Recent Trends in Retirement Income Choices at TIAA: Annuity Demand by Defined Contribution Plan Participants

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ABSTRACT

This paper uses administrative data from TIAA, one of the largest defined contribution retirement plan providers in the U.S., to document time series variation in participant choices regarding retirement income and cross-sectional differences among participants. The fraction of first-time retirement income claimants who selected a life-contingent annuitized payout stream dropped from 54% in 2000 to 19% in 2017. Over the same period, there was a sharp increase – from 9% to 58% - in the fraction of retirees making no withdrawals until the age at which they needed to begin required minimum distributions (RMDs). Among those who made an initial income selection before age 70, the annuitization rate was higher, and the decline in annuitization rates was more modest, than for those who made this selection at an older age. Those who began drawing income after age 70 were like to withdraw only the amount needed to meet the RMD. The paper also explores two potential explanations for the drop in annuitization rates since 2000: falling nominal interest rates and rising ages of income-claiming. Nominal interest rates are a key determinant of payout-per-premium dollar on newly-purchased annuities, and annuitization decisions are sensitive to this ratio. The 10-year Treasury interest rate declined by over three percentage points during the sample period. In addition, the average retirement age of TIAA participants increased by more than 1.5 years, and the average age of first-time income draws rose by nearly five years. Annuitization is much more likely among those who begin taking income before age 70, so later claiming may translate into less annuity demand. Both falling interest rates and delayed claiming appear to contribute to the observed decline in annuitization.

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The Baby Boom cohort is now transiting from its prime working years to retirement age, and a rising fraction of retirement-age households have substantial accumulations in defined contribution (DC) pension plans. These plans typically provide their participants with substantial discretion about retirement payout strategy. Researchers and practitioners are increasingly shifting their attention from the asset accumulation phase of the retirement process to the draw-down phase, when participants must make decisions about the rate at which to remove assets from their DC account and about whether to insure themselves against longevity risk and the risk of late-life medical expenditures. The demand for life-contingent annuity products attracts special attention because of their central role in many optimizing models of retiree behavior, despite the fact that the market for such annuities, whether inside or outside a DC plan, is small. Vanguard (2017) reports that only 12% of the DC plans it administers, covering 15% of plan participants, provide participants with an annuity option at retirement. Even when annuity options are available, they are chosen by relatively few participants.

Defined contribution plan participants who choose not to annuitize can select from a range of strategies for withdrawing funds from their plan account. For example, they may withdraw the funds in a lump sum, request a set of structured periodic distributions, or defer withdrawing the funds until they are required to do so by the IRS' required minimum distribution (RMD) regulations. Different plans offer different withdrawal options. For many DC plan participants, the process of withdrawing funds from a DC plan is actually a sequence of decisions spread across many years rather than a single payout decision at the time of retirement. For example, in every year, an individual who has not previously annuitized can choose to annuitize his or her remaining account balance. This makes it important to follow retired DC plan participants over several years: they may make different distribution choices at different points in their retirement experience. The fraction of plan assets that will be annuitized by a decade after retirement is likely to exceed the fraction annuitized in the first year.

To gain insight on the variation in draw-down decisions, we study participants in TIAA, one of the largest DC pension plans in the United States. Unlike the 401(k) saving programs at many large corporations, the TIAA system, which serves the employees of colleges, universities, and other not-for-profit entities, provides all participants with access to a suite of annuity products. Prior to 1989, most participants in this system were required to purchase a life annuity at retirement. Since then, participants have had the option of using lump sum distributions and systematic withdrawals, and their choices have become more informative about the demand for annuities and other DC draw-down strategies. The TIAA system was launched a century ago and is the leading retirement income provider

for employees in the higher education sector; it is a mature DC plan. Many individuals who reached retirement age in the last two decades contributed to the system for most of their working careers.

In part because of their historically high annuitization rate, the payout choices of TIAA participants attracted research attention. King (1996) presented information on the choice of single- versus joint-life annuities during a period when TIAA participants were required to annuitize in the payout phase. He found that the share of male retirees selecting a one-life annuity had declined from 44% in 1978 to 26% in 1994, with the largest drop taking place when the Retirement Equity Act of 1984 required married retirees to take a two-life annuity unless their spouse signed a waiver. He also found that the fraction of retirees who retired at age 65 had declined over time. Ameriks (1999, 2002) updated these findings to the post-1989 period and found substantial interest in non-annuity options, with many participants deferring taking any distributions until they were required to do so.

The past two decades have witnessed a sharp decline in the fraction of TIAA participants selecting a life-contingent annuitized payout stream when they begin drawing down their DC account balance. In 2000, the fraction of those making an initial income draw who did so by purchasing an annuity was 54%. In 2017, the analogous share was 19%. Over the same period, there was a very sharp increase – from 9% to 58% - in the fraction of retirees making no withdrawals until the age at which they needed to begin required minimum distributions (RMDs). These patterns vary significantly before and after the age at which RMDs are required: of those who make an initial income selection before age 70, the decline in annuitization rates is much more modest than for those who make this selection at an older age. For this age group, the fraction of first income selections in the form of single life annuities is largely unchanged over the period, ranging between 21% and 26%; the fraction initiating joint life annuities dropped from 31% to 22%. A very different story emerges for those making their first income selection at age 71 or older. For this group, a high and rising fraction – 54% in 2000, 88% in 2017 -- withdraw only the amount needed to meet the RMD.

This paper begins by documenting the withdrawal behavior of TIAA participants since 2000. It tracks patterns over time and also documents cross-sectional heterogeneity. After developing a number of stylized facts about payout behavior, it explores two possible sources of falling annuitization rates. One is the drop in the long-term nominal interest rate, a key determinant of payout-per-premium dollar on newly-purchased annuities. The second is delayed retirement and benefit claiming. The average retirement age of TIAA participants increased during the data sample period, as did the average time between a participant's last contribution and first income draw. These forces compound to generate a rise of nearly five years in the median age at first income draw between 2000 and 2017. This

development, combined with lower annuitization rates for later income-claimers, can "explain" some of the observed annuitization decline.

While interest rates and later income claiming appear to correlate with the decline in annuitization, it is also possible that the drop reflects a general shift in tastes for longevity insurance, which might extend beyond the TIAA participant population, or a gradual recognition within the TIAA participant population that annuitization is no longer necessary or the default behavior. These possibilities are difficult to test using only administrative data on the TIAA participant population.

This study is divided into seven sections. The first describes the administrative data on the accumulation and distribution choices of TIAA participants and how we construct our sample of retirees based on a combination of age and contribution status. Section two describes the payout options available to TIAA participants and how they have changed over time. Section three provides an overview of the changing patterns of initial distributions over our sample period, and documents the declining share of participants who are choosing annuities. It also describes how the rates of annuitization reported in this study compare to those in some previous analyses of the TIAA population. Section four studies the role of the decline in interest rates in the decline in annuitization behavior. It presents estimates of a linear probability model relating the choice of payout type to prevailing interest rates as well as participant-level information. Section five focuses on the retirement patterns of TIAA participants. It presents age-specific rates of retirement, defined as the age at which contributions to retirement accounts cease. It notes the potential importance of later retirement in explaining the drop in overall annuitization rates. Section six addition information on annuity choice, including patterns by asset balances, on the choice among different types of annuities, for example between joint-life and single-life annuities, and on the share of participants who choose multiple payout strategies. A brief conclusion notes that these findings on the determinants of annuity demand and the heterogeneity of this demand across households have implications for Social Security and private pension plan design.

1. TIAA Participants Near and Beyond Retirement Age, 2000-2017

We analyze participant-level data from the TIAA system for the period 2000-2017. TIAA maintains administrative records for individual participants and the retirement plans sponsored by the institutions they work for, so the information on transactions and account balances is better than what one might find in a household survey. The participant records include tenure in the TIAA system, contribution data, asset allocation, income distributions, and plan contract information. TIAA does not have data on retirement dates, either self-reported or administrative, so we combine information about

age and contribution patterns to create a sample of "likely retired" individuals, for whom the payout decisions are relevant.

