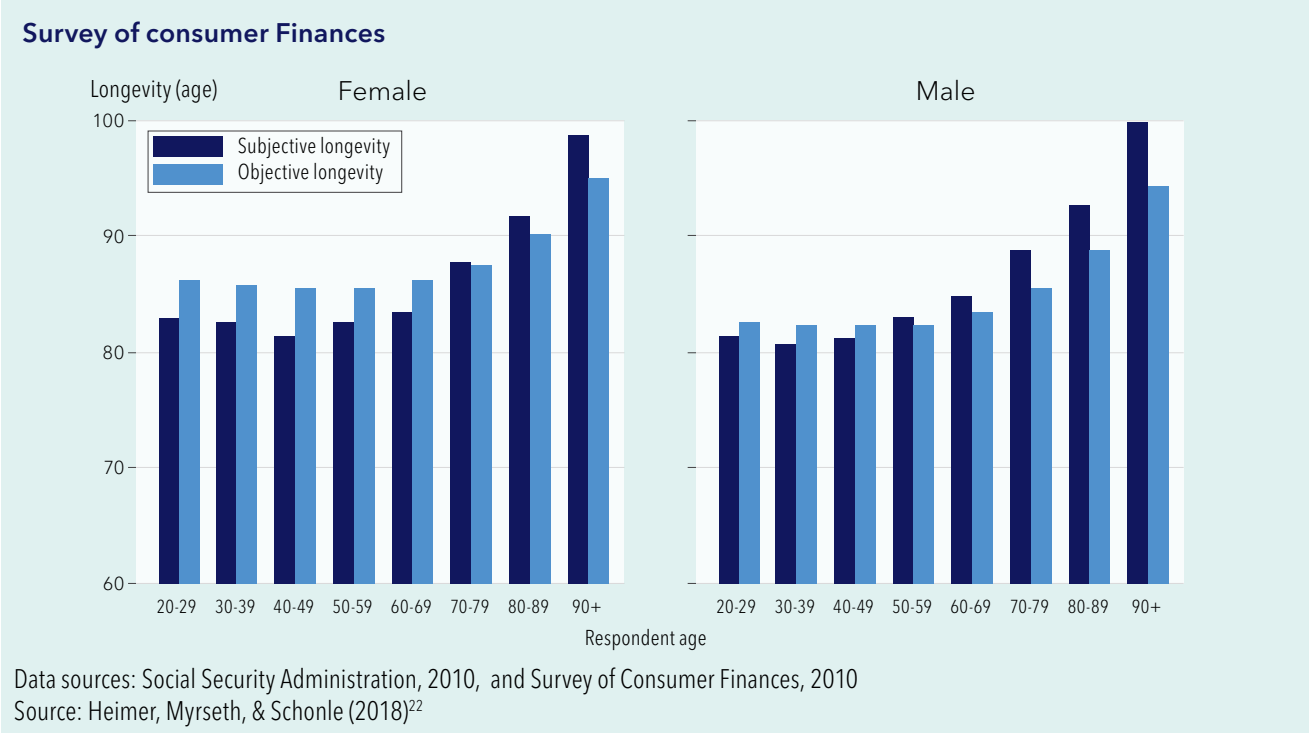
Biases

Avoidance. Research on terror management theory suggests that people understand both that they will eventually die and that there is no way to avoid doing so. In an effort to manage fear of their own death, people tend to avoid thoughts of their own mortality, and also try to engage in pursuits that can assure them of "symbolic" immortality (e.g., taking part in systems or cultures that will continue to exist beyond one's own life span).[18] Interestingly, mortality reminders cause people to strongly embrace countries of origin and act in more patriotic ways, given that people know that their country will survive after their own demise.[19]

Considering the purchase of an annuity may naturally call to mind death-related thoughts for consumers, given its central role in determining the value of such products. And if consideration of an annuity makes death more salient, then one way to manage associated painful thoughts is to simply avoid the annuity decision-making process altogether. Indeed, recent work found that the task of deciding to purchase an annuity spontaneously brings to mind more death-related thoughts than the task of deciding whether to invest in an Individual Retirement Account (IRA).[20] Moreover, experiments have shown that when thoughts of mortality were primed prior to an annuity decision task, annuity choice rate was lower compared to when thoughts of mortality were not primed.[20] Furthermore,

Figure 1: Subjective Longevity Beliefs vs. Actuarial Data

Description: The figure compares subjective longevity beliefs in the 2010 wave of the Survey of Consumer Finances (SCF) to the Social Secuity Administration's projected longevity estimates calculated using actuarial probabilities. For the purposes of illustration, the figure bins respondents in the SCF into their respective age decile, and we calculate and present the mean response (actuarial longevity estimate) of these groups.



