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Annuitization Puzzles[†]

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In his Nobel Prize acceptance speech given in 1985, Franco Modigliani (1986) drew attention to the "annuitization puzzle." He 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 ill-understood." Modigliani's remark remains true 25 years later. Rational choice theory predicts that households will find annuities attractive at the onset of retirement because they address the risk of outliving one's income, but in fact, relatively few of those facing retirement choose to annuitize a substantial portion of their wealth. Adding some behavioral factors only deepens the puzzle because annuities have the potential to solve some complex problems with which individuals struggle, like when to retire and how much they can spend each year in retirement, and thus they might be expected to be attractive for that reason as well.

There is now a substantial literature on the behavioral economics of retirement saving, which has stressed that both behavioral and institutional factors play an important role in determining a household's saving accumulations (for a review,

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see Benartzi and Thaler, 2007). Self-control problems, inertia, and a lack of financial sophistication inhibit some households from providing an adequate retirement nest egg. However, interventions such as automatic enrollment and automatic escalation of saving over time as wages rise (the "save more tomorrow" plan) have shown success in overcoming these obstacles. In this paper, we will show that the same behavioral and institutional factors that have proven to be so important in understanding savings behavior are also important in understanding how families handle the process of decumulation once retirement commences. We also find that a mixture of these factors are important in explaining why there seems to be so little demand to annuitize wealth at retirement.[1]

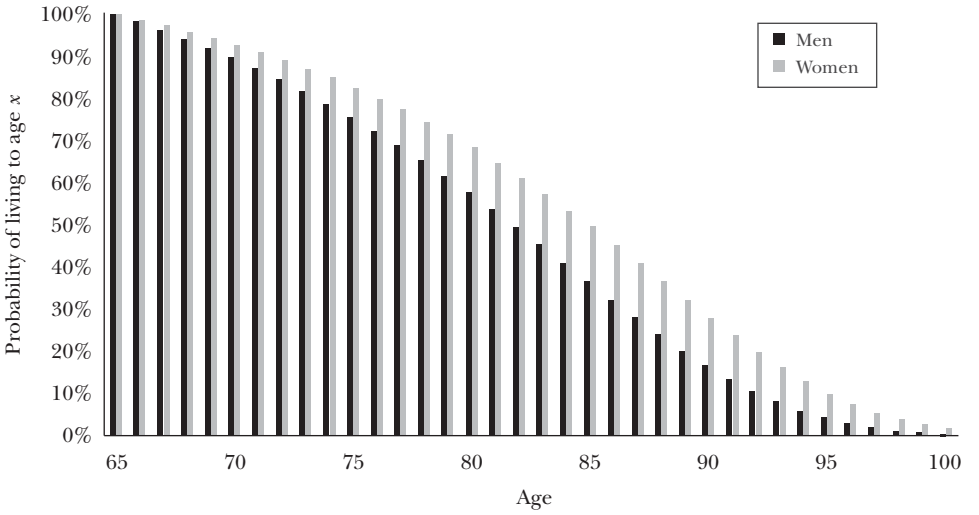
Why Annuities Should Be Popular

Life expectancy at older ages has steadily increased over the last century. For example, at age 65, men have a 50:50 chance of living to 82, and women have 50:50 chance of living to 85 (Bell and Miller, 2005). While average life expectancies often make the headlines, the distribution of longevity is less scrutinized. In Figure 1, we document a large variation in life expectancy at age 65. There is a 22-year difference between the 10th and 90th percentile of the distribution for men (dying at 70 versus 92). Similarly, there is a 23-year difference between the 10th and 90th percentile of the distribution for women (dying at 72 versus 95). In other words, one in ten men retiring at 65 might expect to live another 27 years, and one in ten women can expect to live another 30 years. These numbers give a sense of the potential magnitude of the risk of outliving one's retirement wealth. Of course, annuities are a straightforward way to hedge longevity risk.

Almost half a century ago, Yaari (1965) wrote a seminal paper demonstrating that (under some specific assumptions) rational individuals with no bequest motive should convert all of their retirement wealth to an annuity at retirement. The argument is subtle yet compelling. Suppose you only care about your own utility, and you do not know how long you are going to live. You can either invest your money in a bond or buy an annuity. Yaari shows that by buying an annuity you assure yourself a higher level of consumption in every year that you live compared to holding the bond. The reason is that those who die early subsidize those who live a long time. In the literature, this is called the "mortality premium." Since by assumption those who die early no longer care about consumption, they do not mind sharing their wealth with those lucky enough to still be around. In effect, an annuity is an insurance policy with a negative price! You increase your consumption and eliminate risk

[1] In this paper we refer to fixed, immediate payout annuities. The variable annuities market is considerably bigger than the fixed annuity market. Nonetheless, we do not focus on variable annuities because they are used primarily as tax-efficient investment vehicles in the accumulation phase, rather than as a lifetime source of income in the payout phase.

Figure 1
The Distribution of Life Expectancy for a 65-year Old



Source: Authors' own calculations based on life expectancy data from the Social Security Administration, (Bell and Miller, 2005, Table 6, pages 60–61).
Note: The chart displays the probability of 65-year old men and women living to age *x*.

at the same time, so an annuity strictly dominates the investment alternative.[2] Who says there is no such thing as a free lunch?

This strong result relies on several underlying assumptions: the absence of a bequest motive, complete annuity markets at actuarially fair prices, and specific utility functions (additive separability and expected utility maximization). However, subsequent research has produced more general results. For example, Davidoff, Brown, and Diamond (2005) show that even with incomplete annuity markets, consumers will generally want to annuitize a substantial portion of their wealth. Mitchell, Poterba, Warshawsky, and Brown (1999) have shown that the fees and expenses associated with annuities are not large enough to explain the lack of annuitization. Some have suggested that the absence of inflation-protected annuities in the market may be part of the answer, but such contracts have been available for years in the United Kingdom and are not widely taken.

