Defaulting 401(k) Assets into Payout Annuities For "Pretty Good" Lifetime Incomes

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Abstract

Some US defined contribution plans offer retirees access to an annuity or lifetime income stream as payout options from their 401(k) accounts, though some retirees may hesitate to elect lifetime income streams as a drawdown vehicle. To counter this, plan sponsors could automatically allocate some of retirees' 401(k) assets to annuities, now that regulatory barriers to doing so have eased. Using a lifecycle economic model, we evaluate defaulting retirees' 401(k) assets into payout annuities, and document that defaulting 20% of a retiree's assets over a threshold into an immediate annuity enhances retirement security for most plan participants.

Keywords: life cycle saving; household finance; annuity; longevity risk; 401(k) plan; retirement
JEL classifications: G11, G22, D14, D91

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Around half of private sector US employees participate in tax-qualified employer-sponsored defined contribution (DC) plans and Individual Retirement Accounts (IRAs), which today hold almost $38 trillion (Gorman et al. 2023). In contrast to traditional defined benefit pension plans, these accounts do not automatically pay retirees a lifelong stream of regular benefits during retirement. Instead, retirees themselves must determine how to draw down their retirement wealth in an orderly fashion without running out of money in old age. Some policymakers have become concerned that millions of financially inexperienced and potentially inattentive older consumers may do a poor job handling longevity risk in their retirement accounts, [1] and hence run out of money before they die.

One way for retirees to protect against longevity risk is to use a portion of their retirement savings to buy payout annuities from life insurers. In exchange for the premiums, the insurer then pays policyholders an income stream as long as they live. An appealing feature of life annuities is that they give policyholders access to the 'survival credit,' or the extra return payable to survivors from the pooled assets of early decedents.[2] Much research has analyzed how much of their financial assets consumers should allocate to life annuities using models of optimal household saving and investment behavior;[3] this (normative) literature finds that life annuities are highly valuable and most retirees should allocate a portion of their accumulated financial assets to such contracts. Yet in practice, investors are often reluctant to voluntarily annuitize their retirement assets, a phenomenon known as the 'annuity puzzle.' Explanations for this reluctance include behavioral factors rooted in biases, heuristics, and cognitive limitations such as loss aversion, narrow framing, lack of control, misperceptions about longevity, and inertia (e.g., Gottlieb and Mitchell 2020).

Nevertheless, rational factors can also play a crucial role in the decision not to annuitize, if a retiree anticipates a below-average life expectancy or has few financial assets other than a defined benefit pension or social security (Dushi and Webb 2004; Reichling and Smetters 2015).[4]

From the perspective of the supply side, institutional factors in the US context have also hindered the inclusion of lifetime income products in tax-qualified retirement accounts. For instance, prior to 2014, the 'Required Minimum Distribution' (RMD) regulation discouraged annuitization in employer-based 401(k) plans (Horneff et al. 2023a). In addition, some employers have been reluctant to include annuities in workers' retirement plan options due to concerns over taking on fiduciary liability. A solution to this problem emerged in 2014 when the US Treasury and the Internal Revenue Service allowed plan participants to use their 401(k) account balances to purchase Qualified Longevity Annuity Contracts, or QLACs (IRS 2014; Iwry 2014; US Treasury 2014). To comply with regulations, the amount of IRA or 401(k) assets that individuals could use to purchase QLACs could not exceed 25% of the account; the QLAC had to provide a lifetime income stream beginning no later than age 85; and, except for a refundable premium option, the QLAC could not include death benefits.[5] Moreover, the SECURE 1.0 Act of 2019 instituted a set of 'safe harbor' steps that an employer could follow to avoid taking on liability should the insurer someday be unable to continue paying the income stream. Subsequently, the 2022 SECURE 2.0 Act further enhanced the appeal of lifetime income annuities by raising contribution limits and removing the 25% cap on QLAC purchases within tax-qualified accounts.

Accordingly, US law and regulatory practice have started to encourage plan sponsors to help retirees opt into using a portion of their DC assets to buy lifetime income streams, potentially greatly enhancing Americans' old age consumption. Yet, these institutional measures may still be insufficient to overcome individual reluctance to buy payout annuities. For this reason, in what follows, we examine the pros and cons of including annuities as a *default* in DC accounts. While

this is currently not permitted, it has been proposed in the bipartisan 'Lifetime Income for Employees' bill introduced several times in Congress by Representatives Donald Norcross (D-NJ) and Tim Walberg (R-MI) (Mulholland 2023).

The plan of this chapter is as follows. First, we motivate the rationale for a default annuity in the DC plan payout phase. Second, we highlight key design features, followed by a description of our analytic model. Next, we offer a summary of key results, and we conclude with a discussion of potential policy implications.

Why a Default Annuity?

Prior research has demonstrated that retirement system defaults can powerfully shape workers' behavior regarding how they save and invest. Much of this analysis has focused on how to get workers to contribute to and invest in their pension plans via automatic enrollment (e.g., Madrian and Shea 2001), automatic contribution escalation (Thaler and Benartzi 2004), and automatic enrollment into target date funds (Mitchell and Utkus 2021). To date, these tools have been quite successful in 'nudging' employees into saving at employer-suggested default rates, as well as investing in well-diversified target date funds. The research findings have also found their way into the regulation of employer sponsored DC plans. For example, in 2006, the US Department of Labor (DOL) implemented a regulation on Qualified Default Investment Alternatives (QDIAs) that gave plan sponsors relief from liability for investment outcomes if they defaulted retirement plan savings into investment products, such as target date funds, balanced funds, or managed accounts, when participants did not provide investment direction.