In 2017, there were 1.975 million TIAA participants over age 55, roughly twice as many as there were in 2000. In this group, slightly more than 292 thousand (14.8%) were receiving payout annuities of some form. Older participants were more likely to be receiving such a payout than their younger co-workers. The annuitization rate for those over 75 was about 47%. This study focuses on participants who have not chosen to annuitize any of their assets as of a given date. In 2017, there were about 1.68 million such participants, 53.5% of whom were between the ages of 55 and 64, and 20.5% of whom were between 65 and 69. The TIAA participant population is comprised primarily of workers in the non-profit sector, and includes university faculty and staff, as well as workers at non-profit museums, hospitals, think tanks, and K-12 education; it is a relatively diverse population. Relative to the broader population of defined contribution plans, the employers who select TIAA as their plan provider are more likely to require participation in their pension plan. There are also many small institutions that offer TIAA retirement plans to their employees.

Although the administrative data set that forms the basis for this project has several strengths, it also has several limitations. First, we have very limited demographic information. We have reliable data on age and sex, but not on other demographic characteristics such as marital status and level of education. Another limitation is that we only have information from a single financial institution. It is therefore not possible to measure a participant's net worth, or, for married couples, the total value of their retirement accounts, because one or both members of the household might have other accounts at another institution. When we stratify by participant balance, we are thus stratifying by only one component of household net worth. The lack of information on assets held at other financial institutions also raises challenges for measuring payout strategies: a participant might pursue one payout strategy with her TIAA accumulation, and another with an accumulation at another firm.

To study the payout decisions of "retirees," we focus on TIAA participants who are in the "retirement zone" – defined as being age 60 or older. We begin the calculation of a retirement hazard for year *t* by defining the base (denominator) as the group of participants who made contributions to their retirement plans in year *t.* We then calculate the numerator of each group (the number who "retire") as the number of people who made no contributions in year *t+1* or who stopped contributing and took an income distribution in year *t+1.* We do this for each year from 2000 through 2017. Our panel is unbalanced because new participants enter the sample by reaching age 60 in later calendar years and because new participants may be brought in if an institutional plan changes to TIAA as its

record-keeper. Individuals leave the data set when they die, fully distribute their account balance, or move all of their assets to a financial institution other than TIAA. Our definition of retirement is imperfect, as an individual who stops working at a non-profit institution in the TIAA system, and takes a new job at another employer who is outside the system, would be classified as "retired" in our analysis even though they continue to work and save for retirement elsewhere. For the U.S. population at large, a substantial fraction – perhaps a third according to Ameriks et al. (2018) – work at a "bridge job" after leaving their career job and before retirement, we believe that this is less likely for the TIAA participant population because their career earnings are likely to be higher than average.

Based on this definition, we have 259,325 unique individuals that we estimate retired and took a first income draw in our 2000-2017 sample period, with both men and women representing 50% of the sample. The raw number of participants taking a first income draw each year grew substantially over the sample. There were 7,100 individuals who took some form of income in the year 2000. By 2017, there were over 28,700. In addition to there being growth in the number, the age composition changes over the sample. For example, in 2000, only 1,190 of the 7,100 (17%) participants taking a first income draw were over age 70. In 2017, 66% of those taking a first draw were over age 70. The composition of the participants who are new income recipients in a given year has shifted substantially over time.

2. Payout Choices Available to TIAA Participants

Prior to 1989, TIAA participants were restricted to taking payouts in the form of a single or joint-life annuity. Since 1989, participants have a much richer selection of payout options from which to choose. These include:

Single Life Annuity. This product, available since 1918, provides monthly income for as long as the insured individual lives. There are also various guarantee options that can be added to the policy in exchange for a lower monthly payout. For example, a single life annuity with a 10-year period certain would pay monthly income to the individual or his/her beneficiaries for the first 120 months. Beyond that, payments would continue if and only if the individual was still living.

Joint Life Annuity. Another life-contingent income stream, the payments of which are linked to the life of two individuals (e.g., spouses). In addition to also having guarantee period options, annuitants can also choose whether the payment level stays constant or declines upon the death of one of the insured lives.

Annuity Certain. Although labeled an annuity, the payouts associated with this option do not depend on the mortality experience of the participant or any other beneficiaries. Rather, these

products provide a guaranteed stream of payments for a fixed period, such as 10 or 20 years. In some cases, the annuity certain can be the fastest way to draw assets out of the TIAA system.

Interest Payment Retirement Option (IPRO). This option, first offered in 1989, allows a beneficiary to receive the interest income that would be credited to a TIAA traditional annuity each year, but the principal balance remains intact. The principal is fixed in nominal terms; at some future date the account holder must convert either to an annuity or to a minimum distribution product.

Systematic Withdrawals and Transfers (SWAT). This option has been offered since 1996 and allows a participant to make periodic distributions according to a specified plan. The amount of the payments can be stopped or changed at any time, which makes this a relatively flexible option.

Required Minimum Distribution Option (RMD). In 1991, TIAA introduced the Minimum Distribution Option as a way of assisting participants in meeting federal distribution requirements. In 2012, the firm introduced the RMD option, which is very similar for purposes of our analysis to the MDO option. We combine these two payout options. The RMD option pays participants the minimum amount each year that will satisfy the federal required minimum distribution (RMD) rules. The principal can be invested in a variable annuity product, with returns linked to equity or real estate market returns, or in an account that yields a fixed rate of interest.

Transfer Payout Annuity (TPA). First offered in 1991, this is a sequence of payments, spread over a period of 7 to 10 years, which typically moves funds from a deferred guaranteed fixed annuity, TIAA Traditional, to some other investment. TPAs can be used for multiple purposes: to move funds to another investment vehicle, at TIAA or elsewhere, or to make cash payouts to the participant. Because we are interested in payouts to the individual as income that can be used for consumption, rather than transfers among funds, we will not include TPA's in our analysis.

Each year, a participant who has not previously annuitized his or her DC plan balance at TIAA can choose to annuitize, to elect a non-annuity exhaustive payout plan, or to take only whatever distribution is required – possibly zero – and to postpone delay further disposition decisions for another year. Participants over the age of 90 are no longer eligible to make an annuitization election. The delay option is exercised by many participants, and recognizing its presence is important for several reasons. First, the gap between "retirement" as we measure it and the start of payouts is often several years. Studying the behavior of participants only in the year when they reach retirement can provide a misleading perspective on withdrawal behavior. The longitudinal nature of the TIAA data is critical for studying this multi-period discrete choice problem, because it allows us to track the delays between the end of contributions and that start of payouts.

3. Trends in Payout Choices of New Income Recipients, 2000-2017

Figure 3.1 summarizes the form in which retirees have chosen to take their first income draws over the sample period. In 2000, a bit over a decade after the end of required annuitization, a majority of participants (54%) still took their first income draw in the form of a single or joint life annuity. By 2017, there had been a dramatic decline in annuitization to only 19% of the sample. As annuities have declined, minimum distribution options (MDOs) have become more popular. The MDO was the initial choice of 9% of those who began distributions in 2000, but of 29% by 2007and an even higher share after the Great Recession. TIAA introduced a new payout product tied to required minimum distributions in 2012, and these payouts have grown in popularity since then, reaching 58% in 2017. Minimum distribution options are now the most popular way to withdraw assets. The decline in annuitization from 54% to 19% between 2000 and 2017 is the key focus of this paper.

One year, 2009, stands out as anomalous in Figure 3.1. During the global financial crisis, Congress passed a one-time suspension of the tax provisions requiring distributions. Brown, Poterba, and Richardson (2018) and Mortenson, Schramm, and Whitten (2019) find that about one third of households took advantage of the opportunity to delay RMDs. The suspension allowed participants who were reaching the age at which such distributions usually begin, and who would typically start such distributions, to postpone them. The distribution holiday led the number of participants taking a first income distribution of any kind to fall in 2009; this affected the reported percentages.