Perhaps the most telling argument is made by Brown (2007). He notes that the idea that some combination of fees, inflation, and adverse selection can explain the low take-up rate of annuities is belied by the behavior of Social Security participants in claiming benefits. Individuals are allowed to start claiming Social Security benefits as early as age 62 but do not have to begin claiming before turning age 70. As one waits longer before claiming benefits, those benefits are adjusted upward in

[2] Annuities would also allow higher consumption compared to other drawdown strategies, including even dynamic strategies (Brown, 2007).

an actuarially fair manner. This choice effectively means that by delaying the onset of benefits, participants can buy, at better-than-market prices, a larger annuity, and one that is indexed for inflation and offers survivor benefits. If one wants to buy an annuity at a good price, this is an excellent way to do it. But few participants avail themselves of this opportunity. Most people begin claiming within a year of becoming eligible, and less than 5 percent delay claiming past age 66 (Muldoon and Kopcke, 2008).

As more realistic assumptions are incorporated in the models, such as out-of-pocket health shocks (Sinclair and Smetters, 2004) or annuitization in the form of Social Security benefits or a defined benefit pension plan (Dushi and Webb, 2004), the motive for voluntary annuitization diminishes. But even accounting for these elements, welfare gains from annuitization are significant, at least for those with non-negligible financial assets. Yogo (2011) presents a portfolio choice model with stochastic health depreciation, bequest motives equal to two years of consumption, and pre-existing annuitization through Social Security and defined benefit pension plans. He finds that the welfare gains from having access to a private annuity market can be substantial for a household with a healthy 65 year-old head, worth about 16 percent of household financial wealth.

In addition to these arguments based on rational choice theory, certain behavioral factors should, in principle, increase the attractiveness of annuities. As a first approximation, middle-class American households spend what they make. Whatever saving takes place occurs via pensions and paying off home equity, and the latter vehicle seems to have become much less fashionable in the last decade. If the primary income earner in a household retires,[3] the "spend what you make" rule of thumb is no longer available. Instead, households who choose not to annuitize must learn a new skill, namely calculating the optimal drawdown rate over time. Given the complexity of this optimization problem, it is not surprising that retirees might err, either by under- or overspending. These errors can easily be exacerbated by self-control problems if households have trouble sticking to their drawdown plans, either by spending too little or too much. By converting wealth into an annuity, individuals and households can simultaneously answer the conceptually difficult question of figuring out how much consumption is sustainable given the age and wealth of the consumer, and provide a monthly income target to help implement the plan.

Once retired, households can err in either direction in terms of the speed of drawing down wealth. Anyone with moderately affluent aging parents is probably familiar with the problem of trying to get them to consume some of their wealth without feeling guilty. More solid evidence on excessively conservative drawdown rates comes from the paper in this symposium by Poterba, Venti, and Wise (this issue). Their results reinforce earlier findings that assets continue to accumulate, rather than decumulate, well into retirement and that assets often start decreasing

[3] To simplify our discussion, we ignore the additional complexities of dual-income households. None of our conclusions depend on this simplification.

only with family shocks, such as divorce or death. Similarly, the new data support the previous findings by Venti and Wise (2004), who found that home equity peaks at age 75 (well into retirement) and that significant declines in wealth happen only with an unfortunate shock, such as a death or the entry of a family member into a nursing home.

A similar picture of conservative spending patterns emerges from looking at the drawdown from personal retirement accounts, such as 401(k) accounts or Individual Retirement Accounts. In a related paper, Poterba, Venti, and Wise (2011) find that retirees draw just 2 percent of their assets per year prior to reaching the age of 70½, when IRS rules require that a minimum amount be distributed from retirement accounts. After reaching the minimum distribution age, the average withdrawal rate increases to 5 percent per year. Overall, withdrawals are below investment returns during their sample period of 1997 to 2005.

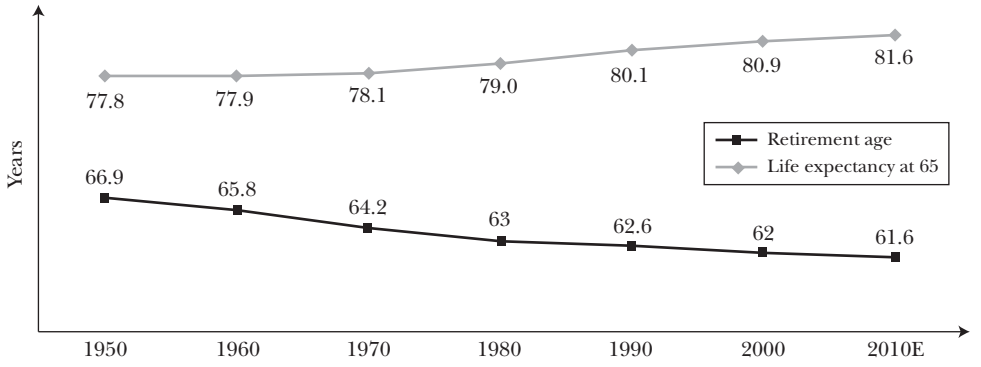
In short, those retirees with non-negligible financial assets appear conservative in consuming their assets. Two explanations are typically proposed: self-insurance against potential health shocks and the desire to leave bequests. Both motives seem important to retirees (Ameriks, Caplin, Laufer, and Van Nieuwerburgh, 2011; Lockwood, forthcoming). However, distinguishing the relative importance of these two explanations is tricky because when we observe someone dying and leaving assets, we do not know if this is the result of a voluntary bequest, lower-than-expected healthcare expenses, or shorter-than-expected lifetime. It is our strong conjecture that many bequests are inadvertent, especially when the bequests go to middle-aged children who are already more affluent than their parents.[4]

Although the general pattern suggests a conservative use of assets after retirement, Poterba, Venti, and Wise (2011) find that some households seem to draw from their accounts too fast. One overly simple summary of the results is that wealthier retirees are too cautious in withdrawing their assets (or have a stronger bequest motive), while poorer retirees are withdrawing too quickly. However, such judgments are difficult to make without knowing underlying utility functions, and we do not want to overstate the case here that any particular household is making a mistake. Our central point is simply that drawing down assets is a hard problem, a problem with which some households appear to be struggling, and one that could be made easier with full or partial annuitization.