Far less is known about how defaults might affect the form in which workers take their retirement benefits, notwithstanding the fact that the US Government Accountability Office (GAO 2016: 50) found that '70% of (survey) participants…indicated that if their employer automatically

invested a small percentage of their future contributions in a competitively priced guaranteed retirement income product, they would stay invested in the product.' One reason few employers and employees have provided default annuities for the payout phase is that the products tend to be complex: for instance, Brown et al. (2021) showed that annuities were attractive to financially literate individuals, while many others simply did not understand them. Framing also plays a role: experimental evidence by Gazzale et al. (2012) showed that people offered a lump sum payment as a default, instead of an annuity-like payout stream, overwhelmingly selected the lump sum (44% more likely), whereas those offered an annuity stream as a default were equally likely to accept it or the lump sum. Moreover, when subjects received a partial deferred annuity comprising a portion of their assets, the deferred annuity was deemed even more appealing than either lump sum or the immediate annuity. In a laboratory setting, Agnew et al. (2008) also showed that 'priming' people with investment or consumption frames strongly influenced their views of income streams versus lump sums, and Alonso-Garcia et al. (2017) concluded that subjects in an experimental context interpreted defaults as 'implied endorsements.'

Moving beyond experimental evidence, Bütler and Teppa (2007) studied administrative records from 10 firms offering retirement programs in Switzerland; nine of the firms had an annuity as the default payout, with full or partial lump sums as alternatives, and the tenth firm offered only a lump sum as the default. Their evidence confirmed that a large majority of participants elected the employer-provided default option. Similarly, Benartzi et al. (2011) documented that, when real-world US retirement plan participants were offered annuity payouts as the default, take up rates were quite high. In the UK, Banks et al. (2015) reported that a majority of retirees followed the 'path of least resistance,' buying annuities from their pension provider even when offered alternative options.

Accordingly, based on this evidence, there is reason to believe that integrating deferred income annuities (DIA) as default alternatives to retirees in DC plans can overcome the behavioral factors driving non-annuitization. Of course, when designing a default solution, it is important to consider potential rational reasons for not annuitizing, such as having a below-average life expectancy or low levels of retirement saving, to ensure that the approach is appropriate for heterogeneous individuals while remaining beneficial, or at least not disadvantageous, to the majority of participants. To model such a proposal, we turn next to a consideration of possible design features, followed by a description of our analytic framework.

Design Features and Current Regulations for Default Annuities

A default investment in an employer-sponsored DC plan refers to a pre-selected fund or set of funds offered by the plan fiduciary that applies automatically, in the absence of an active investment direction from the plan participant (DOL 2006). In the context of the payout decision upon retirement, if the plan sponsor wished to use a lifetime income stream or life annuity as a default option, the plan sponsor would need to address the following questions:[6]

1) When and how much of the retiree's accumulated retirement savings should be used to purchase a life annuity?
2) What type of life annuity should be selected?

Several regulations currently restrict the available options. First, IRS (2014) rules only permit annuities providing fixed lifetime payments; they also limit the use of accumulated 401(k) assets for QLAC purchases (currently) of over $210,000; and they require that annuity payments begin no later than age 85 (although earlier start dates are permitted). Second, the DOL's (2016) guidance on QDIAs must be taken into account, although no specific DOL regulations designate annuity contracts as QDIAs in retirement plans. Accordingly, this guidance primarily addresses the

accumulation phase of retirement savings rather than the systematic drawdown of assets critical to providing stable lifetime income in retirement. In principle, annuities could be incorporated into QDIA-compliant target date funds alongside diversified equity or fixed-income investments. Yet, the DOL guidelines also impose liquidity requirements, including allowing 'a participant or beneficiary to transfer the investment from the qualified default investment alternative to any other investment alternative available under the plan' without restriction (DOL 2006: section 3, indent 1). The rules are silent on whether default annuities could be included as a default option for participants who make no payout election. For these reasons, defaulting participants into an annuity within a target date fund would require a clear opt-out opportunity, and conventional annuities do not usually offer this as they are typically irreversible once purchased. While certain annuity types, such as variable annuities, do offer a degree of flexibility and liquidity, attempts to reduce illiquidity by 'individualizing' the collective annuity structure would come at the cost of lower survival credits.

Other approaches involve automatically setting aside part of a target date fund in lower-risk assets (such as fixed income) once a participant reaches a certain age (e.g., from age 50) and allowing the retiree to purchase an annuity using these assets at some later date (e.g., age 67). Yet in practice, if these assets are not automatically converted into annuities in the second stage but instead require an active 'opt-in,' this would comply with QDIA rules but would not be a true default annuity.

In sum, while QLACs are permitted by the IRS for use in retirement plans, they are not currently allowed as a default payout product in an employer sponsored DC plan. As mentioned above, the Lifetime Income for Employees Act proposed by Reps Donald Norcross (D-NJ) and Tim Walberg (R-MI) would permit retirement plan sponsors to use annuity contracts as QDIAs,

provided certain conditions are met. While that bill has not yet passed, its provisions could still be incorporated into another bill.