Figure 3.2 provides a longer-term perspective on the fraction of TIAA participants who chose life annuities. It draws on data from Ameriks (2002) for the period prior to 2000, when the current analysis begins. It shows that before the introduction of the IPRO in 1989, all participants received annuitized payouts. The MDO option was introduced in 1991, and by 1994, the percentage of participants choosing annuities for their initial payouts had declined to about 80 percent. This fell further after the systematic withdrawal option (SWAT) was introduced. By 2000, when the current data set begins, the annuitization rate had fallen below 60%. The downward trend during our sample period thus represents a continuation of a longer-term trend that began when non-annuity alternatives were first introduced

To account for the constraint associated with required minimum distributions, we divide our sample of participants into those who are not yet 70, and those who are 70 and older. RMDs "are minimum amounts that a retirement plan account owner must withdraw annually starting with the year that he or she reaches 70 ½ years of age or, if later, the year in which he or she retires." (U.S. Internal Revenue Service, 2019) Figure 3.3 shows the selection of payout options by those who make their first income draw before the RMD requirements kick in. The fraction of individuals choosing a single life

annuity is surprisingly constant over the full sample period, varying from a low 21% to a high of 26% with no real time pattern. Joint life annuities, on the other hand, declined from 31% in 2000 to under 20% by 2007, where it stayed within a few percentage points thereafter. Most of this difference was accounted for by the rise in the use of SWAT payments, which are non-life-contingent systematic withdrawals that can be varied at any time. There is also substitution over this period between Interest only (IPRO) options and annuity certain options.

Figure 3.4 summarizes distribution behavior for those over age 70. In this group, the decline in annuitization is very striking, falling from 37% in 2000 to only 6% in 2017. Over this same period, the use of the RMD option grew from 54% to 88% of the sample. In other words, if someone does not take a first income withdrawal by the time they reach age 71, seven out of every eight individuals ends up taking the minimum required distribution as their first withdrawal option.

4. Interest Rates and Annuitization

To explore the factors that might underlie the declining rate of annuitization by TIAA participants, we consider two other developments that took place during our sample period: falling nominal interest rates and delayed claiming of income. This section considers the role of interest rates. The level of nominal interest rates has a direct effect on the monthly income generated by an annuity. The monthly payout (M) of an actuarially fair annuity is determined by the equation:

(1) $$M = V * \left(\sum_{t=1}^{\infty} \frac{P_t}{(1+r)^t}\right)^{-1}.$$

V is the purchase price of the annuity, P_t is the cumulative survival probability to period t, and r is the nominal interest rate. In the special, and unrealistic, case of a constant mortality rate ρ each year, the annual payout would be (ρ+r)*V. As the interest rate (r) falls, so does the amount of monthly income that can be provided by a given account balance.

A decline in nominal interest rates does not just affect the payout on annuities. It affects nominal payouts on a range of other financial assets. If the change is due to a decline in expected inflation, the effect on the optimal consumption profile in standard models of household behavior would be expected to be small. There can be interactions between inflation and net-of-tax returns on some assets, largely as a result of the taxation of nominal interest and nominal capital gains. By altering the relative returns on different assets, such effects might alter the household's optimal portfolio structure and could impact the demand for annuities, but these effects are likely to be modest. If the decline in nominal rates is due to a decline in the real interest rate, in contrast, the slope of the optimal consumption profile would likely change, and with it the amount of annuitized income the household

would demand. These effects in neoclassical models, however, may significantly understate the impact of falling nominal rates on annuity demand. A substantial body of empirical evidence suggests that behavioral factors and framing influence the demand for annuities (see for example Brown (2009), Brown, Kapteyn, Luttmer, Mitchell, and Samek (2017), and Brown, Kling, Mullainathan, and Wrobel (2013). The ratio of annuity payout to the initial premium is a highly salient feature when individuals are considering whether to annuitize. This suggests that the level of nominal payouts on the annuity, rather than its payout relative to other investment options, may be an important driver of annuity demand.

The nominal interest rate on 10-year Treasury bonds averaged 6.03 percent in 2000. It declined to 4.63 percent by 2007, and then dropped more sharply, to 1.80 percent by 2012, and remained low – typically below 2.5 percent – after that. The decline in long-term nominal rates thus coincides with the decline in annuitization. Figure 4.1 shows the share of first-time income draws accounted for by single- and joint-life annuities, as well as the annual average nominal interest rate on the 10-year U.S. Treasury bond. The interest rate and the annuitization rate move together in our sample.

To explore this further, we estimate linear probability models for whether or not the participant's first income draw is either a joint life annuity or a single life policy. The controls in this equation, which is fit to 253,045 observations, include the participant's TIAA account balance, measured in constant year 2000 prices, as of the beginning of the year in which they took their first income distribution, their tenure in the TIAA retirement system, their gender, and indicator variables for the age at which the participant first took a payout. We allow for separate indicator variables for single years of age between 59 and 74, and then a 75+ category for all participants who claim income at a later age.

Table 4.1 presents the estimates from this linear probability model. Participants with larger balances are less likely to annuitize, those who have been TIAA participants are more likely to annuities – about one percent more for every three years of participation – and women are about 3 percent more likely to annuitize than men. The key finding with regard to time series variation, however, is the estimated relationship between the nominal 10-year Treasury yield and the annuitization probability. A one percentage point increase in the interest rate translates to a five percentage point increase in the annuitization probability. This suggests that interest rate changes of the magnitude observed in the 2000-2017 sample could have a substantial dampening effect on annuitization rates.

5. Shifting Retirement Patterns of TIAA Participants

The drop in annuitization rates in the last two decades was more pronounced for TIAA participants who did not begin income withdrawals until age 70 or later than among those who began

withdrawals in their 60s. In addition, the distribution of age-at-first-claim shifted, and more participants delayed claiming either because they retired later or because they waited for some time after retiring before making their first income claim. Between 2000 and 2017, the average age of retirement for male TIAA participants who were working at age 60 increased by about 1.5 years. For women, the increase was about a year. Since these labor force participation changes may have contributed to the declining annuitization rate, this section presents information on the shifts in both retirement ages and post-retirement claiming delays among the TIAA participant population.

It is important to remember that given the nature of the TIAA participant data, data on contributions to retirement plans must be used to impute "retirement year" as the year when the participant ceases to contribute. "Retirement" is the cessation of contributions to the TIAA retirement system. For most participants this probably corresponds to retirement, at least from their primary job, but for some it may only reflect separation from a job for which TIAA is the retirement plan provider, and a transition to another job with different retirement plan coverage.

Figures 5.1 and 5.2 present the hazard rates of retirement for men and women respectively at ages between 60 and 73 in 2000, 2005, 2010, and 2015. In 2000, for example, 7.7% of 60-year-old men who were contributing in the prior year stopped contributing to their TIAA account and "retired." The blue line in each figure, which corresponds to the 2000 data, shows a more pronounced retirement spike at age 65 than any subsequent year. These hazard rates peak at age 65 at 26.4% for men and 22.6% for women. By 2010, in contrast, the hazard rates at age 65 had fallen to 18.7% for men and 17.7% for women.

Although the hazard rates at each age do not fall monotonically over time, the hazard rates for 2000 are generally higher than those for the subsequent years. Retirement rates in 2010, a year right after the Great Recession when retirement rates for older workers were generally depressed, in part reflecting lower retirement preparedness on account of asset price declines, were lower than those in any of the other years. The cumulative effect of the changing age-specific retirement hazard rates can be seen in Figure 5.3, which plots the average retirement age by year in our sample separately for men and women. For women, the average age at retirement was roughly 64.5 years from 2000 through 2008. Over the next decade, it rose to about 66. For men, the increase is even more dramatic, rising from just over 65 years in 2000 to nearly 67.5 in 2017. These patterns resemble those for the broader U.S. population, although the estimated average retirement ages in the TIAA system have been and continue to be higher than economy wide averages. Munnell (2017) estimates average retirement ages

using the Current Population Survey. She finds a trend toward higher ages, but lower averages: 62.3 for women and 64.6 for men in 2015, for example.