Deciding when to begin retirement is also a complex optimization problem, requiring forecasts not only of financial returns and life expectancies, but also health outcomes. At least for the financial and life expectancy aspects of the problem, annuities can make this problem simpler. If a household can calculate a current income level that would provide an adequate lifestyle, a check of annuity prices

[4] Using data from five waves of the Health and Retirement Survey (1994–2002), Brown, Coile, and Weisbenner (2006) provide some evidence that is at least consistent with our conjecture. They found that 40 percent of respondents who expected to inherit between $10,000 and $50,000 ended up inheriting more, another 40 percent inherited about what they expected, and the remaining 20 percent inherited less than expected.

Figure 2
The Evolution of Retirement Age and Life Expectancy at Age 65 for Men



Sources: Data on retirement age are from Gendell (2001, 2008), with data for 2010 being estimated. Data on life expectancy at birth are from the Social Security Administration (Bell and Miller, 2005, Table 10).
Notes: The chart displays the evolution of retirement age and life expectancy at age 65 for men. The retirement age is defined as the earliest age at which less than half the population remains in the labor force.

can establish whether existing wealth is sufficient to assure this lifestyle or whether retirement should be postponed.

As with the decumulation of assets, it is not possible to say that any specific household is making a mistake regarding the timing of retirement. However, several facts suggest that households are not making precise calculations regarding the optimal retirement age. First, a disproportionate fraction of employees retire at precisely age 65 although nothing special happens economically at that age.[5] Analyzing data from three national datasets, Lumsdaine, Stock, and Wise (1996) found that 47 percent of those employed on their 65th birthday retire within 12 months. This rate is higher than the 32 percent rate for 64 year-olds and the 34 percent rate for 66 year-olds. Retiring at age 65 thus seems to be a vestigial norm leftover from past regimes in which retirement was mandatory at that age.

Second, as shown in Figure 2, over the past 60 years, the age at which people retire has dropped by almost six years. The average age at retirement is now about 61.1 years, down from 66.9 years six decades ago. It is difficult to reconcile this tendency to retire earlier with two other facts. We are living longer and saving less. For men, life expectancy at age 65 has increased from 12.8 years to 16.6 from 1950 to 2010, an increase of nearly 30 percent. Since saving rates have also fallen, it is

[5] There are two spikes in retirement ages: 62 and 65. Consistent, with a declining average retirement age, the magnitude of the age-62 spike has grown substantially and became larger than the age-65 spike by the 1990s. The age-62 spike emerged after 1962, when the earliest Social Security claiming age was lowered from 65 to 62 (Moffitt, 1987). On one side, this spike leaves little doubt that Social Security rules do influence retirement decisions. On the other, the age-62 spike is less interesting from a focal point perspective, because it can be explained with liquidity constraints and workers not having enough benefits to retire without Social Security.

hard to see how Americans are rationally planning to fund this extended period of retirement—which suggests that some of them are making a mistake.

A mistake in deciding when to retire can be quite costly. According to calculations by Lumsdaine, Stock, and Wise (1996), the typical 60-year-old man could experience a 23 percent increase in utility by choosing to retire at the optimal age instead of retiring at 65, and the typical woman could gain 30 percent. The only plausible explanation that Lumsdaine, Stock, and Wise (1996) cannot reject is that retiring at age 65 is a rule of thumb driven by "custom or accepted practice." Behaghel and Blau (2010) also find evidence supporting this focal point hypothesis. In 1983, the "full retirement age" changed from 65 to 66 in two-months increments for individuals born between 1938 and 1943. Interestingly, employees with lower cognitive skills kept retiring on their 65th birthday, while those with higher cognitive skills adjusted their retirement age to the new full benefits age, suggesting that the speed at which individuals adjust their reference point depends on their cognitive skills.

The sum of this evidence makes a strong case that people should be making greater use of annuities to increase their consumption level in retirement, both to deal with uncertainty and to help solve the cognitively difficult tasks of deciding how fast to draw down their wealth and when to start retirement. Why don't they?

Is There an Annuity Puzzle?

The theoretical prediction that many people will want to annuitize a substantial portion of their wealth stands in sharp contrast to what we observe. Only a tiny share of those who reach retirement age with money in a personal retirement account or other financial assets will choose to annuitize a substantial share of that wealth. Part of the reason is that only 21 percent of defined contribution plans even offer annuities as an option (PSCA, 2009), and virtually no 401(k) plans do. Even when such an option is offered, it is rarely taken. Using data from a survey of 450 large 401(k) plans, Schaus (2005) reports that only 6 percent of participants elected an annuity when it was available (although, as we discuss below, this number might not be representative of the real demand for annunities).[6] A similar picture emerges if we look at sales of individual life annuities purchased directly from an insurance company, typically through an agent or broker. In 2007, sales of fixed immediate annuities (contracts in which the guaranteed stream of payments begins within one year of purchase) amounted to just $6.5 billion (data are from LIMRA International).[7] For comparison, in 2007 households transferred more than $300 billion from employer-sponsored retirement plans to Individual Retirement Accounts (IRAs), while total

[6] Many defined contribution plan accounts have very low balances. There is no correction for low balances in the Schaus (2005) study.

[7] Sales of fixed immediate annuities do not include sales of structured settlements, but they include non-life-contingent and period-certain products. Therefore, they might overestimate the sales of life-contingent annuities.

assets in IRAs were $4.8 trillion and assets accumulated in defined contribution plans were $4.4 trillion (Investment Company Institute, 2010 and 2011).

Why do so few people opt for annuitization at retirement? One simple reason is that many people have not saved up enough to make buying an annuity a viable option, especially since it is sensible to have an emergency fund that is liquid. The sizable portion of households with little or no wealth at retirement are in essence completely annuitized because their only source of income is Social Security. For this segment of society, there is no annuity puzzle, although there is probably a savings puzzle. But even among those households that do accumulate enough in their retirement accounts to make an annuity feasible, an annuity is rarely chosen (Dushi and Webb, 2004).