Our Life-Cycle Framework

Next, we explore the potential impact of true default annuities in 401(k) plans on plan participant well-being, should these be permitted in the future. To this end, we adopt a realistically calibrated model of optimal consumption and portfolio choice over the lifecycle (see Horneff et al. 2023b). In this setting, workers can contribute part of their labor earning (plus employer matching contributions) into tax-qualified 401(k) accounts where the assets are invested in a target date fund according to the rule: *'Equity exposure (%) = 125 – age.'* At the worker's retirement age (66), a portion of the plan assets (up to the contribution limit) is then used to purchase a qualified longevity annuity contract (QLAC) priced using the Society of Actuaries (2012) mortality table (unisex, trend function). Assets held outside the retirement plan can be invested in bonds earning an assumed 1% return per year, and risky equities having a risk premium of 4% and volatility of 18%. The individual's preferences for consumption C_t and bequests Q_{t+1} are assumed of the *Epstein-Zin* type with risk aversion ρ, elasticity of intertemporal substitution ψ, bequest preferences of b, and discount rate β. Survival rates p_t^s are taken from the US Population Life Table (Arias and Xu 2019) with heterogeneity by sex and education (Krueger et al. 2015):

$$J_t = \left\{ (1-\beta) {C_t}^{1-1/\psi} + \beta \left(\sum_i \Pi_{ij,t} \, E_t \left(p_t^s J_{t+1}^{1-\rho} + (1-p_t^s) b \left(\frac{Q_{t+1}}{b} \right)^{1-\rho} \right) \right)^{\frac{1-1/\psi}{1-\rho}} \right\}^{\frac{1}{1-1/\psi}} . \quad (1)$$

Individuals are assumed to be heterogeneous along several dimensions. In particular, depending on their sex and education levels (high school dropout, <HS; high school graduate, HS; or having at least some college, Coll+), they will have different mortality expectations and labor

income profiles (calibrated using PSID data) until retirement. They will then receive social security benefits thereafter. Various exogenous risk factors, such as capital market fluctuations, out-of-pocket medical expenditure shocks, and labor income dynamics, also contribute to additional (*ex post*) heterogeneity.

Our model also incorporates housing costs (depending on the individual's age, sex, and labor income) as well as key institutional factors including taxes (on labor income, social security benefits, and capital income), social security contribution and benefit rules, and regulations on tax-qualified retirement accounts (limits on own 401(k) contributions and employer matches, withdrawal penalties, RMD from age 73, and IRS rules on QLACs). Overall, for a reasonable set of preference parameters ($\rho = 7$, $\psi = 0.35$, $b = 1.1$, $\beta = 0.95$) our model outcomes are quite consistent with evidence on actual 401(k) balances in the US (Horneff et al. 2023b).

To quantify the impact of allocating a portion of retirement assets to a specific type of life annuity, we follow Horneff et al. (2019) and use the year before retirement as the time of the purchase. With respect to the type of annuity, we model QLAC-compliant annuities that pay fixed lifelong benefits starting immediately at age 67, or else they can be deferred to either age 80 or 85. We then use our life-cycle model to determine the optimal share of accumulated 401(k) assets that each individual should rationally convert to an annuity at age 66. To capture a wide range of household types, we solve the model using dynamic programming techniques for each of the three annuity types (benefits starting at age 67, 80, or 85) for a total of 18 groups: men and women, three educational profiles (<HS, HS, Coll+), and three preference types with respect to risk aversion and bequests. Using this model, we determine what percentage of DC assets each type of investor would optimally allocate to life annuities, on average. We can also quantify the resulting welfare gains relative to a situation in which retirees do not annuitize at all. In the next stage, we investigate what happens when a default annuity strategy is applied.

Here we define a default strategy as a pair consisting of an annuity start age (67, 80, 85) and an allocation rule that converts a portion of retirement assets into a lifetime income stream or annuity. For realism, we assume that a plan sponsor must be able to differentiate retirees using only observable factors, without relying on assets held outside the 401(k) plan, the retiree's health status, or social security benefit payments. Accordingly, this implies that the plan sponsor can only use the retiree's 401(k) account size for the allocation rule. We also require that the default solution improves the welfare of most plan participants while minimizing welfare losses that occur in rare and exceptional cases. In this sense, we define what we mean by generating a 'pretty good' lifetime income.

Results for Optimal Annuitization

We illustrate individuals' optimal demand for lifetime income streams using DC assets at retirement for the three different annuity start dates: age 67 (labelled DIA@67), age 80 (DIA@80), and age 85 (DIA@85). This is generated by solving our lifecycle model's policy function for the three annuity start dates and for each of the six demographic groups as well as three preference sets. Next, we generate 100,000 simulated independent lifecycles with respect to the exogenous shocks (stock returns, labor income, medical expenses) using optimal feedbacks with respect to the control variables (consumption, investment in stocks, bonds, DC assets, and annuity purchases at age 66). The simulation results are then aggregated into average optimal annuity purchases as a percentage of DC assets at age 66 and presented in Table 1.

Table 1 here

In terms of preferences, relative to the reference case (middle panel), demand decreases when individuals have a stronger bequest motive (left panel) and increases when individuals are more risk averse (right panel), in line with previous studies using a similar approach.[7] Women are

expected to annuitize more than men due to their relatively higher life expectancy and the fact that the annuities are priced using a unisex table (as required under US law for employer-sponsored retirement accounts). We also see that the shorter the annuity deferral period, the more households wish to use their DC assets to buy annuities. This result is plausible, as the payouts increase as the deferral period shortens; nevertheless, the premium also increases.

It is also clear that college-educated retirees will annuitize a larger proportion of their DC assets, compared to the other groups. This is because the better-educated earn more during their working years, enabling them to save more in retirement accounts and receive higher social security benefits when retired. Nevertheless, this effect is dampened by the progressive and nonlinear structure of the social security benefit formula, which provides a benefit-to-income replacement rate of 90% for the lowest lifetime earners, with only a marginal boost of 32% for those with middling earnings and another 15% marginal boost for those earning higher incomes. Further, social security benefits are capped for the highest earners. Accordingly, those with at least some college receive benefits that replace a smaller share of their total lifetime earnings. Additionally, they tend to have a higher wealth-to-income ratios at the start of retirement due to higher retirement savings.