The hazard rate data in Figures 5.1 and 5.2 can be used to calculate the change in the probability that a TIAA participant who is contributing to a retirement plan at age 60 will still be "working," i.e. contributing to a TIAA-administered retirement account, at later ages, and in particular at age 70. In 2000, for a male TIAA participant who, as he aged, faced the age-specific retirement probabilities that we measure in the 2000 cross-section, the probability of working until at least age 70 is 19.8%. The same calculation for a male TIAA participant in 2015, using the age-specific retirement hazard rates that year, was 25.2%, roughly one-quarter higher. Using the 2010 retirement hazard rates, the probability of still working at age 70 was even higher, 30.3%. This reflects an increase in the 2010-15 period in the probability of retirement in the late 60s, which makes it possible for the average age of retirement to have increased from 2010 to 2015, while the probability of working to at least age 70 also increased.

To place the changing probability of working until at least age 70 in context, the data in Figures 3.3 and 3.4 show that in 2017, the probability that a participant who claims income before age 70 annuitizes is 47 percent, compared with 6 percent for those who claim income after age 70. A five percentage point increase in the share of participants claiming after age 70 would therefore translate into a two percentage point drop in the overall share of annuitants – a relatively modest contribution.

One of the important discoveries from the TIAA administrative data is that there are often multi-year gaps between the age at which a participant stops contributing, or "retires," and the age at which income draws begin. Figure 5.4 presents information on the number of years that elapse, for 65-year-old retirees in each year, between the year of last contribution and the year of initial income draw. An income draw can be an RMD, an annuity payment, the start of an annuity certain payout, or any other draw-down of the account balance. The rightmost column shows that of those who "retired" in 2017, more than 70% did not take any income draws in the next two years. For those who retired in 2013, more than half had not taken any income by the end of our sample period. Even among those who "retired" in 2005, more than one third had not yet drawn any income. Some might ask how this is possible given the minimum distribution rules that apply after age 70 ½; since they apply to the aggregation of 403(b) holdings, and not on an account-by-account basis, it is possible that those who have not taken any income draws are taking distributions from other 403(b) accounts and thereby satisfying the RMD rules without taking distributions from TIAA.

The importance of age at first income draw in affecting the probability of annuitization is reflected in the coefficients on the age-specific variables in the linear probability model of Table 4.1.

The last two columns of that table show the distribution of participants, by age, in two years: 2000 and 2017. We can calculate the "effect" of later claiming on annuitization rates by multiplying the coefficient on each age-specific indicator variable by the difference in the share of participants in each age group between 2000 and 2017. The result, driven largely by the increase in claimants over the age of 70 in 2017 relative to 2000, is a decline of 0.139 in the probability of annuitization. This suggests that the changing age pattern may be an important factor in the observed decline.

The striking divergence between our estimate of the date of retirement, and the date at which income draws begin, is a topic that warrants further exploration with richer data than the administrative data we analyze. There are a number of potential explanations. One is an artifact of the data we study: the year we label "retirement" may not be the participant's last year in the labor force. If the participant works for several more years, but does not contribute to a TIAA retirement plan account, decisions about income draws may still be made at retirement, but our approach will not capture this. A second possibility is that the measured gap is real, and that the participant is collecting additional information before making a decision about annuitization or other forms of retirement account draw-down. Participants might be coordinating retirement payout decisions with a spouse, waiting to learn about other retirement benefits that they may be entitled to, or trying to estimate their annual spending needs in retirement. For some of these purposes, gathering information by learning about their experience in the first few years of retirement can be helpful.

A third possibility is that the participants who delay before making a decision about how to draw down their retirement balances are simply procrastinating, taking time to file the necessary paperwork to begin annuity payouts or start other income draws. In this case, there might be opportunities to improve participant welfare by providing more education about payout options, reducing the burdens of filing for payouts, or creating default options. It is important to remember in discussing the potential welfare effects of different withdrawal strategies that payouts from a plan do not necessarily translate into consumption, especially for wealthier individuals who have assets outside their DC plan that can support retirement consumption. For wealthier households, plan withdrawals are more likely to affect the timing of their taxes, and the fees that they pay on their overall investment portfolio, than the profile of their consumption spending.

The last two potential explanations for gaps between retirement and the start of income draws have different implications for the attractiveness of "one size fits all" policies that automatically annuitize participants' DC plan balances at retirement. If retirees have limited demand for annuities, and take time after retirement to assess the set of risks that they face and the relative attractiveness of

annuitizing, payout strategies that do not provide longevity insurance, and deferring income withdrawals, then "auto-annuitization" provisions at retirement may reduce retiree welfare.

6. Additional Evidence on Annuitization Behavior

The TIAA administrative data provide a wealth of information on details of the payout choices made by participants. In this section we summarize the data on three issues: the relationship between account balance and annuitization behavior, the choice between single life and joint life annuities, and the role of multiple payout strategies.

Figure 6.1 presents annuitization patterns in 2015 by account balance decile. Focusing on the life annuity figures (which includes both single and joint life annuities), we can see an inverted U-shape across the deciles. In the bottom decile, only 19% of individuals take their first distribution in the form of a life contingent annuity. Annuitization rates peak at the 3rd through 5th decile, reaching as high as 38%. Annuitization rates then fall with account balance, falling all the way to only 11% in the top decile. In the linear probability model specification of Table 4.1, the negative effect of balance on annuitization rate dominates. The information in Figure 6.1 pertains only to the probability of annuitization, not the fraction of the account balance that is annuitized. The fraction tends to decline as the balance increases, at least for most of the distribution.

Most of the discussion of payout choices in retirement plans proceeds as if the choice facing retirees is between an annuity and a lump sum distribution, and as though retirees will choose one form of payout structure. In practice, the annuity choices facing retirement plan participants are often much more complicated. In addition, a small but significant set of participants choose a combination of payout strategies in drawing down their retirement wealth. This section presents information on the choices of TIAA participants, beginning with the choice between single-life and joint-life annuities, and then presenting information on the complex nature of many payout strategies.

The choice between joint life vs. single life annuities is of interest not just because it highlights the multiple payout strategies available, even with the annuity space, but because it can also shed light on the potential role of interest rate variation in affecting payout choices. The expected duration of payouts on a joint and survivor (J&S) life annuity is longer than that for a single life annuity. The same statement is true for annuities with a fixed number of years of certain payouts in comparison with annuities with no guarantee period. When interest rates decline, the cost of purchasing longer-duration retirement products rises by comparison to shorter-duration products. A shift away from J&S annuities

and toward single life annuities would therefore be consistent with interest rate variation playing a part in the demand for annuity products.

The last two decades have seen a shift away from J&S annuities and toward single-life products among TIAA participants. In 2000, the data reported in Figure 3.1 show that 54 percent of those choosing a life-contingent payout chose a joint life annuity. That fraction declined to 47 percent in 2017, with a greater decline among male participants than among women. There has also been a trend away from selecting guarantee periods for those who choose joint life annuities, and toward choosing guarantee periods for single-life annuitants. Men are less likely to choose single life annuities than women: in 2016, 71% of women and 37% of men selecting annuities chose single-life annuities.

We also find that a limited number of participants choose multiple payout strategies. In 2016, 88% of participants were receiving distributions had selected only one payout strategy. Another ten percent had selected two strategies. The two most common combinations are a minimum distribution payout and an additional cash distribution, a combination that was selected by 2.3% of the participants-in-distribution, and a combination of a joint life annuity payout and a payout from minimum distribution contract, which was selected by 1.9% of the participants. In both cases, the minimum distribution option plays a role, suggesting that these participants are interested in preserving the value of their DC plan account for late-life consumption or for a bequest. This heterogeneity is a reminder that for a non-trivial minority of participants, payoff strategies that involve a combination of annuity income and periodic cash payments are attractive. The importance of MDO/RMD strategies also suggests that for those who do not choose annuities, the RMD requirements loom large in their distribution planning.