Data sources: Social Security Administration, 2010, and Survey of Consumer Finances, 2010
Source: Heimer, Myrseth, & Schonle (2018)[22]

we speculate that the purchase of an annuity may be seen by many consumers as an act of "tempting fate" (i.e., being presumptuous about the future), which studies show can increase the accessibility of negative thoughts and the perceived likelihood of associated events[21] – in this case thoughts of dying younger. Indeed, people under the age of 60 (i.e., pre-retirement) tend to underestimate their own life expectancy by approximately 2-3 years[22] (see Figure 1). Finally, we note that focusing attention on the likelihood that a person will "die by" various ages leads to around a 10 year lower estimates of life expectancy compared to assessments of when a person will "live to."[23]

Extreme aversion to a negative return on investment. Even if some consumers do not avoid thinking about their life expectancy, and even if they make an accurate assessment, they may nevertheless be deterred from purchasing annuities by a tendency toward extreme risk aversion. One of the most heavily researched topics in behavioral economics is the concept of *loss aversion*: potential losses have greater impact on decisions than equivalent gains. Thus, the thought of losing $100 is worse than the thought of foregoing a gain of $100.[24,25] For many consumers, the decision to purchase an annuity may boil down to a question of whether or not one will actually live long enough recoup the initial premium.[7] Thus, consumers may view annuities as "risky gambles," with some possibility to "lose" money: there's some chance that the beneficiary may die before getting back his or her initial deposit, even though there is also some chance that the beneficiary will get back more. Due to loss aversion, the potential loss if one dies earlier than expected will have greater impact on annuity purchase decisions than the possible gains if one lives longer than expected, resulting in pronounced risk aversion. Compounding this issue, we tend to *overweight probabilities of unlikely events*[26] (such as dying in the next few years) when evaluating prospects. To the extent that the unlikely negative event of an early death naturally comes to mind when a consumer evaluates an annuity, this will contribute to even greater impact of that possibility and even more pronounced risk aversion and reluctance to purchase annuities.

Possible Solutions

While it may be difficult to counteract people's natural aversion to pondering their own future death or the possibility of losing money on the purchase of annuities, our reading of the behavioral literature suggests possible solutions.

1. Avoid any mention of death. Recent studies have found that one way to counteract the death-related anxiety that arises from the annuity decision-making process is to simply leave out mentions of death in promotional materials. Namely, Salisbury and Nenkov[20] used two different promotional messages to gauge interest in annuity take-up. One message, used standard language that firms tend to use:

FINANCIAL PLANNING: Annuities

What is an Annuity?

An annuity is a financial product offered by financial companies.

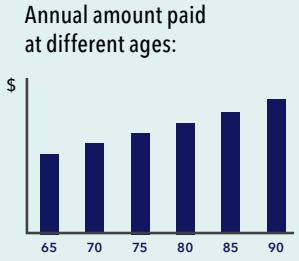
When you put your savings into an annuity, you pay a lump sum of money upfront. In return for that lump-sum investment, you receive a series of regular monthly payments each year you live, until you **die**, after which any remaining amount stays with the financial company.

Hypothetical annuity example

The amount received from the annuity depends on when you **die**.

Suppose a 65 year old person puts his or her retirement savings into a life annuity that is adjusted 2% annually for inflation.

The total amount received increases 2% each year, until the annuity holder **dies**.



*Each number represents the amount received per year at that age. The annual amount is split across 12 monthly payments that continue until the annuity holder **dies**.

Source: Salisbury, L. C. & Nenkov, G. Y. Solving the annuity puzzle: The role of mortality salience in retirement savings decumulation decisions. *J. Consum. Psychol.* 26, 417–425 (2016).

The other message, however, modified this standard message so that mentions of death were removed:

FINANCIAL PLANNING: Annuities

What is an Annuity?

An annuity is a financial product offered by financial companies.

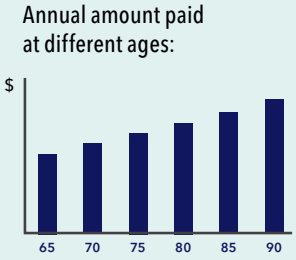
When you put your savings into an annuity, you pay a lump sum of money upfront. In return for that lump-sum investment, you receive a series of regular monthly payments each year you live, after which any remaining amount stays with the financial company.

Hypothetical annuity example

The amount received from the annuity depends on how long you **live**.

Suppose a 65 year old person puts his or her retirement savings into a life annuity that is adjusted 2% annually for inflation.

The total amount received increases 2% each year, as long as the annuity holder **lives**.



*Each bar represents the amount received per year at that age. The annual amount is split across 12 monthly payments that continue as long as the annuity holder **lives**.