Given this financial position, it is rational for the higher-paid to supplement their lifetime incomes by purchasing additional annuities from their DC assets. In contrast, lower-earning individuals receive much higher social security replacement rates, reducing their need to convert their relatively modest financial wealth into lifetime annuities. Another important factor is that life expectancy differs by education groups: our model explicitly acknowledges that the least-educated have significantly lower life expectancies than do their better-educated counterparts. Consequently, when annuities are priced based using unisex mortality tables and do not take education into account, they are less attractive to the latter subgroup.

Table 1 also illustrates how the demand for annuities varies by demographic group. Women having a college degree and longer life expectancy, having high risk aversion, and only moderate bequest motives (ρ=5; b=4), are willing to convert an average of 39.6% of their accumulated DC assets into immediate annuities. In contrast, the demand for annuities starting at age 85 is close to zero (0.05%) for men lacking a high school diploma, having below average life-expectancy, high bequest motives and moderate risk aversion (ρ=5; b=4).

We next show the welfare gains from giving people access to deferred lifetime income streams by comparing two individuals, both age 67. Each behaves optimally before and after retirement, but the first has the opportunity to buy a DIA, while the second does not. The values depicted in Table 2 show the additional dollar amount that would be needed in the DC retirement plan at age 67, to compensate for not having a DIA, to make the individual as well off as if the annuity were available.

Table 2 here

Not surprisingly, in the context of our life-cycle model with fully rational decision makers, all values in Table 2 are positive, which means that retirees are always better off if they use a portion of their retirement assets to buy a payout annuity. What is interesting, of course, is the extent to which this varies across the annuity start ages and demographic subgroups. To put this in the context of the desired default solution, Table 1 provides information on the amount, while Table 2 shows which type of annuity could be used. When comparing the magnitude of welfare gains, no single type of annuity dominates in terms of providing the highest welfare gains for every single demographic group. Nevertheless, certain patterns are salient.

First, the DIA@85 is dominated by at least one of the other two annuity start ages in all cases. This means that, for both men and women across all educational groups and all preference

types considered, DIAs with a shorter deferral period (starting at age 67 or age 80) are preferred to DIA@85.

Second, men and women having only a high school degree or less do best in the immediate or DIA@67 case across all three preference types. The results are more mixed for the college-educated: those with only a moderate bequest motive (middle and right panels) do best with a DIA@80, while those with a stronger bequest motive (left panel) favor the DIA@67. The reason that deferred annuities are more suitable for college graduates than immediate annuities, and vice versa for the two other education groups, is that the DIA starting earlier is more expensive, whereas an annuity deferred longer is significantly less costly and provides much greater benefits to those who live longer. Since college graduates receive higher expected labor income and have lower mortality rates compared to the population average (about 6% lower for men and 8% lower for women), this makes sense. Beyond the age of 80, however, the rapid rise in mortality risk makes later deferral less attractive. For instance, a 66-year-old man has a 65% probability of reaching age 80, but only a 45% chance of reaching age 85. The least educated have much higher mortality rates compared to population averages: 32% higher for male and 24% higher for female high school dropouts. This higher mortality is not taken into account in the actuarial pricing of the annuity, which is based on unisex mortality tables regardless of education. So for deferral periods starting at age 80 or even 85, many of the least-educated individuals are unlikely to reach the payout phase.

Another interesting pattern relates to individuals having a strong bequest motive (left panel), where we see that the immediate annuity (DIA@67) is the best choice for both men and women. The explanation is that with deferred annuities, if the individual dies relatively young, the heirs receive no bequest; in contrast, an immediate annuity does generate some consumption even when the individual dies relatively soon after retiring.

To sum up, the DIA@67 is the best choice in 14 of the 18 cases studied, while the DIA@80 is optimal in 4 of the 18 cases. DIAs starting at age 85 are dominated by at least one of the other annuity start dates. In the next section, we use this information to find a plausible 'good enough' default solution for a majority of retirement savers.

Results for Default Strategies

To develop a meaningful default solution for deferred income annuities (DIA), it is crucial to keep in mind that no information may be used that the plan sponsor cannot directly observe. Essentially, this includes only age, gender, and the wealth held in the retirement account. Information that was used in the previous section to determine the optimal annuitization rate—such as preferences, Social Security benefits, additional financial assets, the wealth-to-income ratio, or expected mortality—is assumed to be unavailable. Based on the information available to the plan sponsor, the following general objectives can be required for a default solution:

- As few retirees as possible should experience a reduction in utility, and
- As many retirees as possible should experience a positive utility gain.

From the previous section, it is clear that these two objectives conflict. As an example, an annuitization rate of 20% in DIA@80 would lead to a significant utility gain for female college graduates, but most male high school dropouts would be worse off if this were the default. Conversely, for male high school dropouts, a deferred annuity would be unpalatable.

It is also crucial to note the important heterogeneity within each subgroup. Figure 1 illustrates this by reporting the cumulative probability distribution of optimal annuitization rates for the DIA@80 product. Results are generated from 100,000 simulated lifecycles with optimal feedback; the solid line depicts results for the average male high school dropout (ρ=5; b=4) while the dotted line refers to an average college-educated woman (ρ=5; b=1.1). For example, Figure 1

shows that, among male high school dropouts, the demand for deferred annuities is basically zero in over 80% of the simulated lifecycle profiles (ρ=5; b=4). The reason is that most of these individuals accumulate very few financial assets and can expect relatively high social security benefits. As a result, they optimally purchase no annuities with their small retirement savings, and instead they keep their money in liquid stocks and bonds. In a handful of rare cases (<0.1%) where such individuals do manage to accumulate relatively high financial wealth (due to an unexpectedly successful employment history or exceptional capital market returns), 5% annuitization rates might be appropriate.