The precise nature of the annuity puzzle is not well-defined. In the context of a standard neoclassical economics problem, it would be stated this way: an agent should prefer the safety and increased consumption of the smooth income stream provided by the annuity to the risky alternative associated with a lump-sum payment. In the framework of behavioral economics, additional factors enter the picture. Do consumers fully understand their options? Are annuities perceived to be a bad choice? Which option is the default choice?

We can draw a useful analogy with saving for retirement. In a world of straightforward rational choices, it seems that nearly everyone should join a 401(k) plan, especially when the company matches employee contributions. But even under those circumstances, almost one-third of employees fail to join such plans. Do those employees have some reason why they should not participate in the retirement plan, or have they simply never gotten around to completing the enrollment process, perhaps naively believing they will get to it later? Much research shows that even tiny obstacles such as the need to make a phone call or fill in a form can result in procrastination and lack of action in a retirement savings plan. In one large 401(k) plan studied by Carroll, Choi, Laibson, Madrian, and Metrick (2009), the participation rate for new hires decreased from 69 to 41 percent as the employer switched from the take-up friendly framework of "prompted choice," in which employees were asked to state whether they would like to save for retirement or not, to an opt-in regime, in which the small burden of making a phone call was placed on the employee to enroll.

The same issues apply to the choice of whether to annuitize. Is the low annuitization rate a reflection of underlying preferences or of features of the choice environment? This question has important practical implications, because in most retirement plans when an employee stops working, that retiree would have to shop around actively if interested in investing some or all of the retirement plan balance in an annuity. Remember, few defined contribution plans offer annuities. Owners of Individual Retirement Accounts (IRAs) are in the same boat; they have to seek out annuity products as they reach retirement if they want to ensure lifetime income.

Some defined benefit pension plans require retirees to make an active choice between a lifetime income option—which we will loosely refer to as an "annuity" without worrying about fine distinctions—and a lump-sum distribution. These situations offer an opportunity to investigate whether retirees are interested in annuity

Table 1
Annuitization Rates

	Study	*Retirees annuitizing*
Defined benefit plans	Hurd and Panis (2006)	61%
	Authors' evidence on IBM employees	88%
	Butler and Teppa (2007)	86%
	Mottola and Utkus (2007)	27%
	Authors' other evidence	53%
Cash balance plans	Mottola and Utkus (2007)	17%
	Authors' other evidence	41%
Defined contribution plans	Schaus (2005)	6%
	Butler and Teppa (2007)	54%

Notes: The above table reports the fraction of employees choosing an annuity across different retirement plans (defined benefit, cash balance, and defined contribution). Butler and Teppa (2007) studied three defined benefit plans and seven defined contribution plans. Mottola and Utkus (2007) analyzed one defined benefit and one cash balance plan. Our data from IBM include both participants in a defined benefit and a cash balance plan. Our other evidence is from 75 defined benefit and 37 cash balance. In the text, we report the overall annuitization percentage across all 112 plans.

products when that choice is easy to select. In such situations, the plan sponsor offers the annuity directly. The specific form of the annuity is predetermined by the employer, saving the employee the possibly overwhelming task of selecting an annuity from the many options offered in the market.

We identified three studies where retires make an active choice between the annuity and cashing out,[8] and have done some additional research ourselves to complement these. To preview the results, when an annuity is a readily available option, many participants who have nontrivial account balances choose it. Table 1 summarizes this evidence on annuitization rates. We now briefly summarize each of these studies.

[8] Warner and Pleeter (2001) studied a military downsizing program where army personnel were given a choice between a lump sum and a fixed number of payments (referred as an annuity). They found that half of the officers (51 percent) and 92 percent of the enlisted personnel chose the lump sum option over the multiple payments, even though the discount rates used in the conversion were almost 20 percent. Since the average age of the individuals in the sample was 31.4 (33.9 for officers and 30.9 for enlisted), this is more of a choice about liquidity during a career change than a retirement income decision. For this reason we excluded this study from our review. Ameriks (2002) analyzed retirement payout choices of TIAA-CREF members. From 1991, TIAA-CREF allowed participants to choose automatic payouts set at minimum required by IRS rules, and from 1996, systematic withdrawals like say 5 percent of the account balance per year. In the last year of analysis available, 2001, the fraction of employees choosing the annuity over other distribution alternatives was 45 percent. Nonetheless, annuitization rates have constantly decreased from the 76 percent level observed in 1996. Since the choice for TIAA-CREF participants is between an annuity and different monthly income streams (not a lump sum), we excluded this study as well.

Hurd and Panis (2006) investigated payout decisions using data from five waves of the Health and Retirement Study from 1992 to 2000. Based on the authors' assumption that 45.2 percent of employees in defined benefit plans are offered the alternative of lump-sum distribution options—they are all offered an annuity, by definition—we calculate that 61 percent of retirees selected an annuity over the lump-sum option when they had both choices readily available.[9] One potential caveat of this study is the use of self-reported data, which could be subject to misreporting. The other results we report are based on archival data.

Butler and Teppa (2007) explored annuitization decisions within ten Swiss pension plans (three defined benefit plans and seven defined contribution plans) between 1996 and 2006. Of the 4,544 individuals in their sample, 73 percent elected the annuity, 17 percent elected a combination of the annuity and the lump sum, and the remaining 10 percent elected the lump sum. (Of the defined benefit plans, 86 percent of retirees chose to annuitize; of the defined contribution plans, 54 percent chose to annuitize.) A caveat here is that the annuity was the default in most of those Swiss plans. Had the lump sum option been the default, it would have almost certainly received a greater market share. In fact, for one of the plans they studied, the lump sum was, indeed, the default option and the take up rate of the annuity was very low (10 percent).

Mottola and Utkus (2007) analyzed payout choices in two Fortune 500 companies: one with a defined benefit pension plan and the other with a "cash balance plan," which is a defined benefit plan that defines for each employee the promised benefits in terms of a stated account balance, like a defined contribution plan (we elaborate on the differences between pension plans and cash balance plans in the next section). It found that 27 percent of retirees in the defined benefit plan selected the annuity, whereas 17 percent of retirees in the cash balance plan chose the annuity. Interestingly, half of the individuals older than 70 years old chose the annuity.