Source: Salisbury, L. C. & Nenkov, G. Y. Solving the annuity puzzle: The role of mortality salience in retirement savings decumulation decisions. *J. Consum. Psychol.* 26, 417–425 (2016).

The researchers found that hypothetical interest in the annuity was higher when the modified brochure was used (though we cautiously note that their sample size was relatively small, and this result should be replicated before such messaging is implemented widely). Relatedly, marketing communications could focus on the age at which a consumer could live until (rather than the age at which they might die by).

2. Frame annuities as purchasing "enhanced financial security." Although people are averse to losing money for which they receive no compensating value, they are open to paying money for symbolic value such as options or insurance. For instance, an unpublished study of hypothetical behavior[27] found that people would rather pay an insurance premium in advance (presumably to obtain a certain value from "peace of mind") than pay after the insurance period only if there is no claim (which exposes them to the possibility of feeling like they are losing money), despite the fact that the latter amounts to an interest-free loan from the insurance company. We suggest that marketing materials for annuities emphasize that customers are purchasing not just an income stream, but also confidence that their financial needs will be taken care of for the rest of their lives, so that early death will be less likely to be experienced as a "loss."

2. Spending uncertainty: How much money will I need to cover that amount of time?

Setting aside a consumer's uncertainty about how long he or she will live, the decision to purchase an annuity is intimately connected with projections about one's monthly or yearly spending needs in retirement. For example, health and care-related expenses are difficult to predict in advance, as are potential offsetting contributions from friends and family or other sources of income. Uncertainty concerning spending needs may deter annuity purchase due to two related biases: the tendency to sharply discount the value of future consumption, and the tendency to see lump sums as being more adequate than their equivalent, annuitized streams.

Biases

Steep discounting of the future. Many long-term decisions involve tradeoffs between rewards in the present versus the future. Saving for retirement, for instance, involves putting aside money today for future use: a sacrifice is made now, but the benefit of doing so is greater spending later on in one's life. Economic theorists have long known that people tend to discount the value of future outcomes[28] and usually are willing to accept smaller rewards sooner in lieu of larger rewards to be received later. Put another way, people

tend to attach far greater value to consumption in the present or near-term compared to the future. A small degree of discounting may be rational as one can safely exchange a smaller amount of money today for a larger amount of money in the future or vice versa through saving or borrowing. However, several studies have observed unreasonably high rates of discounting in practice. For instance, when given the choice between $5 today and $10 in six months, many consumers may opt for the smaller-sooner reward,[29] reflecting an absurd rate of discounting (these consumers forego a 200% annual return for waiting half a year). Examples of extreme discounting of the future are commonly observed outside the laboratory – for instance, when a customer of Amazon pays a premium to have a non-urgent product shipped a few days faster, or when an employee foregoes an employer match in a 401(k) plan in order to spend a little more money in the present.[30] Likewise, many consumers may unreasonably discount the importance of consumption in their (distant) post-retirement relative to present consumption, and therefore forgo opportunities to spend a large amount money today in order to obtain a guaranteed income stream in the future.[31] This tendency may result from a mistaken belief that their emotions in the future will not be as strong as the emotions they experience in the present (e.g., "having less future income is not ideal, but it won't bother me that much").[32]

Wealth illusion. Another obstacle to the purchase of annuities is the fact that people are biased to see large lump sums as being more adequate than equivalent monthly annuitized streams of income. Lump sums that accumulate in defined contribution plans are generally large and unfamiliar denominations to most people: to most consumers, $1m seems like a large amount of money, and $5m seems larger, but it is difficult to assess just how large these amounts are in terms of their purchasing power over time. Thus, most people have difficulty appreciating the adequacy of lump sums and simply regard a typical 401(k) accumulation at retirement as a large amount of money. In contrast, when these same lump sums are expressed in terms of monthly payments, or annuities, people are far more sensitive to how adequate or inadequate they may be. Most consumers can easily understand how far a given monthly amount will get them because they are used to paying expenses such as rent or utilities on a monthly basis and they are used to budgeting based on monthly paychecks. Indeed, a recent study found that retirement-aged research participants thought that a given lump sum (e.g., $500,000) would provide more for them in retirement than its equivalent, annuitized stream (e.g., $2,500 a month for the rest of one's life[33]). Thus, many consumers may prefer to keep 401(k) money at retirement (in its lump sum form) rather than trade it in for what appears to be a stream of income that will provide insufficient future spending.

Possible Solutions

We suggest possible ways of addressing consumers' tendency to unreasonably discount future spending needs and undervalue annuitized income streams:

1. Bring future selves to the present. Prior work has found that consumers can be motivated to save more for retirement when their emotional bonds to their future, retirementaged selves are strengthened.[34] For example, one study showed research participants ageprogressed images of their future selves in order to prompt more empathy with those distant selves, and found greater subsequent willingness to save for retirement. Thus, one way to reduce discounting of future spending is by making later selves salient and more emotionally evocative to consumers when they are offered annuities (e.g., by presenting them with a computer-aged photo of themselves or a narrative that draws them into visualizing their future selves).