7. Conclusion

This paper summarizes the changes over time in the choices that TIAA participants make with regard to the distributions from their retirement accounts. Unlike many defined contribution systems, the TIAA system offers annuities to all participants. Until 1989, participants were required to annuitize. In the three decades since that constraint was removed, the fraction of participants choosing annuities has trended downward, and today, only a minority elect to annuitize their payouts. A combination of cash payout strategies, particularly strategies focused on making required minimum distributions each year, have grown in popularity. This paper examines two factors that may have contributed to this decline, and tries to assess their relative importance. Both declining nominal interest rates, which lower the ratio of annuity payouts relative to the account balance that is annuitized, and rising ages at which

TIAA participants initially begin to draw income from their accounts, appear related to the decline in annuity demand.

Estimates from a linear probability model for choosing an annuity, estimated using data on all TIAA participants over the age of 60 who stopped contributing to their pension accounts between 2000 and 2017, suggests that the drop in nominal interest rates over this period could account for a decline of about 19 percent in the probability of annuitization. The shift to taking first income draws at later ages could account for another 14 percent decline. Together, these two factors account for most of the 35 percentage point decline in annuitization rates in our sample.

The finding that most participants in the TIAA system, even when confronted with an easily-accessible annuity option provided by the plan provider, choose not to annuitize their retirement balances has a number of potential implications for Social Security policy design and for the operation of defined contribution pension systems in both the public and private sectors. For many individuals, the annuity provided by Social Security is not sufficient to cover all basic needs. As DC plans become the primary retirement saving vehicle for private sector workers, the rate at which DC plan participants decide to remove assets from their DC plan accounts, and whether they opt to protect themselves against longevity risk by purchasing an annuity, will play an important part in determining late-life financial security. Our findings suggest that there is substantial heterogeneity across households in their demand for annuitization.

Several public policies adopted in the last decade have provided greater flexibility to retirees with regard to their selection of payout options, in particular the partial or gradual annuitization of retirement accumulations. These policies were designed, at least in part, to encourage the selection of annuity payouts. Beshears, Choi, Laibson, Madrian and Zeldes (2014) surveyed 401(k) participants and found that "allowing individuals to annuitize a fraction of their wealth increases annuitization relative to a situation where annuitization is an "all or nothing" decision." Theoretical work on the optimal structure of retirement payouts also points to the attraction of partial annuitization. Horneff, Maurer, and Stamos (2008) find that when consumers have Epstein-Zin preferences and face substantial heterogeneity in future mortality, the optimal strategy for selecting retirement payouts involves gradual annuitization in response to new information during the retirement period. The same finding could emerge from a different source if there are fluctuations in the prices at which annuities are available, but potential annuity buyers cannot insure against fluctuations in long-term interest rates and other factors that determine retail annuity rates. These individuals may benefit from annuitizing only part of

their DC plan accumulation at the point of retirement, while holding other assets as "dry powder" to deploy in the event of decline in the relative price of annuities.

It is important to remember that the decision not to annuitize assets at retirement does not mean that an individual will exhaust their resources if they live an unexpectedly long life, and it does not imply a failure of consumer optimization. Theoretical results on the welfare gains from purchasing annuities, such as those in Mitchell, Poterba, Warshawsky, and Brown (1999), typically apply in settings without a baseline annuity such as that provided by Social Security. The decision not to annuitize, however, may have implications for the time path of post-retirement consumption, and it may in particular lead retirees to reduce their spending in the early years of retirement to preserve a savings cushion for later years. This implies that the tax and regulatory environment governing post-retirement draw-down of DC plan balances can affect both withdrawal behavior from pension accounts and the shape of the optimal intertemporal consumption path.

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Figure 3.1: Income Choices of TIAA Participants, 2000-2017