Figure 1 here

By contrast, more than 70% of college-educated females who are highly risk averse and have a moderate bequest motive (ρ=7; b=1.1) will rationally allocate over 20% of their DC assets to purchase a DIA@80. At the same time, there are also a few cases (about 5%) where some would demand no annuities at all, due to having experienced a poor earnings history or unfavorable capital market returns.

A way out of this dilemma has been proposed by Horneff et al. (2020), who recommend using a minimum threshold for assets accumulated in the retirement plan to identify who would be unlikely to demand annuities and consequently would receive only a minimal utility gain from annuitization. For the group with plan assets below the threshold, we set default annuitization rate to zero. For the remaining sample, we select a default annuitization rate applied to the (positive) difference between retirement plan assets and the threshold level to maximize the potential for a significant utility gain. The minimum investment required in order to purchase an annuity is set to $1,000, an amount that avoids impractically low payouts. In addition, no more than the legal contribution limit may be used to purchase annuities from the 401(k) assets.

Figure 2 reports welfare gains (relative to the no-annuity case) for the lowest-educated males (ρ=5; b=4). Since they face higher than average mortality, they are the least interested in annuities and would experience the greatest disadvantage from having much of their retirement savings defaulted into an annuity. Here the isoquants represent equal welfare gains (relative to the no-annuity case) for various combinations of a fixed annuity fraction above a threshold (x-axis) and a DC asset threshold (y-axis). Welfare gains are indicated on the respective isoquant. Panel A presents the results for the immediate annuity DIA@67 while Panels B and C indicate the results for the two deferred annuities DIA@80 and DIA@85.

Figure 2 here

Of particular interest is the zero isoquant, representing the threshold/annuitization rate combinations that result in neither a utility loss nor gain. For the DIA@67 product (Panel A), either the 250K/20% combination or the 200K/8% combination is utility-neutral. To determine which combination is preferable, one must also examine the optimal annuitization rates of other subgroups in Table 1. It turns out that most of those groups tend to favor a higher annuitization rate.

For the deferred DIA@80 annuity, a 10% annuitization rate would only be utility-neutral for a threshold exceeding 300K. Yet, this high a threshold would be restrictive for other subgroups, potentially filtering out too many people. To avoid this, the 240K/7% combination appears to be a suitable alternative. Conditions are even more restrictive for the DIA@85 annuity, which requires a minimum 401(k) balance of over $300K to maintain utility neutrality at a 5% annuitization rate.

To incorporate the interplay between avoiding utility losses for vulnerable subgroups (in this case, high school dropouts) and utility gains for others, it is useful to examine the pattern of gains for all 18 subgroups under the three default solutions. Specifically, we consider the 250K/20%-DIA@67, 240K/7%-DIA@80, and 250K/4.5%-DIA@85 combinations, with results appearing in Table 3. As before, the values indicate the additional DC retirement wealth required

at age 67 to compensate retirees not automatically enrolled in the default annuity option under consideration, allowing them to achieve the same utility as those who were.

Table 3 here

First, we consider the 250K/20%-DIA@67 (immediate annuity) combination. Here all households experience a utility gain, meaning that none of the groups are disadvantaged by the default annuity. The welfare gain is smallest ($11) for the least-educated males (ρ=5; b=4). For all other subgroups, we observe much higher values. For example, for college-educated women (high risk aversion and low bequest), the default DIA enhances welfare by $11,191 (first row), or about 3.6% of average retirement plan accruals. The highest welfare increase from this default solution is for men (ρ=5; b=1.1), who enjoy an increase in welfare of $13,598 or 3.8% of retirement assets.

If, alternatively, a deferred annuity at age 80 were to be the default instead of the immediate annuity, welfare gains rise substantially, especially for the college graduate group. Highly risk averse women (with a moderate bequest motive) achieve a welfare gain of 13% with the DIA@80 ($12,654 versus $11.193). Similar values are also observed for college-educated men having similar preferences. Even college graduates with a low level of risk aversion (ρ=5; b=1.1) receive higher welfare gains with the DIA@80 than the default solution with a DIA@67. Nevertheless, for 14 of the 18 subgroups considered, the DIA@80 deferred annuities are less advantageous compared with the immediate annuity, particularly for those without a college degree. Moreover, for male high school dropouts with low risk aversion and a strong bequest motive, this default option results in a small welfare loss.

For college graduates with high risk aversion and low bequest motives (ρ=7; b=1.1), the default solution with the DIA@85 annuity produces slightly higher welfare gains than the DIA@67 default. Yet, these welfare gains are dominated by the DIA@80 solutions. Moreover, the DIA@85 produces negative values in 2 out of 18 cases, meaning that this option is less appealing.

To determine which options would be ‘pretty good’ annuities, one must determine which of the three defaults would suit most retirees. The DIA@85 is ruled out, since it is always dominated by at least one of the other two other defaults. If the primary objective were to ensure that no plan participant would be disadvantaged, then the DIA@67 (250K/20%) would be suitable, as it provides a greater utility gain for most subgroups, compared to the DIA@80.