2. Link accumulation with decumulation. If the relatively large financial sacrifice required to purchase future income is a deterrent, then one possible solution is to reduce the sacrifice that is felt in the present and link it directly to future consumption. For instance, we imagine creation of an investment vehicle that automates periodic contributions to a target date mutual fund so that, for example, saving $10 per day until retirement might be expected to yield, say, $20 (inflation-adjusted) of consumption per day beginning at retirement.

3. Investment Outcome Uncertainty: How would I do with an annuity compared to other investments?

Setting aside for a moment uncertainty about longevity and spending needs, a third source of uncertainty when deciding whether or not to purchase an annuity concerns how the returns one would receive from an annuity compare to the returns one would receive from alternative investments. As noted earlier, an annuity represents a form of insurance against outliving one's savings. The obvious alternative to purchasing an annuity, then, is to self-insure by saving enough and investing in such a way that future income is adequate to support desired consumption. Three biases may undermine the appeal of annuities. First, many consumers express excessive optimism toward their ability to manage their own finances and second, this may be exacerbated when recent market performance has been good. Third, many consumers may distrust financial institutions that guarantee annuities.

Biases

Unrealistic optimism in self-management. An abundance of behavioral research finds that people tend to exhibit a number of *positive illusions*, acting as if the future will be great especially for themselves.[35,36] In particular, they tend to experience an *illusion of control* over chance events,[37] they believe that they have more favorable attributes than their average peer, and they are biased to believe that negative events are less likely to affect them than their peers.[38] Of particular relevance, laboratory studies find that people tend to exhibit overconfidence in their own ability to successfully manage their own investments.[39]

Over-responsiveness to recent market performance. Abundant psychological research finds that people often judge the likelihood of future events by the ease with which instances of these events come to mind. For example, many people assume that deaths due to shark attacks are more common than deaths due to accident sustained while taking a selfie, because news stories about shark attacks are more common in the media and therefore easier to recall. In fact, "selfie deaths" in 2015 were roughly 50% more common than shark attack deaths.[40] Similarly, when the stock market has recently appreciated sharply in value, consumers may overestimate the likelihood that it will continue to do so in the future. Indeed, in a study of real annuity decisions from more than 100,000 new retirees, Previterro[41] found that the better the stock market had recently performed, the more likely consumers were to cash out their savings into a lump sum and the less likely they were to purchase an annuity. This effect was quite large: moving from a year where stock market returns were in the bottom quarter of historical returns to a year when they were in the top quarter, would reduce the likelihood that a consumer will purchase an annuity by about 10 percentage points.

Distrust in financial institutions. The purchase of any insurance product requires some degree of faith that the guarantor will remain solvent over the term of the contract. Thus, uncertainty concerning future investment returns involves not only market investments but also the solvency of the annuity provider. To this point, the Great Recession appears to have instilled in consumers a lack of trust in financial institutions. Stevenson and Wolfers,[42] for example, analyzed annual Gallup surveys from 1973 onward, and found that trust in banks has declined over time, precipitously in the wake of the Great Recession of 2007-2009. Interestingly, trust in banks seems to mirror the unemployment rate (i.e., when the unemployment rate is high, trust in banks is lower; when unemployment rate is low, trust in banks is slightly higher). Although no research has directly examined the link between institutional trust and annuity purchase rates, we speculate this may be another relationship that is affected by macroeconomic cycles: when bank defaults and high unemployment rates are easily accessible in a consumer's mind,

then agreeing to a long-term contract with an insurance company in the form of an annuity may seem like an unattractive proposition.

Possible Solutions

When considering the uncertainty surrounding future market returns, annuities may seem like a poor choice for many consumers. We propose potential interventions.

1. Market annuities as *insurance* rather than *investments*. Because annuities are often recommended by financial advisers, consumers may erroneously view them as an investment vehicle much like a mutual fund or savings bond. We suggest that viewed in an investment frame, annuities may appear to be inferior to consumers who attend to their relatively low rates of return. Of course, in their most basic form, annuities are meant to be insurance against outliving one's money. We assert that the insurance frame may be more appealing to consumers because it emphasizes the certainty that annuities can offer. One robust observation of behavioral economics is that people are willing to pay a premium for certainty over intermediate probabilities.[24,25] Thus, it has been argued that annuities should be framed in terms of the amount of spending that they offer consumers rather than the returns that they could provide.[47] In a study involving hypothetical decisions, Brown and colleagues[43] found that when annuities were framed as offering a monthly $650 return for life (i.e., an *investment frame*) take-up was quite low (21% compared to other similar products). But when annuities were framed as offering an opportunity to spend $650 per month for life (i.e., a consumption frame), take-up was considerably higher (70% compared to other similar products). Likewise, Benartzi and colleagues[44] found that purchase rates for actual annuities was higher when future payments were presented in a consumption frame as monthly income (53% take-up) compared to when future payments were presented in an investment frame as one's balance over time (41% take-up).