To complement this evidence, we analyzed two new datasets with records of actual payout decisions between annuity and lump sum. First, we collected data on 18,761 employees who retired from IBM between 2000 and 2008. We found that 88 percent of employees selected full annuitization, 8 percent selected a combination of annuitization and the lump sum, and the remaining 5 percent selected the lump sum. One potential caveat in this case is that the annuity option was "sweetened" for employees younger than 65 in an effort to encourage early retirement.[10]

[9] In practice, we classify as lump sum the reported disposition "Cashed out" and "Roll into IRA [Individual Retirement Account]." We classify as annuity the disposition "Draw current benefits" (or, to be more precise, a fraction of this number to account for the fact that only 45.2 percent of the respondents had a lump sum option available in their defined benefits pension plan).

[10] The annuities were "enhanced" by approximately 15 to 20 percent for employees retiring earlier than 65. One additional concern is that IBM employees might have access to additional lump sum distributions through supplemental defined contribution plans. Given the average benefit amount ($413,000, median $387,000) and the average tenure (30 years), we tend to believe that the defined benefit aspect of their plans represents the most relevant source of retirement wealth for these employees.

However, if we focus on employees 65 or older, we still observe an annuitization rate of 61 percent.

Second, we analyzed more than 103,000 payout decisions from 112 different defined benefit plans provided by a large plan administrator during the 2002 to 2008 period. One drawback of this dataset is that we can only infer the existence of a lump sum option from the fact that some participants selected it. The existence of such an option is not otherwise indicated in the data set. To the extent that we mistakenly include plans that do not offer lump sums or that offer lump sums only to some employees, our annuitization rate will be biased upward. To minimize the above concern, we only assumed a lump sum option was available to everyone in the plan if at least 5 percent of employees chose it. We also limit our analysis to the choices of participants who retire between 50 and 75 years old with at least five years of job tenure and an account balance greater than $5,000. We eliminated younger participants and those with small balances because their decisions tend to be about whether to cash out the account to spend it or to roll it over into another retirement account, rather than a choice between an annuity and a lump sum. Using these sample selection criteria, virtually half of the participants (49 percent) selected annuities over the lump sum.[11]

Our analysis of this data set also reveals a potential pitfall in estimating the popularity of annuitization. For one of the large plans in our sample, the annuitization rate for account balances below $5,000 was zero (they were all required to take a lump sum), whereas the annuitization rate for those with more than $5,000 was 96 percent. Yet the *average* rate for the entire plan was only 13 percent—because most accounts were below $5,000. Clearly, the 13 percent take-up rate for annuities does not reflect preferences so much as it does the distribution of account balances. Thus the common view that there is little demand for annuities even in defined benefit plans is largely driven by looking at the overall population of participants, including young and terminated employees and others with small account balances who are either required to take a lump-sum distribution or simply decide to take the money. This finding is consistent with earlier studies (like Landsberger, 1966) showing that small windfalls tend to be spent whereas large windfalls are largely saved.

One might question to what extent our annuitization results are driven by the "pricing" of annuities offered in defined benefit plans—that is, are the annuities

[11] In this sample, of those with defined benefit plans, 53 percent selected annunities; of those with cash balance plans, 41 percent. As additional robustness checks, we analyzed the distribution of annuitization rates across plans and the distribution of employees across plans. Annuitization rates are almost uniformly distributed across plans between 1 and 95 percent (our cut-off values). Therefore, we can rule out the possibility that our average annuitization rate is driven by plans with low annuitization rates and plans with very high annuitization rates (that might indeed not offer the lump sum option). Analogously, our result is not driven by one super-large plan. Our largest plan accounts for 10 percent of the observations, and its average annuitization rate is 38 percent. The largest ten plans include about half of our observations. Additional evidence on high annuitization rates is provided by Chalmers and Reuter (2009) who find that 85 percent of Oregon state employees selected an annuity. However, many retirees in their sample were given an added incentive to choose the annuity over the lump sum.

offered in the defined benefit plan more or less attractive than those offered in the market? The Internal Revenue Code regulates the conversion between lifetime income benefits and lump sums in defined benefit pension plans by prescribing the mortality tables and discount rate to use in the calculations. More specifically, the federal rules indicate the *minimum* lump sum amount that can be offered in a defined benefit plan for those who give up their lifetime income benefits, but of course, plans are free to offer more-generous lump sums. Consider, for example, a 65-year old employee entitled to a single life annuity paying $12,000 a year. The Congressional Research Service (Purcell, 2007) estimated that the minimum lump sum amount that can be offered to this employee was equal to about $145,000 as of October 2007. To get a sense of the relative pricing of lifetime income benefits offered by defined benefit plans, we calculated the stream of lifetime income that could be purchased in the individual annuity market with $145,000. We collected annuity prices from two websites: ⟨http://www.immediateannuities.com⟩ and ⟨http://www.newretirement.com⟩, as of May 2011. We adjusted these annuity price quotations to reflect the historical prices in October 2007 (source of historical quotes: WebAnnuities.com). For our calculations, we used separate price quotations for 65-year old men and women with residency in either California or Illinois. The resulting annual payments range from $11,337 (women in California) to $12,453 (men in Illinois). These payments would represent 94 to 104 percent of the equivalent payments in a defined benefit plan. These results suggest that the annuities in defined plans are "fairly priced" compared to the alternative lump-sum option and that our results are not driven by very generous annuity payments.[12]

The overall message of these studies is that many participants with defined benefit pension plans, when offered a simple choice between lifetime income and a lump sum payment, will choose annuities. This finding suggests that the low annuitization rates in the case of defined contribution plans might not reflect the underlying preferences of retirees for lifetime income products, but rather a mix of other institutional factors regarding the availability of annuities within their existing retirement plan. However, these institutional factors are not the entire story. Additional behavioral factors are important to understanding why the market for annuities is so small.