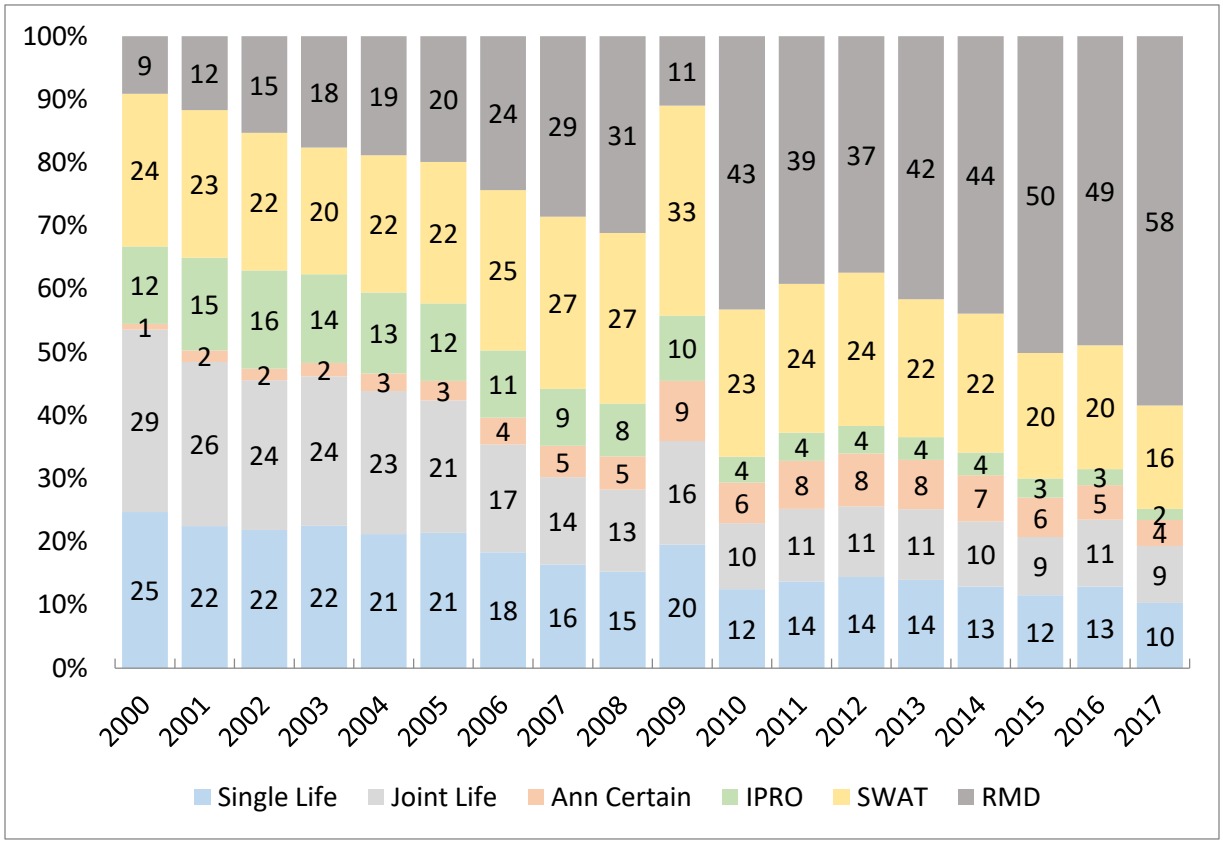


Figure 3.2: Longer-Term Perspective on Annuitization

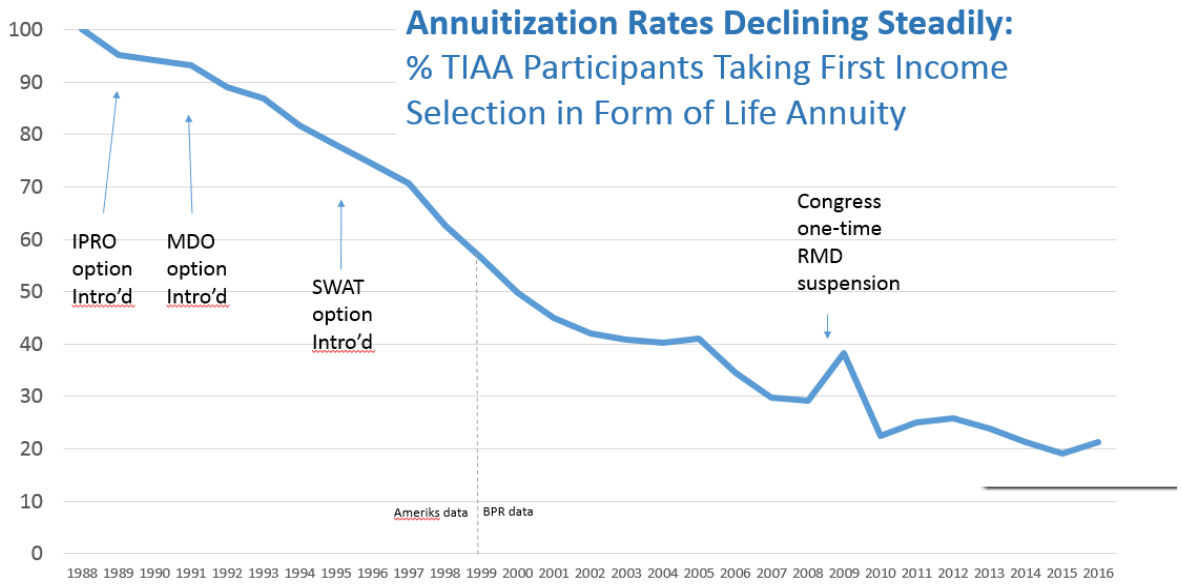


Figure 3.3: Income Choices of TIAA Participants under Age 70, 2000-17

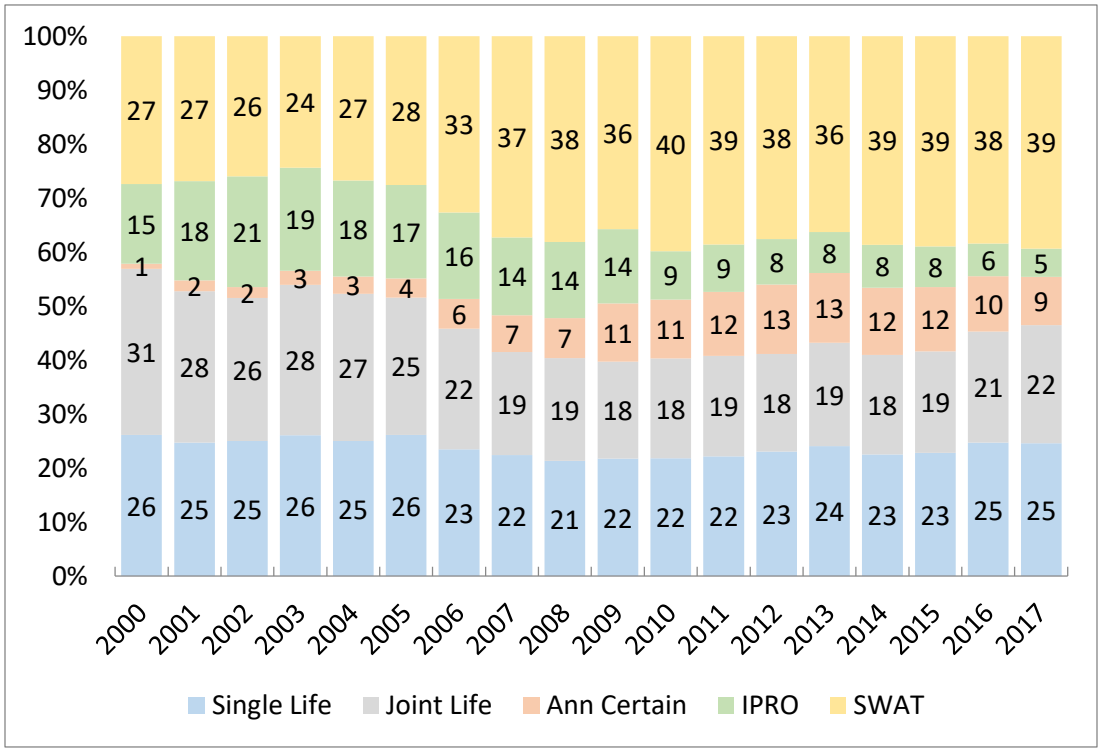


Figure 3.4: Income Choices of TIAA Participants over Age 70, 2000-17

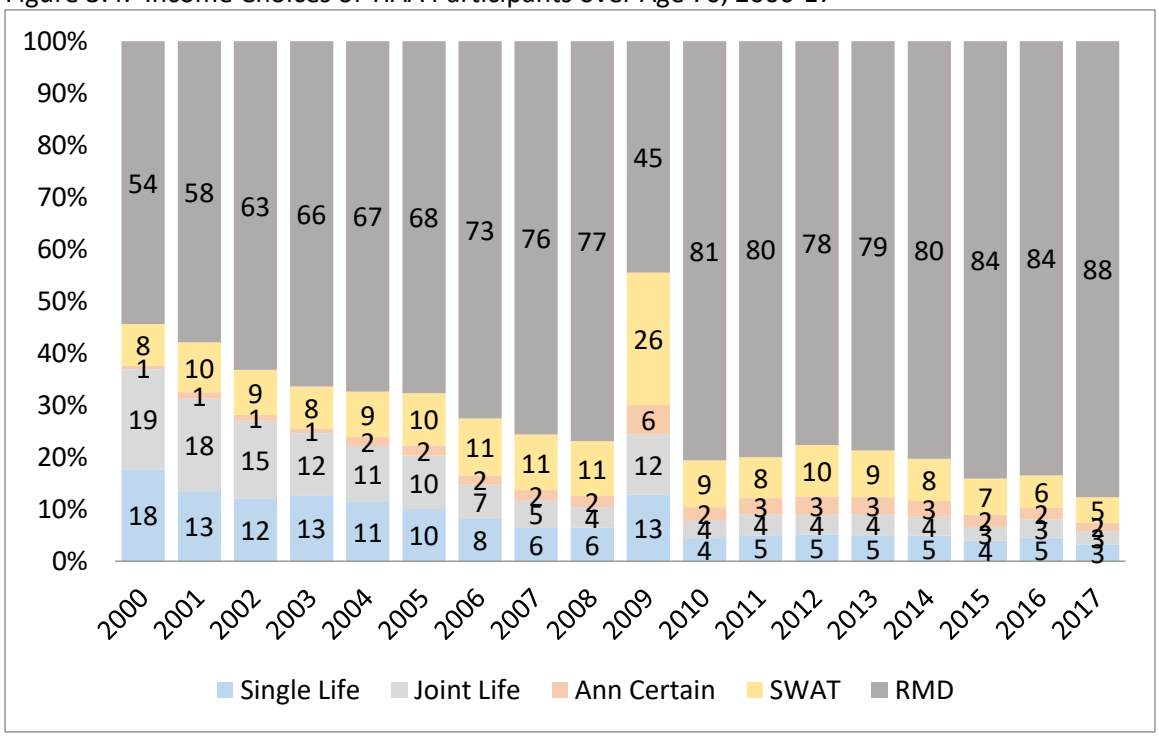


Figure 4.1: 10-Year Treasury Interest Rate and Probability of Annuity as First Draw