2. Build consumer trust. If annuity providers should be selling certainty and peace of mind, marketing materials should cultivate consumer trust, for instance by emphasizing the guarantor's competence and benevolence.[45]

4. Decision Uncertainty: Am I making the right choice?

Whether or not consumers attempt to assess uncertainty concerning longevity, spending needs, or returns to annuities relative to other investments, a fundamental uncertainty they face concerns their own capability of making a competent choice. Given the inherent complexities associated with decumulation decisions, consumers may lack appropriate expertise or lack confidence in their own expertise or the advice they are receiving. Moreover, many consumers may lack the awareness of opportunities to purchase annuities or simply neglect to follow through on vague intentions to purchase them.

Biases

Financial illiteracy and lack of financial confidence. Most consumers have very limited *financial literacy*.[46,47] One commonly used test of financial literacy, for example, asks survey respondents the following questions:

- If the chance of getting a disease is 10 percent, how many people out of 1,000 would be expected to get the disease?
- If 5 people have the winning number in a lottery and the prize is 2 million dollars, how much would each of them get?
- Let's say you have $200 in a savings account. The account earns 10% interest per year. How much would you have in the account at the end of two years?

In a survey of thousands of Baby Boomers, only about 1 in 5 correctly answered the final question concerning compound interest (and among those who got it wrong, 43% made a simple interest calculation in answering $240, ignoring the interest that accrues on first year interest).[48] Likewise, studies show that even sophisticated consumers tend to adopt a linear view of interest accumulation, and one presumes, of decumulation.[49] Financial literacy is significantly positively related to planning for retirement, even when statistically controlling for other relevant factors such as age, education, income, sex, race, retirement status, marital status, and number of children.[48] Such a link between financial literacy and planning for retirement is important given that planning for retirement is positively related to the accrual of retirement assets.

Although no research has directly linked financial literacy to decumulation decisions, given that prior research has linked poor financial literacy with underfunded retirement accounts, we expect that consumers with poor financial literacy will also be unlikely to purchase an annuity. Many studies have found that consumers are less likely to act under uncertainty when they feel relative ignorant or uninformed.[50,51] Moreover, one recent study found that when people feel *comparatively ignorant* in evaluating financial instruments they are less likely to invest in various retirement saving vehicles.[52] It stands to reason that the same will apply for consumer decisions with respect to purchasing annuities.

Choice overload. While the decision whether or not to purchase a single annuity is financially complex, this complexity increases as the number of decisions demanded on behalf of consumers increases (e.g., which insurance company to use, which product to buy, whether to pay extra for inflation protection, whether to pay for a period certain guarantee, etc.), and as the number of available options increases. Of course, the abundance of options offered in the annuity market is well-intentioned: each consumer is unique, and providing them with more choices allows for the ability to obtain a more individually-tailored decumulation product. However, when presented with too many options or decisions, consumers become anxious and grow increasingly unsure of whether the decision that they might make is the "right" one. When such *choice overload* is experienced, consumers may ironically choose to defer their decision rather than pick a currently available option[53,54] (but see research by Scheibehenne and colleagues).[55] In one study in the retirement domain, for example, researchers examined 401(k) plan participation for approximately 800,000 employees, and found that as investment options increased, participation decreased.[56] Specifically, the study found that for every 10 funds added to a given employer's 401(k) plan, employee participation decreased by 1.5 to 2 percentage points.

Inertia. Even if consumers wade through the thicket of uncertainties surrounding annuity purchasing to reach a tentative decision which product to purchase, consumers may not follow through on this intention, either because of procrastination or forgetfulness.[57]

Possible Solutions

1. Simplify presentation of information. Laboratory studies find that people are more likely to make investments if they are not made aware of their financial illiteracy and when investments are presented to them in simple terms that are easily understood and processed.[52] All materials describing an insurance product, like an annuity product, should thus be written in as clear and simple a way as possible, with arcane details left to the fine print and secondary web pages.