A counterargument might be that over 60% of the US workforce has at least some college education, and for this subgroup, the DIA@80 would be the most attractive alternative. According to the National Center on Education Statistics (de Brey et al. 2019), high school dropouts comprise only about 6.8% of the US workforce, whereas over 85% of the workforce has at least some college. Accordingly, if the goal were to maximize utility for as many retirees as possible, the DIA@80 would be the better choice. Yet, the DIA@80 results in a small but negative utility for male high school dropouts; this group comprises around 4.4% of the workforce, though we are unaware of how many have a high bequest preference. Nevertheless, even if they did, the $240K threshold and the $1K minimum investment amount would ensure that, in 60% of the life-cycle paths for this subgroup, such persons would not be defaulted into an annuity. If a default solution that brings small disadvantages to very few individuals but provides significant benefits to the vast majority could be justified, the DIA@80 deferred annuity would be an appropriate choice for a default solution.

In sum, there are many reasonable ways to incorporate deferred annuities as defaults in a 401(k) retirement plan.

Conclusions and Implications

US law and regulatory practice now encourage defined contribution (DC) plan sponsors to help retirees access lifetime income streams, potentially greatly enhancing Americans’ retirement

well-being. Yet, these changes may be insufficient to overcome individuals' reluctance to buy payout annuities using their retirement assets. Also, though many default mechanisms have been acclaimed as a way to overcome such behavioral barriers in the case of *saving*, very few exist to help retirees manage their money successfully throughout their later years.

Our work demonstrates that converting a portion of DC retirement savings into lifetime income streams using annuities can do much to protect retirees against longevity risk. We show that plan sponsors could default a portion of retirees' DC plan assets into lifetime incomes, as long as their savings exceeded a reasonable threshold. Our approach would thus enhance many peoples' well-being later in life while also avoiding instances where annuitization is rationally unfavorable. Defaulting people into partial annuitization would also mitigate the chance of adverse selection. That is, near-retirees receiving private information about a negative health shock could still opt out, but the well-documented 'stickiness' of defaults would likely reduce selection effects compared to a purely voluntary opt-in system. Moreover, annuity pricing for individually-purchased annuities includes substantial loadings in mortality tables to account for adverse selection. By contrast, a default-based approach for retirement income payouts from DC accounts would allow lower loadings and enhance value for participants.

Nevertheless, questions remain about how to implement default annuities in retirement plans. One approach could be for employers to insert DIAs into target date funds designed to carry older individuals not only 'to,' but also 'through,' retirement. The US Department of Labor (2006) explicitly designated target date funds as a QDIA option and allowed lifetime income offerings to be embedded into such portfolios prior to retirement. Default annuities could be integrated into retirement plans for the payout phase, likely around retirement age, since annuity products are illiquid and do not permit retirees to opt out. Current regulation requiring that plan participants be permitted to opt out of defaults is therefore difficult to reconcile with automatically defaulting

retirees into annuities. Plan sponsors might also wish to customize a 'pretty good' default annuity tailored to meet the needs of their specific workforces. For example, a high-tech firm that employed highly-educated workers could adopt the DIA@80 product, whereas a different company with a less-educated workforce would find the DIA@67 most appealing.

Employers seeking to implement default lifetime income annuities could also direct employers' contributions or matches to the DIAs. Indeed, as noted by Iwry and Turner (2009), current law does allow plan sponsors to require that employer contributions be held in a deferred annuity. Accordingly, it would also be feasible to default a portion of employer contributions into a DIA.[8] Nevertheless, this would need to be implemented well before retirement, making it more difficult for workers to roll their employer's DC plan contributions into a new employer's plan or an IRA.

In any event, our research illustrates that defaulting a portion of retirees' DC plan assets into a deferred income annuity is an attractive way for plan sponsors to provide their retirees with 'pretty good' lifetime incomes. To achieve this goal, existing QDIA regulations would need to be adapted to explicitly include life annuities as a default solution in retirement.

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Notes

[1] For more on the impact of aging on financial literacy and economic behavior, see Angrisani and Lee (2019), Lusardi and Mitchell (2014); Lusardi et al. (2018); Brown et al. (2017); and Mazzona and Perrachi (2018).

[2] Conventional capital market assets do not provide this extra return; see Horneff et al. (2023a).

[3] Among others see Horneff et al. (2008, 2010, 2015); Chai et al. (2011); Inkmann et al. (2011); Koijen et al. (2011, 2016); and Huang et al. (2017). Other prior authors have indicated sympathy for the idea of annuities in retirement plans, among them are Milevsky (2005); Gale et al. (2009); Iwry and Turner (2009); Scott (2008); Blanchett (2015); VanDerhei (2019); and Kreps et al. (2020).

[4] Additional attempts to explain the annuity puzzle include (i) health shocks (Peijnenburg et al. 2017); (ii) bequest motives (Lockwood 2012); (iii) market factors, such as high loadings and the sheer complexity of annuity products (Hurwitz 2019; Lambregts and Schut 2020); (iv) low interest rates driving low payouts; and (v) family support within couples (Hubener et al. 2015; Kotlikoff and Spivak 1981).

[5] Linking payments to a stock market index or to a portfolio of mutual funds is expressly disallowed, even if there is a minimum guaranteed income under such contracts, also known as variable or investment-linked payout annuities. Interestingly, however, participating life annuities, where payments are linked to the overall investment and mortality experience of a life insurance company, are consistent with the regulatory requirements of a QLAC (IRS 2014). For an analysis see Maurer et al. (2016).

[6] In addition, ensuring appropriate communication to participants (including education) about the risk/return trade-offs of annuities would also be important for plan sponsors when using default annuities, but this is beyond the scope of this chapter.

[7] See Inkmann et al. (2011) and Horneff et al. (2020).

[8] Defaulting an employer's entire contributions to a DIA may overshoot the mark, however, in view of the fact that average employee contributions in 2019 to 401(k)s were around $6,940, while employer contributions averaged $4,040 (Yochim 2019).