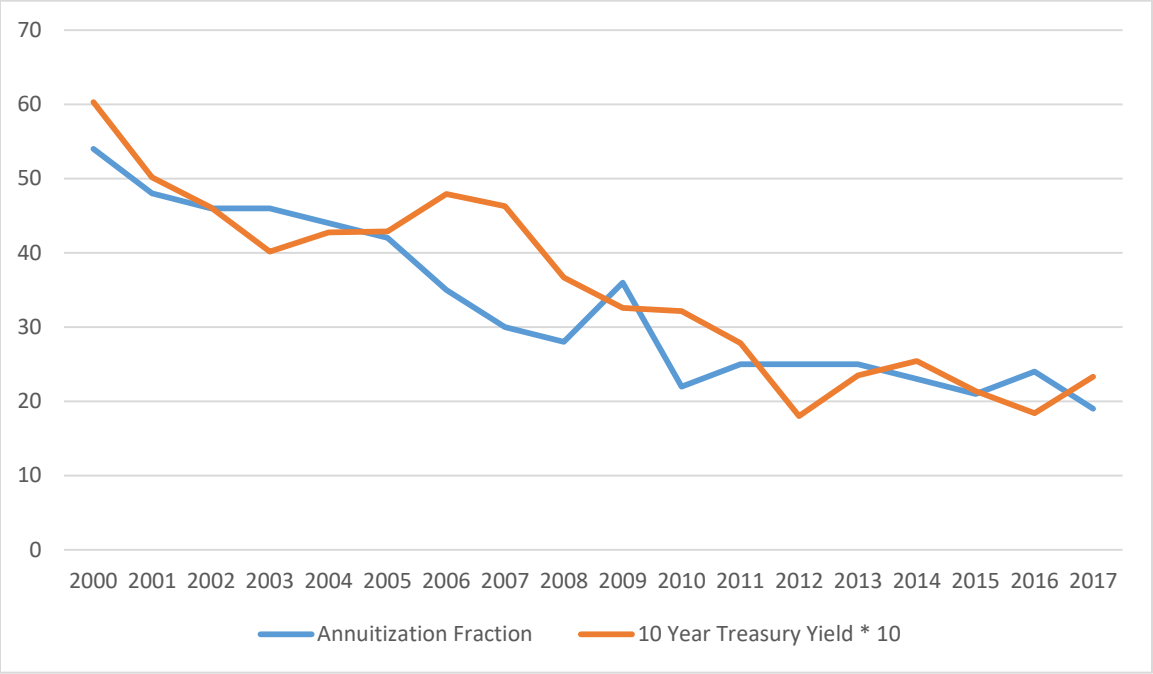


Table 4.1: Probability that TIAA Participant's First Income Draw is an Annuitized Income Stream

Variable	Coefficient Estimate (Standard Error)	Mean Value in 2017	Mean Value in 2000
Participant Balance ($M)	-0.1373 (0.0023)	0.539	0.303
Years of Participation in TIAA System	0.0033 (0.0001)	25.1	23.5
Female	0.0335 (0.0017)	0.548	0.396
10-Year Treasury Rate	0.050 (0.0008)	2.33	6.03
Age = 56	-0.0139 (0.031)	0	0.005
Age = 57	-0.0463 (0.028)	0	0.014
Age = 58	0.0012 (0.028)	0	0.009
Age = 59	0.1287 (0.023)	0.003	0.037
Age = 60	0.1742 (0.022)	0.011	0.063
Age = 61	0.2171 (0.022)	0.013	0.065
Age = 62	0.3165 (0.022)	0.031	0.145
Age = 63	0.2694 (0.022)	0.026	0.077
Age = 64	0.2783 (0.022)	0.031	0.079
Age = 65	0.3536 (0.022)	0.053	0.157
Age = 66	0.3321 (0.022)	0.058	0.060
Age = 67	0.2986 (0.022)	0.040	0.042
Age = 68	0.2937 (0.022)	0.033	0.039
Age = 69	0.3053 (0.022)	0.034	0.034
Age = 70	-0.0332 (0.022)	0.303	0.064
Age = 71	-0.0620 (0.022)	0.122	0.041
Age = 72	-0.0218 (0.022)	0.0521	0.020
Age = 73	0.0014 (0.022)	0.040	0.014
Age = 74	0.0162 (0.022)	0.035	0.012
Age > 74	0.0059 (0.022)	0.114	0.016
Constant	-0.057 (0.022)	1.0	1.0

Figure 5.1: Retirement Hazard for Male TIAA Participants by Cohort

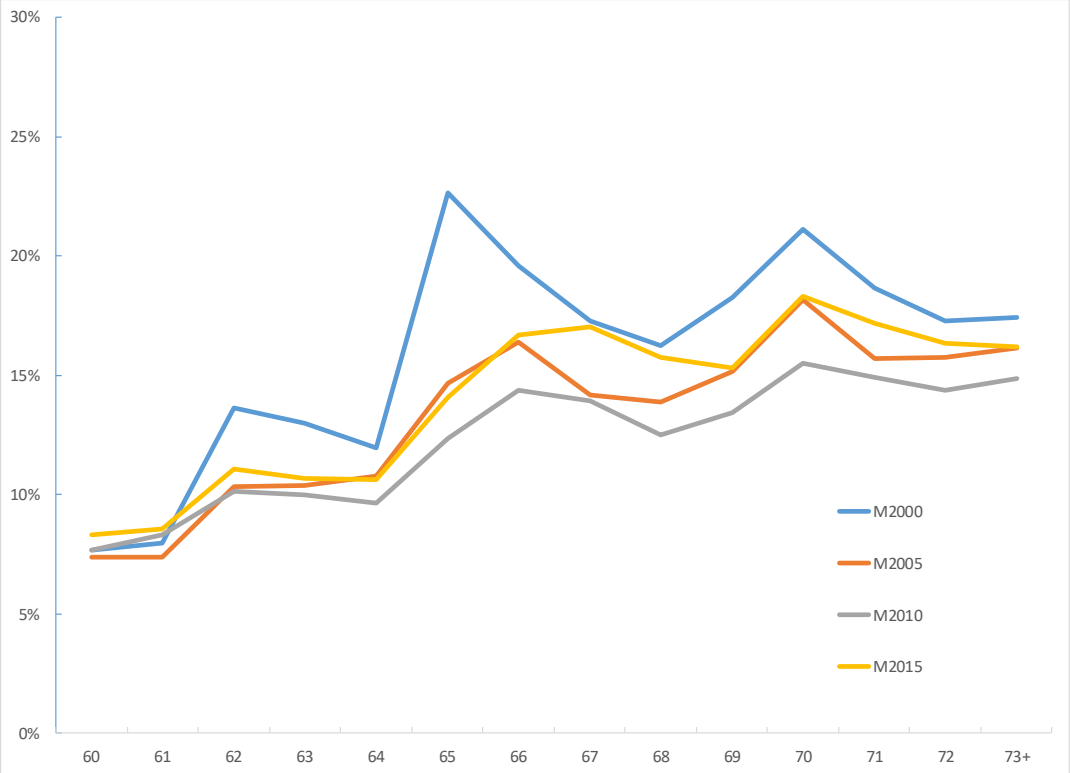


Figure 5.2: Retirement Hazard for Female TIAA Participants by Cohort

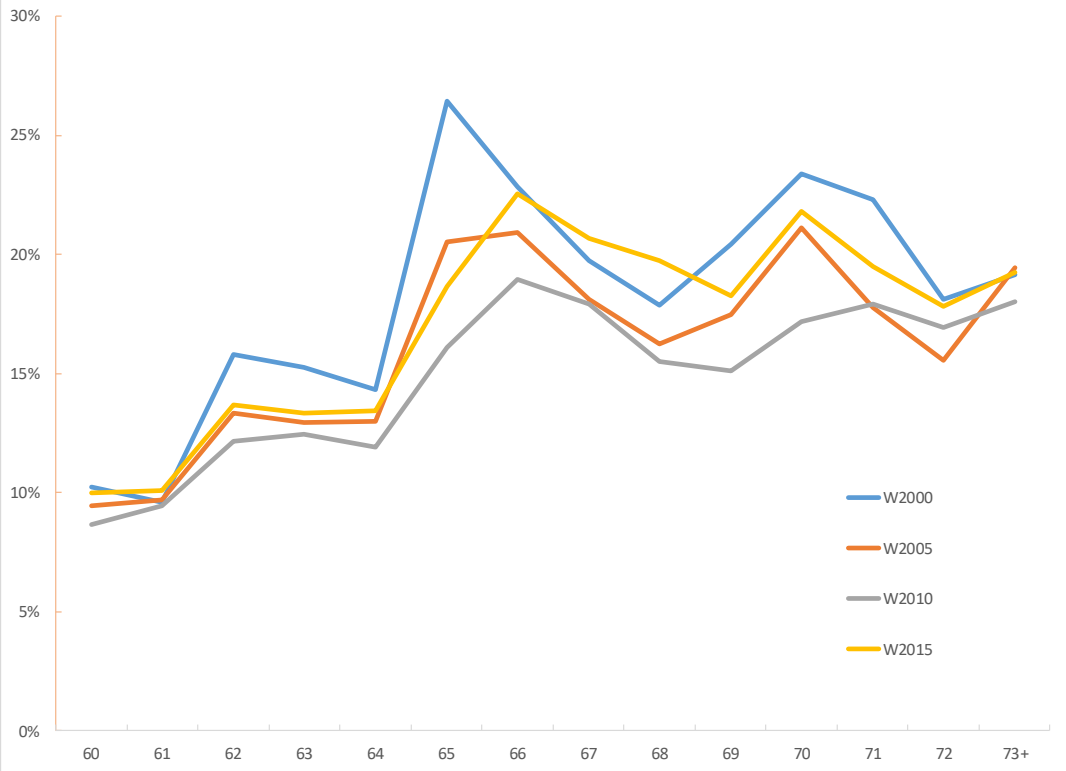


Figure 5.3: Average Retirement Age of TIAA Participants Who Contributed at Age 60, 2000-2017