Framing, Mental Accounting, and Other Obstacles to Annuitization

We know from many studies in psychology that minor differences in wording can create large differences in behavior. For example, describing beef as "75 percent lean" sounds healthier than presenting it as "25 percent fat" (Levin and Gaeth, 1988). Similarly, an income replacement ratio of 70 percent at retirement seems much more palatable than a spending reduction of 30 percent. Framing issues can

[12] The Pension Protection Act has introduced some changes in the conversions. Starting from 2012, lump sum distributions will be reduced by 10 percent, making the annuity option more attractive.

be particularly powerful in the case of annuitization because the concept is complicated and most people have not thought very much about the question before nearing retirement age. This is also not a domain where there can be much learning from experience. You only reach age 65 once per lifetime.

An interesting paper by Brown, Kling, Mullainathan, and Wrobel (2008) illustrates the potential importance of framing in the context of annuities. The authors conducted an Internet survey of adults at least 50 years old. Subjects were asked to rate the attractiveness of an annuity in one of two conditions: a "consumption frame" in which the annuity was described as providing $650 of monthly *spending* for life, or an "investment frame" in which the annuity offered a guaranteed monthly *return* of $650 for life. In both conditions, there was no residual income or wealth after death. The authors predicted that annuities would be viewed as less appealing when framed as an investment, because the investment return greatly depends on the time of death. Consistent with their predictions, the percentage of subjects choosing to annuitize was just 21 percent in the investment frame versus 70 percent in the consumption frame.

Building on the work of Brown, Kling, Mullainathan, and Wrobel (2008), we have exploited the naturally occurring differences in framing that are inherent in two kinds of pension plans: traditional defined benefit and cash balance. In a traditional defined benefit plan, an employee is guaranteed a specified lifetime income, the level of which depends on years of service and ending salary. It could be called a defined annuity plan; in fact, for many years a "pension" and an "annuity" were synonyms for this reason. In contrast, participants in cash balance plans are given regular statements as to account balances, similar to 401(k) plans. Each participant's account is credited annually with employer contributions and interest income. Employer contributions could be, for example, 5 percent of pay, and the interest income could be based on a fixed rate or linked to an index such as one-year Treasury bills. Cash balance plans are in a sense hybrid plans, because they share features of both traditional defined benefit and defined contribution plans. Similar to traditional defined benefit plans, all the investment risk is borne by the employer, because employees are guaranteed a certain rate of return. Similar to defined contribution plans, participants have their own accounts (though these don't have to be prefunded). Nearly all cash balance plans offer both a lifetime income option, which they are required to offer by law, and lump-sum distributions.

We hypothesized that traditional defined benefit plans will foster a consumption frame and promote annuitization because the accrued benefits are usually communicated in terms of monthly or annual income. In contrast, cash balance plans are likely to promote an investment frame and reduce annuitization, because they are communicated as account balances.[13] In our sample of 112 retirement plans,

[13] This conjecture is consistent with what is called the compatibility hypothesis in psychology. The basic idea is that choice attributes will be weighted more heavily when they are compatible with the response scale than when they are not. For example, subjects were asked to predict the performance of ten target students in a history course on the basis of their performance in two other courses—English literature

which included 75 defined benefit pension plans and 37 cash balance plans, annuitization rates were 53 percent in the defined benefit plans compared to 41 percent in the cash balance plans (as shown in Table 1).

To examine this result more rigorously, we regressed the decision to annuitize on a series of explanatory variables such as demographic characteristics like age, gender, and tenure along with the benefit amount and on an indicator variable for whether the employee participates in a cash balance plan. Controlling for these and other factors *increases* the difference between the take-up of annuities between the two types of plans. We found that being enrolled in a cash balance plan reduces the probability of choosing an annuity by 17 percentage points.[14] To put this sizable magnitude in perspective, consider that women are more likely to choose annuitization than men by 4 percentage points; age increases the likelihood of annuitization by about 2 percentage points per year; and having $100,000 more in benefits increases the probability of annuitization by about 3 percentage points. Consistent with our findings, Mottola and Utkus (2007) report a higher annuitization rate in the defined benefit plan they studied (27 percent) than in their one cash balance plan (17 percent).[15]

Another crucial aspect of understanding the decision of whether to annuitize is to recognize that while economists tend naturally to think about annuitization as a risk-reducing strategy like the purchase of insurance, many consumers may not share this point of view, especially those who are presented with a lump sum and asked whether they wish to "purchase" an annuity. This formulation may lead the consumer to feel that the consumer is taking a considerable sum of money and putting it at risk—the risk being that the consumer will die relatively soon, making the purchase a bad deal.

The phenomenon of loss aversion also comes into play here. Losses hurt about twice as much as equivalent gains give pleasure, both in uncertain contexts (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992) and cases without uncertainty (Kahneman, Knetsch, and Thaler, 1990). Thus a key issue is whether

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and philosophy—expressed in different scales, either in letter grade or as class rank. When asked to predict a class rank in history, subjects would rely more on the grade, either from English literature or philosophy, that was expressed in the same scale: class rank (Slovic, Griffin, and Tversky, 1990).

[14] For a table showing the specific regression results, see the online Appendix available with this article at ⟨http://e-jep.org⟩. Employers that start a cash balance plan might be less paternalistic or they might be forced to do so because of financial hardship. Therefore, our higher take-up rate of lump sums might be driven by either an endorsement effect or solvency concerns. To address these concerns, we include in our analysis employer fixed effects and, hence, compare traditional defined benefit and cash balance plans offered by the same employer (holding endorsement effect and solvency constant). Under this specification, our result is even stronger: employees in cash balance plans are 30 percent less likely to select an annuity.

[15] In a related paper, Payne, Sagara, Shu, Appelt, and Johnson (2011) investigated the effect of framing on longevity expectations. In one condition, they asked subjects to indicate the probability of "living to" a certain age, whereas in another condition they asked subjects to indicate the probability of "dying by" that age. They found a 10-year gap in the median expected age of death: 85 years for the live-to frame versus 75 for the die-by frame. They also found that these differences in longevity expectations were correlated with the intent to annuitize.

a consumer considers the purchase of an annuity as a cost (and thus a loss) or as an "investment." Hu and Scott (2007) modeled the annuity purchase decision of an agent who is loss averse (more precisely, an agent whose utility function follows Kahneman and Tversky's "prospect theory") and confirmed the intuition that loss-averse agents dislike annuities. The insight is that if a consumer thinks of the choice between a lump sum of $250,000 and a corresponding stream of payments, the former is a "sure thing" whereas the value of the latter depends on how long the consumer lives.