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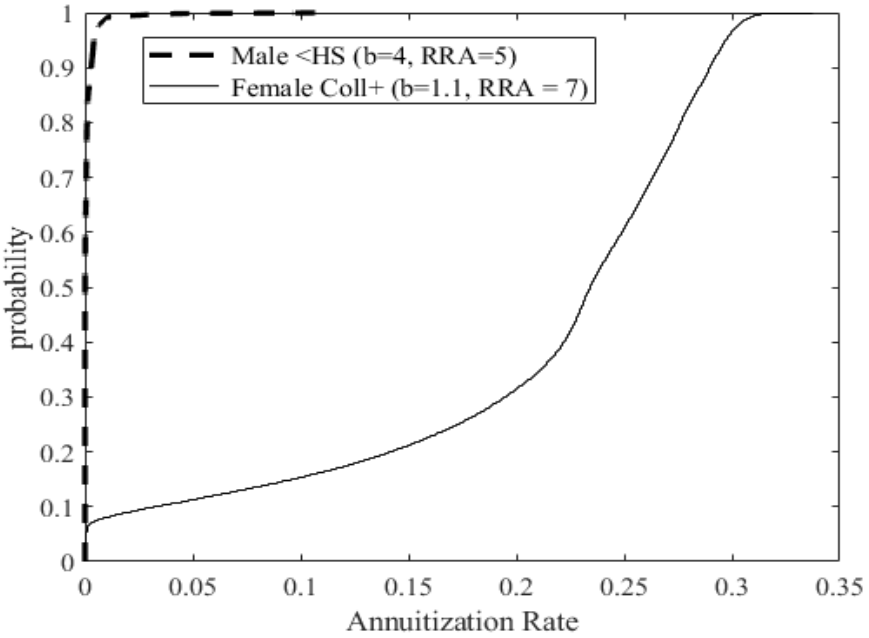
Figures

Figure 1 Cumulative probability distribution of optimal annuitization rates in DIA@80

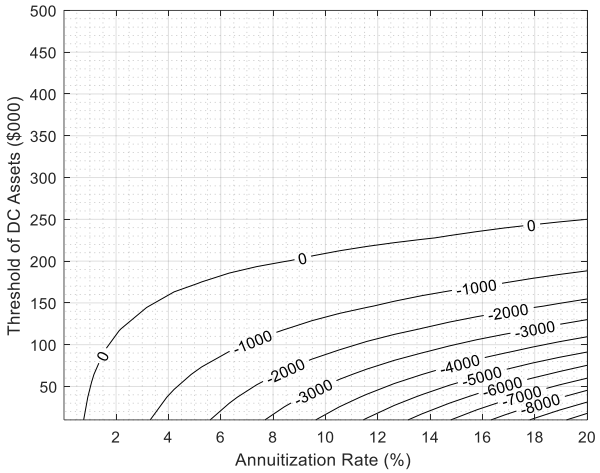


Notes: The Figure indicates the cumulative relative frequencies (y-axis) of optimal annuitization rates (x-axis) of DC plan assets that the retiree converts at age 66 to a deferred income annuity (DIA@80) starting benefits from age 80. Results are generated from 100,000 simulated lifecycles with optimal feedbacks; the solid line refers to male <HS relative risk aversion ρ=5 and bequest b = 4, while the dotted line refers to a college-educated female (ρ=7; b=1.1). For additional details see Table 1.

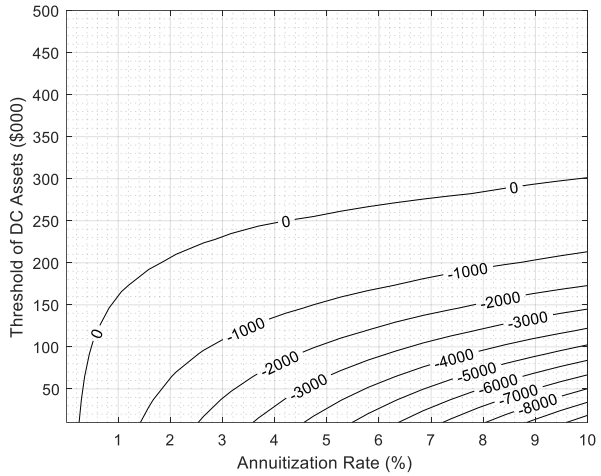
Source: Authors' calculations.

Figure 2 Utility gains ($) for a male high school dropout (ρ=5 , b = 4) for alternative annuitization rates and DC assets

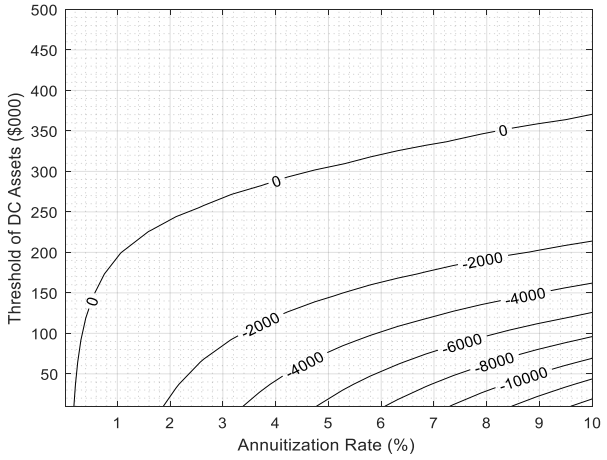
Panel A: DIA@67



Panel B: DIA@80



Panel C: DIA@85



Notes: The figure show welfare gains (relative to the no-annuity case) at age 67 for a male high school dropout with above-average mortality, relative risk aversion ρ=5 , and bequest b = 4 having access to a default DIA defined by both a threshold level of DC assets (y-axis) and an annuitization rate of DC assets above the wealth threshold at age 66 (x-axis). Each isoquant line represents equal welfare gains ($) relative to the no-annuity case for alternative combinations of annuitization rate and wealth threshold. Panel A shows results for an immediate DIA paying benefits from age 67; Panel B starts benefits at age 80; and Panel C pays benefits from age 85. For additional notes on parameters see Table 1.