2. Timely reminders. To neutralize some of the anxiety that may arise from the annuity decision-making process, "planning prompts" and timely reminders could be implemented. When consumers face anxiety about a given decision, they may defer the decision (or ultimately opt for the status quo). Planning prompts lay out the "when, where, and how" of a specific decision.[58] In one recent study, for example, mailers were sent to employees who were due for a colonoscopy. Those who got a 'sticky note' with a message that read "Don't Forget!" and a blank space in which the details of the appointment could be recorded were about 15% more likely to receive a colonoscopy than employees in a control condition.[59]

In theory, annuities ought to appeal to a high proportion of Americans, as annuities promise to provide guaranteed lifetime income in retirement. Naturally, some people may forgo purchasing annuities because they simply lack sufficient funds or are comfortable bearing the risk of alternative investment strategies. However, many others are deterred for reasons that are difficult to rationalize. In the overview of this so-called "annuity puzzle" it was observed that annuities call to mind uncertainty surrounding longevity, future spending needs, investment outcomes and an investor's ability to properly evaluate these opportunities. Research was surveyed showing that each of these four sources of uncertainty is associated with various behavioral biases that can present obstacles to investing. Possible strategies for helping consumers overcome these biases were suggested along the way, so that they may be better prepared for a secure financial future.

References

1. Brown, J. *Rational and Behavioral Perspectives on the Role of Annuities in Retirement Planning*. (2007). doi:10.3386/w13537
2. Goldstein, D. G., Johnson, E. J. & Sharpe, W. F. Choosing Outcomes versus Choosing Products: Consumer-Focused Retirement Investment Advice. *J. Consum.* Res. **35,** 440–456 (2008).
3. Sumit Agarwal, John C. Driscoll, Xavier Gabaix & David Laibson. The Age of Reason: Financial Decisions over the Life Cycle and Implications for Regulation. *Brookings Pap. Econ.* Act. **2009**, 51–117 (2009).
4. Kochanek, K. D., Murphy, S., Xu, J. & Arias, E. Mortality in the United States, 2016. *NCHS Data Brief* 1–8 (2017).
5. Yaari, M. E. Uncertain Lifetime, Life Insurance, and the Theory of the Consumer. *Rev. Econ. Stud.* **32,** 137 (1965).
6. Davidoff, T., Brown, J. R. & Diamond, P. A. Annuities and individual welfare. *American Economic Review* **95,** 1573–1590 (2005).
7. Hu, W.-Y. & Scott, J. S. Behavioral Obstacles in the Annuity Market. *Financ. Anal. J.* **63,** (2007).
8. Office, U. S. G. A. Retirement Income: Ensuring Income throughout Retirement Requires Difficult Choices. (2011).
9. KRC Research. TIAA 2017 Lifetime Income Survey executive summary. *TIAA 2017 Lifetime Income Survey* (2017).
10. Modigliani, F. Life cycle, individual thrift, and the wealth of nations. *Science* **234,** 704–12 (1986).
11. Brown, J. & Mitchell, O. Who Values the Social Security Annuity? New evidence on the Annuity Puzzle. (2007).
12. Finkelstein, A. & Poterba, J. Selection Effects in the United Kingdom Individual Annuities Market. *Econ. J.* **112,** 28–50 (2002).
13. Brown, J. R. (Jeffrey R., Mitchell, O. S., Poterba, J. M. & Warshawsky, M. J. *The role of annuity markets in financing retirement.* (MIT Press, 2001).
14. Johnson, R. W., Burman, L. E. & Kobes, D. I. Annuitized Wealth at Older Ages: Evidence from the Health and Retirement Study. *Final Rep. to Empl. Benefits Secur. Adm. U.S. Dep. Labor* (2004).
15. Thaler, R. *Quasi rational economics*. (Russell Sage, 1994).
16. Kanhneman, D., Slovic, P. & Tversky, A. *Judgment under uncertainty: Heuristics and biases. Cambridge University Press* (1982). doi:10.1126/science.185.4157.1124
17. Beshears, J., Choi, J. J., Laibson, D., Madrian, B. C. & Zeldes, S. P. What makes annuitization more appealing? *J. Public Econ.* **116,** 2–16 (2014).
18. Solomon, S., Greenberg, J. & Pyszczynski, T. A. *The worm at the core : on the role of death in life*. (Random House, 2015).
19. Solomon, S., Greenberg, J. & Pyszczynski, T. A Terror Management Theory of Social Behavior: The Psychological Functions of Self-Esteem and Cultural Worldviews. *Adv. Exp. Soc. Psychol.* **24,** 93–159 (1991).
20. Salisbury, L. C. & Nenkov, G. Y. Solving the annuity puzzle: The role of mortality salience in retirement savings decumulation decisions. *J. Consum. Psychol.* **26,** 417–425 (2016).
21. Risen, J. L. & Gilovich, T. Why People Are Reluctant to Tempt Fate. *J. Pers. Soc. Psychol.* **95,** 293–307 (2008).
22. Heimer, Rawley, Z., Myrseth, K. O. R. & Schoenle, R. S. *YOLO: Mortality beliefs and household finance puzzles*. (2018).
23. Payne, J. W. et al. Life expectancy as a constructed belief: Evidence of a live-to or die-by framing effect. *J Risk Uncertain* **46,** 27–50 (2013).
24. Kahneman, D. & Tversky, A. Prospect Theory: An Analysis of Decision under Risk. *Econometrica* **47,** 263– 292 (1979).
25. Tversky, A. & Kahneman, D. Advances in Prospect Theory: Cumulative Representation of Uncertainty. *J. Risk Uncertain.* **5,** 297–323 (1992).
26. Tversky, A. & Fox, C. R. Weighing risk and uncertainty. *Psychol. Rev.* **102,** 269–283 (1995).
27. Fox, C. R. *Timing of Insurance Premiums*. (1996).
28. Frederick, S., Loewenstein, G. & O'donoghue, T. Time Discounting and Time Preference: A Critical Review. *J. Econ. Lit.* **40,** 351–401 (2002).
29. Kirby, K. N. & Marakovic, N. N. Delay-discounting probabilistic rewards: Rates decrease as amounts increase. *Psychon. Bull. Rev.* **3,** 100–104 (1996).
30. Laibson, D. Golden Eggs and Hyperbolic Discounting. *Q. J. Econ.* **112,** 443–478 (1997).
31. Schreiber, P. & Weber, M. Time inconsistent preferences and the annuitization decision. *J. Econ. Behav. Organ.* **129,** 37–55 (2016).
32. Kassam, K. S., Gilbert, D. T., Boston, A. & Wilson, T. D. Future anhedonia and time discounting. *J. Exp. Soc. Psychol.* **44,** 1533–1537 (2008).
33. Goldstein, D. G., Hershfield, H. E. & Benartzi, S. The illusion of wealth and its reversal. *J. Mark. Res.* **53,** (2016).
34. Hershfield, H. E. Future self-continuity: How conceptions of the future self transform intertemporal choice. *Ann. N. Y. Acad. Sci.* **1235,** 30–43 (2011).
35. Taylor, S. E. & Brown, J. D. Illusion and Well-Being: A Social Psychological Perspective on Mental Health. *Psychol. Bull.* **103,** 193–210 (1988).
36. Windschitl, P. D. & Stuart, J. O. in *The Wiley Blackwell Handbook of Judgment and Decision Making* 431– 455 (John Wiley & Sons, Ltd, 2015). doi:10.1002/9781118468333.ch15
37. Langer, E. J. The illusion of control. *J. Pers. Soc. Psychol.* **32,** 311–328 (1975).
38. Weinstein, N. D. Optimistic biases about personal risks. *Science (80-.).* **246,** 1232–1234 (1989).