The Hu and Scott (2007) formulation also sheds light on another puzzling aspect of the annuity market. The rare consumers who do go out and buy annuities in the market (as opposed to accepting the annuity they have been offered as a pension benefit) typically choose what are called "period certain" annuities. In this sort of annuity, the consumer is guaranteed that the payments will last for at least n years, even if the consumer dies before year n. The (relative) popularity of this form of annuity is a puzzle in a standard life-cycle model, because it is dominated by the strategy of buying a bond of duration n and an annuity that starts making payments in year $n + 1$. Scott, Watson, and Hu (2011) call this result the "annuity market separation theorem." More generally, consumers should not pay the load for an annuity for the years in which they are very likely to be alive, so the best strategy is to self-annuitize for the first n years and buy what is called a deferred annuity for the out years. By buying period certain annuities, consumers are getting this advice exactly backwards! The same thinking applies to a bequest motive. If a consumer wants to assure a bequest, the best way to do this is to simply make the bequest immediately, or buy a bond that is set aside for that purpose.

Mental accounting can also contribute to the explanation for why annuitization is so rare for participants in defined contribution plans. In defined contribution plans, retirees need to "write a check" to purchase an annuity, often by rolling over their retirement savings account to an Individual Retirement Account and then purchasing an annuity. Making matters worse, the purchaser has to write a big check to get a series of small checks, which may simply look like a bad deal to a naive consumer. It is well established that once people think they have something, they become reluctant to give it up. In the case of defined contribution plans, people have an account balance (the typical frame), so purchasing an annuity means giving up their account balance, which triggers loss aversion.

Policy Proposals

We join many other economists who have studied this problem in concluding that numerous households would benefit by increasing the share of their retirement wealth that is annuitized. The potential behavioral advantages we have discussed with respect to deciding when to retire and how to budget expenditures in retirement only reinforce this view. While at this point in the history of defined contribution plans, only households in the top half of the income distribution have enough

financial resources to be able to purchase a meaningful annuity, this situation is likely to change over time, both because the plans will have been in existence longer and because plan sponsors have learned how to encourage employees to increase their saving rates. If these arguments for encouraging more annuitization are found convincing, it becomes interesting to ask whether there are steps the government might take to facilitate (though not compel) more annuitization. We think reforms in two general areas are worth considering: modifications to the Social Security System and changes in the regulations of defined contribution plans. We discuss these in turn.

The changes to Social Security would be aimed at increasing the demand for annuitized assets. Social Security is the one source of annuitized wealth that nearly all families have accumulated. Furthermore, Social Security benefits are indexed for inflation, and (we will assume) have no default risk. Although the Social Security system will have to be tweaked in the coming years to make it solvent, we believe that this will happen, and proceed here under that belief.

As mentioned earlier, the easiest way to increase the amount of annuity income that families have is to delay the age at which people start claiming Social Security benefits. Participants are first eligible to start claiming benefits at age 62, but by waiting to begin, the monthly payments increase in an actuarially fair manner until age 70. For historical reasons, an intermediate age is labeled as the "full retirement age" or "normal retirement age" on the Social Security Administration website. The full retirement age had long been 65, but it is slowly being raised to age 67. For anyone born between 1943 and 1954, for example, the full retirement age is now 66. Until one reaches the full retirement age, Social Security benefits are reduced by $1 for every $2 a participant earns in excess of $14,160. (After reaching the full retirement age, there is no earnings limit.) However, these reductions in benefits are repaid in terms of higher benefits after the full retirement age is reached, so this apparent tax is actually just a forced saving provision. Those who wait from 62 to 66 increase the monthly payments they receive by at least a third, and those who wait until 70 see benefits go up by at least 75 percent. (We say "at least" because if people delay claiming and keep working it is possible that they can qualify for an even higher benefit level.)

A good place to start would be to end the use of the confusing "full retirement age" term. After all, there is no sense in which the benefits upon reaching the "full retirement age" of 65 or 66 are "full." Monthly benefit income continues to grow if people delay claiming up to age 70, so it would seem that that age would qualify as "full." Moreover, the "full retirement age" should not be referred to as "normal," because by any reasonable usage the "normal" age to begin claiming benefits is age 62. Currently, about 46 percent of participants begin claiming at this age, the first year in which they are eligible. Less than 5 percent of participants delay receiving benefits past their full retirement age (Muldoon and Kopcke, 2008). However, by designating the full retirement age as somehow "full" or "normal," the Social Security Administration may be inadvertently influencing participants' decisions about when to retire.

A related reform would be to do a better job of explaining how the earnings test on income works before a recipient reaches the full retirement age. Many beneficiaries do not understand that the reduction in benefits that accompanies a return to work is actually an investment in a higher annuity income later (Biggs, 2008; Liebman and Luttmer, 2009). Engelhardt and Kumar (2009) use a change in the law to document this belief. Until 2000, the earnings test was applied to all Social Security beneficiaries under age 70. In 2000, the earnings test was abolished for those over the full retirement age. Engelhardt and Kumar examine the earnings of those in the key 65–70 age group (the full retirement age was 65 at this time) before and after 2000. They find that before 2000 there is substantial bunching of earnings at the income amount above which benefits are withheld, suggesting that the earnings test discourages work after people reach that threshold. Although better communication might help, another policy option would be to allow people to just take a "time-out" from receiving benefits. This "claim and suspend" option is now available only to those over the full retirement age, and we suspect that the option of just suspending benefits for a while would be easier to understand.