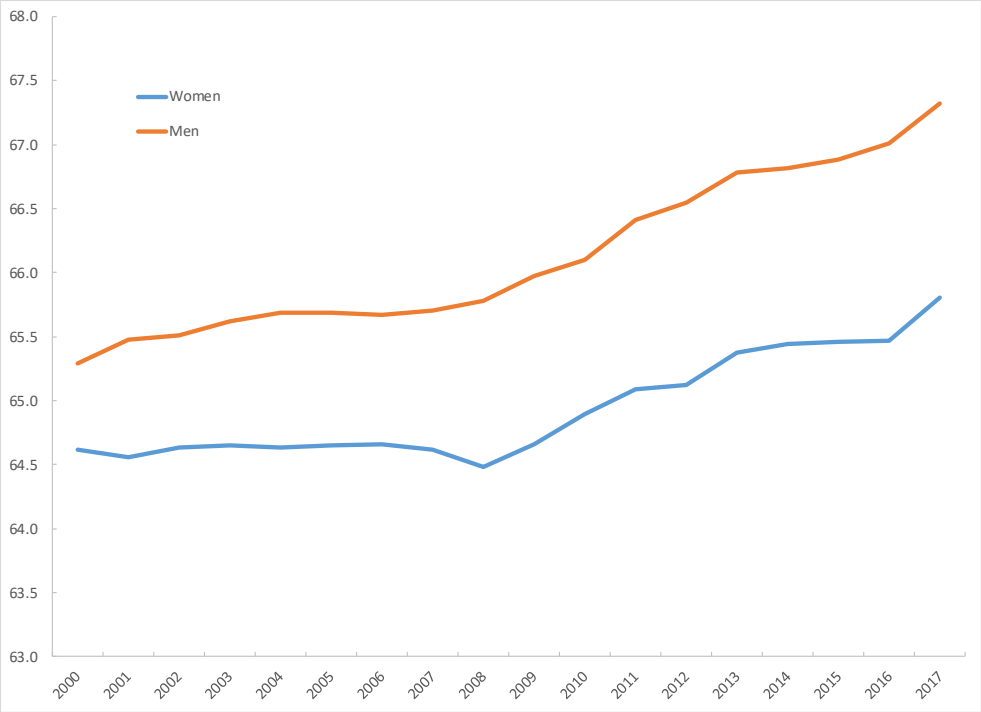


Figure 5.4 Years from Retirement to First Income Draw, 65-Year-Old Retirees in Various Years

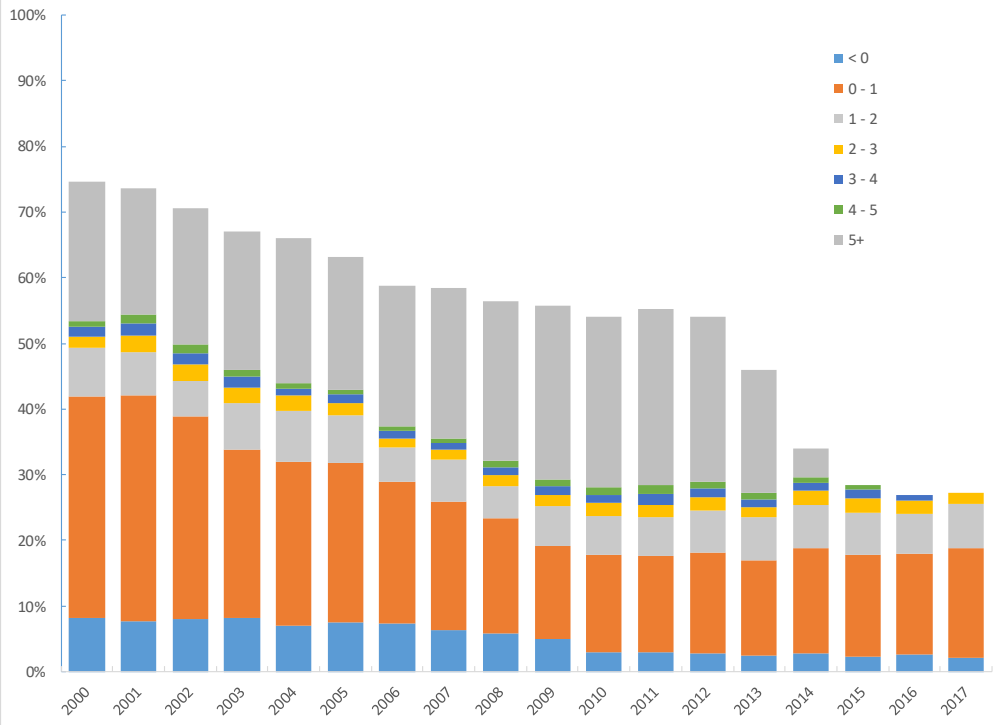
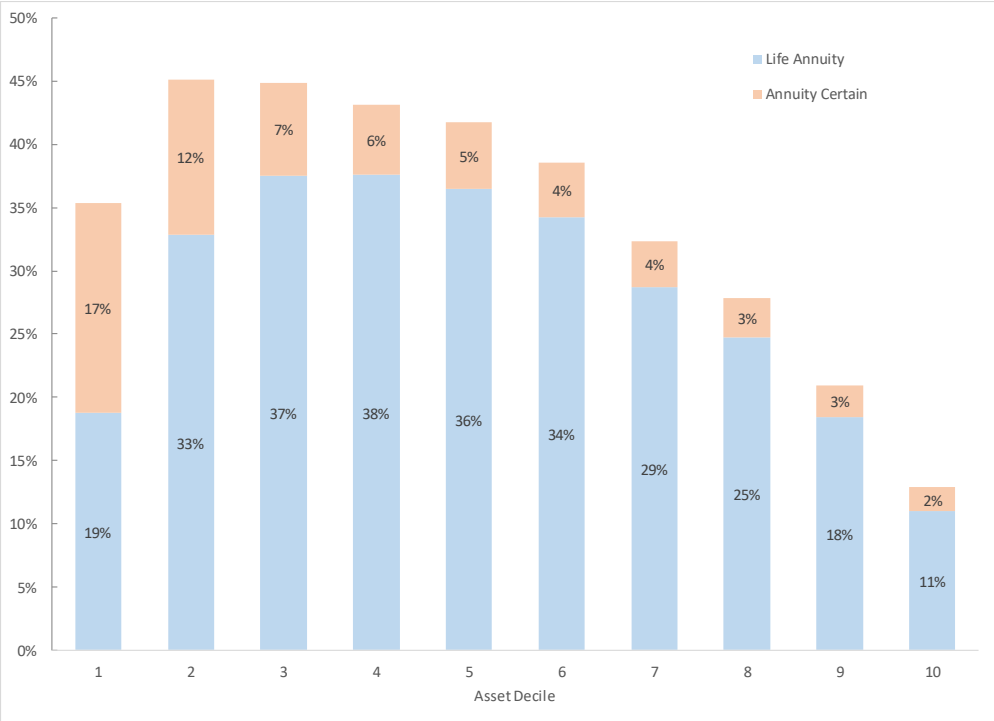


Figure 6.1: Probability of Annuitization by Size of TIAA Account Balance



Account balances are measured at beginning of year of "retirement". A participant is categorized as an annuitant if he or she takes a life annuity or annuity certain at any point in the future.