39. Moore, D. A., Kurtzberg, T. R., Fox, C. R. & Bazerman, M. H. Positive Illusions and Forecasting Errors in Mutual Fund Investment Decisions. *Organ. Behav. Hum. Decis. Process.* **79,** 95–114 (1999).

40. Rizzo, C. More people have died from selfies than shark attacks this year. (2015). Available at: https://mashable.com/2015/09/21/selfie-deaths/#qtfLw0L72aqm. (Accessed: 8th April 2018)

41. Previtero, A. Stock market returns and annuitization. *J. financ. econ.* **113,** 202–214 (2014).

42. Stevenson, B. & Wolfers, J. Trust in Public Institutions over the Business Cycle. *Am. Econ. Rev.* **101,** 281–287 (2011).

43. Brown, J. R., Kling, J. R., Mullainathan, S. & Wrobel, M. V. Why Don't People Insure Late-Life Consumption? A Framing Explanation of the Under-Annuitization Puzzle. *Am. Econ. Rev.* **98,** 304–309 (2008).

44. Benartzi, S., Previtero, A. & Thaler, R. H. Annuitization Puzzles. *J. Econ. Perspect.* **25,** 143–164 (2011).

45. Du, S., Bhattacharya, C. & Sen, S. Convergence of interests: Cultivating consumer trust through corporate social initiatives. in *Advances in Consumer Research* 687 (2007).

46. Fernandes, D., Lynch, J. G. & Netemeyer, R. G. Financial Literacy, Financial Education, and Downstream Financial Behaviors. *Manage. Sci.* **60,** 1861–1883 (2014).

47. Agnew, J. & Szykman, L. in *Financial Literacy: Implications for Retirement Security and the Financial Marketplace* (2011). doi:10.1093/acprof:oso/9780199696819.003.0009

48. Lusardi, A. & Mitchell, O. S. Baby Boomer retirement security: The roles of planning, financial literacy, and housing wealth. *J. Monet. Econ.* **54,** 205–224 (2007).