Source: Authors' calculations.

Tables

Table 1 Optimal DIA ratios (in %) of DC assets by sex/education/preference subgroups and alternative deferral ages

Preferences		moderate risk aversion (ρ=5), high bequest (b=4)			moderate risk aversion (ρ=5), low bequest (b=1.1)			high risk aversion (ρ=7), low bequest (b=1.1)		
Sex	**Education**	DIA@85	DIA@80	DIA@67	DIA@85	DIA@80	DIA@67	DIA@85	DIA@80	DIA@67
Female	Coll+	1.72	3.5	9.77	8.33	14.13	29.65	12.4	20.6	39.6
	HS	0.87	1.78	5.59	5.3	9.89	26.1	9.3	16.2	41
	<HS	0.12	0.44	1.55	1.6	3.77	12.51	4.7	9.4	27.6
Mean DIA Ratio		1.3	2.7	7.8	6.8	12	27	10.8	18.3	38.8
Male	Coll+	0.61	1.12	4.05	7.5	13.12	26.9	13.4	21.2	35.7
	HS	0.41	0.69	2.71	5.06	9.15	23.14	10.2	17.2	38.6
	<HS	0.05	0.1	0.84	1.49	3.62	11.7	6	10.8	29.4
Mean DIA Ratio		0.5	0.9	3.3	6.1	10.9	24.1	11.6	18.8	35.9

Notes: The table reports the expected share (in %) of the individual's DC tax-qualified account balances used to optimally purchase the specified DIA for alternative payout start ages (67, 80, 85) by demographic subgroups (by sex, education, and parameters for bequest (b) and relative risk aversion (ρ)). Assumed time preference β=0.95 and EIS ψ=0.35 parameters are identical across settings. Average DIA ratios are generated from 100,000 simulated lifecycles for each subgroup using the model in Horneff et al. (2024). Mean DIA ratios use population weights by sex/education: male <HS = 11%, HS = 30%, Coll+ = 59%; female <HS = 10%, HS = 27%, Coll+ = 63%, as per the National Center on Education Statistics (2019). All values in 2019 dollars.

Source: Authors' calculations.

Table 2 Welfare analysis: Optimal annuitization of DC assets versus without annuitization

Preferences		moderate risk aversion (ρ=5), high bequest (b=4)			moderate risk aversion (ρ=5), low bequest (b=1.1)			high risk aversion (ρ=7), low bequest (b=1.1)		
Sex	**Education**	DIA@85	DIA@80	DIA@67	DIA@85	DIA@80	DIA@67	DIA@85	DIA@80	DIA@67
Female	Coll+	2,910	4,439	5,918	19,239	23,313	20,542	35,887	42,413	34,962
	HS	868	1,390	2,163	6,635	8,153	9,501	13,947	17,942	21,691
	<HS	479	0,787	900	1,307	2,108	2,819	4,562	6,490	8,419
Male	Coll+	1,135	1,759	2,677	17,351	21,650	18,292	40,848	47,401	36,332
	HS	546	904	1,363	7,843	10,097	11,030	20,284	24,892	25,142
	<HS	194	197	412	1,776	2,702	3,565	6,954	9,433	11,542

Notes: The values given refer to the additional amounts ($) that must be paid at age 67 into the person's DC plan that would yield the same utility if individual has no access to a DIA, versus the settings with optimal purchases of DIA using the model in Horneff et al. (2024). For additional notes see Table 1. All values in 2019 dollars.

Source: Authors' calculations.

Table 3 Welfare analysis for alternative default solutions

Preferences		DIA@67 20% fixed fraction above asset threshold $250K			DIA@80 7% fixed fraction above asset threshold $240K			DIA@85 4.5% fixed fraction above asset threshold $250K		
Risk Aversion		*moderate*	*moderate*	*high*	*moderate*	*moderate*	*high*	*moderate*	*moderate*	*high*
Bequest Strength		*high*	*low*	*low*	*high*	*low*	*low*	*high*	*low*	*low*
Sex	**Education**									
Female	Coll+	5,102	8,759	11,193	3,514	9,116	12,654	2,338	8,238	11,570
	HS	1,742	3,467	6,850	1,066	2,905	5,079	0,685	2,705	4,030
	<HS	892	1,277	2,917	782	991	2,379	471	630	1,747
Male	Coll+	866	8,890	13,600	25	9,284	15,643	-75	8,010	13,626
	HS	820	5,250	8,371	263	4,801	8,360	73	3,927	6,999
	<HS	9	1,913	4,123	-223	1,484	3,467	-231	1,028	2,660

Notes: The values given refer to the additional amounts ($) that must be paid at age 67 into the person's DC plan that would yield the same utility if individual has no access to a DIA, versus different default settings. The left panel uses 20% of DC assets above a threshold of 250K to purchase DIA@67. The middle panel uses 7% of DC assets above a threshold of 240K to purchase DIA@80. The right panel uses 4.5% of DC assets above a threshold of 250K to purchase DIA@85. In all cases, the minimum annuity purchase amount is 1K. All values in 2019 dollars. For additional notes see Table 1.

Source: Authors' calculations.