Another communications reform would be to encourage people to give careful thought to postponing claiming benefits. One useful step has already been taken, which was to remove something the Social Security Administration called its "benefits calculator." This calculator computed how long a participant had to live in order to "break even" by delaying the take-up of benefits. The calculation was undiscounted. So, a participant who could have claimed a benefit of $1,000 a month and waited two years in order to increase her benefit by say $200 per month (at a cost of $24,000) would be told that she had to live 10 years in order to break even. Service agents for Social Security will now perform this calculation only if the client requests it, but it has been de-emphasized. The de-emphasis of the break-even analysis has probably been a helpful step toward encouraging people to delay claiming benefits—and thus to increase annuitization. In a paper comparing various ways of framing the decision about when to take up benefits, Brown, Kapteyn, and Mitchell (2011) find that of the ten frames they investigated, a break-even analysis produces the *earliest* take up of benefits. Behaghel and Blau (2010) found similar results. Other frames delayed take-up by as much as 16 months. The frame that leads to this latest claiming uses age 66 as the anchor and calculates the gains from waiting relative to that age (Brown, Kapteyn, and Mitchell, 2011).

The second main category of policy changes involves increasing the supply of easy-to-find annuity options for those of retirement age with 401(k) and other defined contribution plans. The goal should be to emulate the progress that has taken place during the last two decades in the design of plans for the accumulation phase: specifically, the widespread adoption of "automatic" features, including automatic enrollment, automatic escalation, and default investment strategies such as "target date funds" that rebalance a portfolio for a decreasing level of riskiness as the participant ages. These innovations came from the private sector

and the academic community, but the federal government has been proactive in encouraging their spread. The U.S. Department of Treasury issued rulings to clarify that features such as automatic enrollment and escalation were legal. The Pension Reform Act of 2006 offered firms an incentive to adopt these features (as well as matching contributions) by offering employers a waiver from nondiscrimination rules (which limit the proportion of retirement benefits that accrue to the firms' highest paid workers). The Department of Labor also facilitated the use of target-date funds by including such funds in the set of "Qualified Default Investment Vehicles" that were designated as acceptable (see ⟨http://www.dol.gov/ebsa/newsroom/fsQDIA.html⟩).

It is now time to consider making automatic decumulation features available in defined contribution plans. Such features could range from full annuitization to options that include a mix of investments and annuities—for example, perhaps including a deferred annuity component to handle the problem of tail risk in longevity and even long-term care coverage, the problem discussed by Brown and Finkelstein (this issue). However, solving the regulatory issues is much more complicated for annuities than for mutual funds. With a mutual fund, as long as the manager cannot abscond with the money nor adopt an overly risky investment strategy involving leverage, it is fairly straightforward for a sponsor to do a satisfactory job as the fiduciary of the plan. With annuities, the task is not so simple. As matters stand now, the U.S. Department of Labor has issued regulations that were intended to give employers a checklist of duties to complete in order to qualify for a "safe harbor," but virtually no firms have used these rules to include lifetime income options within their 401(k) plan. Many employers feel that the guidelines for achieving the safe harbor status are too vague. In particular, plan sponsors object to the requirement that as fiduciary, the employer "appropriately concludes that, at the time of the selection, the annuity provider is financially able to make all future payments" (see ⟨https://webapps.dol.gov/FederalRegister/HtmlDisplay.aspx?DocId=21588&AgencyId=8&DocumentType=2⟩). Even before the recent financial crisis, it would have been difficult for a plan sponsor to know how to go about this task.

Some employers have suggested that the safe harbor could be based on the credit rating of the annuity provider, but recent experience with credit ratings—like when they failed to spot the riskiness of mortgage-backed securities during the housing price bubble—makes it unlikely this suggestion will be viewed favorably. An alternative strategy would be to make the annuity products safer via a government guarantee along the lines of the Federal Deposit Insurance Corporation for banks and the Pension Benefit Guaranty Corporation for pension plans. This proposal would be a radical change, however, since insurance regulation is handled at the state level. Every state does offer some kind of guarantee for annuities with limits that average just over $200,000. For better or for worse, these guarantees do not really come from the government. In these programs, if a firm fails, the money for the bailout comes from other insurance companies that operate in the state, not the state itself. This structure does not really address

the issue of a macro shock to longevity that will affect *all* insurers (as well as state defined benefit pension plans).

The outline of a satisfactory solution is clear enough. Plan sponsors want clear guidelines to indicate when defined contribution retirement plans can offer an annuitization option within the plan while clearly meeting their fiduciary legal responsibilities. Filling in the details of this outline, however, is a difficult task. Economists could contribute to it.

Conclusions

The notion that consumers are simply not interested in annuities is clearly false. Social Security remains a wildly popular federal program, and those workers who still have defined benefit pension plans typically choose to retain the annuity rather than switch to a lump-sum distribution. Furthermore, when participants in defined benefit pension plans with built-in annuitized payout are offered the opportunity to switch to a defined contribution plan, most stick with what they have (Brown and Weisbenner, 2009). The tiny market share of individual annuities should not be viewed as an indicator of underlying preferences but rather as a consequence of institutional factors about the availability and framing of annuity options.

A substantial proportion of retirees choose an annuity when they are presented with that option at an appropriate age and have accumulated enough of a stake to make annuitization sensible. We believe that many participants in defined contribution retirement plans would prefer to annuitize as well, but not if they have to do all the work of finding an annuity to buy, as well as bear the risk and responsibility for having picked the annuity supplier. Furthermore, even if participants can make a seamless transition from investing to annuitizing (as TIAA-CREF participants can do), mental accounting often does not make the transaction from accumulating assets in a defined contribution plan to an annuity payout appear attractive. An annuity should be viewed as a risk-reducing strategy, but it is instead often considered a gamble: "Will I live long enough for this to pay off?"

Perhaps annuities fall into the same mental category of life insurance, about which there is an old saying that it is not bought, it must be sold. However, private sector insurers are understandably reluctant to make a big investment in this market. It is difficult to predict what will happen to life expectancies over the next 30 years, and there is no existing way for sellers of annuities to hedge this "longevity risk." A case can be made that the government should address this problem, perhaps by selling "longevity bonds" in which the yield adjusts to changes in life expectancy, but the case is a tricky one. The easy case to make is that economists should be devoting more attention to the decumulation phase of household portfolio choice. Compared to the accumulation phase, much less is known, and many interesting puzzles are waiting to be solved. This is a topic to be taken up now. Don't procrastinate!

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