49. McKenzie, C. R. & Liersch, M. J. Misunderstanding savings growth: Implications for retirement savings behavior. *J. Mark. Res.* **48,** S1–S13 (2011).

50. Fox, C. R. & Tversky, A. Ambiguity aversion and comparative ignorance. *Q. J. Econ.* **110,** 585–603 (1995).

51. Fox, C. R. & Weber, M. Ambiguity aversion, comparative ignorance, and decision context. *Organ. Behav. Hum. Decis. Process.* **88,** 476–498 (2002).

52. Hadar, L., Sood, S. & Fox, C. R. Subjective Knowledge in Consumer Financial Decisions. *J. Mark. Res.* **50,** 303–316 (2013).

53. Chernev, A., Böckenholt, U. & Goodman, J. Choice overload: A conceptual review and meta-analysis. *J. Consum. Psychol.* **25,** 333–358 (2015).

54. Schwartz, B. The Tyranny of Choice. *Scientific American* **290,** 70–75 (2004).

55. Scheibehenne, B., Greifeneder, R. & Todd, P. M. Can There Ever Be Too Many Options? A Meta-Analytic Review of Choice Overload. *J. Consum. Res.* **37,** 409–425 (2010).

56. Sethi-Iyengar, S., Huberman, G. & Jiang, G. in *Pension Design and Structure: New Lessons from Behavioral Finance* (2005). doi:10.1093/0199273391.003.0005

57. Choi, J. J., Laibson, D. & Madrian, B. C. $100 bills on the sidewalk: Suboptimal investment in 401(k) plans. *Rev. Econ. Stat.* **93,** 748–763 (2011).

58. Gollwitzer, P. M. Implementation intentions: Strong effects of simple plans. *Am. Psychol.* **54,** 493–503 (1999).

59. Milkman, K. L. *et al.* Planning Prompts as a Means of Increasing Preventive Screening Rates. *Prev. Med.* **56,** 92–93 (2013).

60. Mitchell, O. S., Poterba, J. M., Warshawsky, M. J. & Brown, J. R. New Evidence on the Money's Worth of Individual Annuities. Am. Econ. Rev. **89**, 1299–1318 (1999).

61. Simon, H. A. A Behavioral Model of Rational Choice. *Q. J. Econ.* **69,** 99 (1955).

62. Kahneman, D. A perspective on judgment and choice. American Psychologist. *Am. Psychol.* **58,** 697–720 (2003).

63. Smith, V. K., Taylor, D. H. & Sloan, F. A. Longevity Expectations and Death: Can People Predict Their Own Demise? *Am. Econ.* Rev. **91,** 1126–1134 (2001).

About the Authors

Hal Hershfield
Associate Professor
UCLA Anderson School of Management
Ph.D., Stanford University

Hal Hershfield is an Associate Professor of Marketing, Behavioral Decision Making, and Psychology at UCLA. His research, which sits at the intersection of psychology and economics, examines the ways that people consider their future selves, and how feelings of connection to these distant selves can impact financial decision making over time. He earned his Ph.D. in psychology from Stanford University. Hershfield publishes in top academic journals and also contributes op-eds to *The New York Times*, *The Wall Street Journal* and other outlets. He consults with the Consumer Financial Protection Bureau and companies such as Athene USA, Principal Financial Group and Prudential. The recipient of numerous teaching awards, Hershfield was recently named one of "The 40 Most Outstanding B-School Profs Under 40 In The World" by business education website Poets & Quants.

Craig Fox
Professor
UCLA Anderson School of Management
Ph.D., Stanford University

Craig Fox is Harold Williams Professor of Management, and Professor of Psychology and Medicine at UCLA. He is co-founder and chair of the Behavioral Decision Making Area of the UCLA Anderson School of Management. Professor Fox has previously taught at Stanford, Northwestern, Columbia, the University of Chicago, and Duke University's Fuqua School of Business where he was named the 2001 "Outstanding Faculty Member." Dr. Fox's research explores behavior under risk, uncertainty and ambiguity, using a range of empirical methods from lab and field studies to brain imaging. He also applies insights from behavioral economics and social psychology to improve financial and health decisions. He earned his B.A. in economics and psychology from U.C. Berkeley, and his Ph.D. in experimental psychology from Stanford University. Dr. Fox teaches executive, MBA and Ph.D. courses in decision making, negotiation, leadership, strategy and dynamic management.

ATHENE
Driven to do more.®

Athene Annuity and Life Company
7700 Mills Civic Parkway
West Des Moines, IA 50266-3862

Athene.com

We are Athene. And we are relentless when it comes to creating an innovative portfolio of fixed annuities to meet your accumulation and retirement income needs.

At Athene, we see every day as a new opportunity to measure ourselves against the best – and then we don't stop until we've set the bar even higher. We stand ready to help you achieve more.

21825 (06/19)