RETIREMENT INCOME INSTITUTE
Alliance for Lifetime Income

RESEARCH PAPER
JULY 2023
Retirement Income Institute Original Research-#022-2023

ABSTRACT

Interest in annuities among defined contribution (DC) plan sponsors is on the rise. This paper provides context around key considerations for plan sponsors who are deciding whether to include an annuity in a DC plan and provides general guidance on which approach to select given plan sponsor preferences and other relevant criteria. Overall, this research suggests there likely isn't a single annuity product structure that is going to work for all DC plans given the notable differences in product features and likely varied preferences among plan sponsors and participants. Therefore, it is essential that DC plan sponsors interested in longevity solutions continue to stay abreast of developments as the space continues to evolve, especially since the DC annuity ecosystem is still in its infancy.

SELECTION CONSIDERATIONS FOR PLAN SPONSORS WHEN INCLUDING AN ANNUITY IN A DEFINED CONTRIBUTION PLAN

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INTRODUCTION

Defined contribution (DC) plan sponsors are increasingly focused on getting participants not just "to" but also "through" retirement. For example, the percentage of plan sponsors seeking to retain retiree assets in the DC plan has increased from 46% in 2015 to 74% in 2021, and while 17% of plan sponsors preferred to move retiree assets out of the DC plan in 2015 only 7% did so in 2021 (DCIIA 2022).

However, the strategies and solutions required to help participants accumulate a sufficient balance to get "to" retirement can be very different than those that help participants deplete savings to get "through" retirement. One approach to account for these differences is allocate savings to a product or solution that provides some form of guaranteed, or protected, lifetime income, such as an annuity. While most 403(b) plans offer some type of annuity today, less than 20% of 401(k) plans do.[1]

This paper provides context around key considerations for plan sponsors who are deciding whether to include an annuity in a DC plan and provides general guidance on which approach to select given plan sponsor preferences and other relevant criteria. Five annuity product-types are reviewed: single premium immediate annuities (SPIAs), deferred income annuities (DIAs), a fixed annuity (FA) with a guaranteed lifetime withdrawal benefit (GLWB), a variable annuity (VA) with a guaranteed lifetime withdrawal benefit (GLWB), and protected lifetime income benefit (PLIB) strategies, in addition to delayed claiming of Social Security benefits.

Research on optimal annuities has primarily focused on the economic benefits of the various solutions and has generally ignored product and

1. https://www.pionline.com/defined-contribution/annuities-struggle-foothold-401ks-despite-being-mainstay-403b-plans

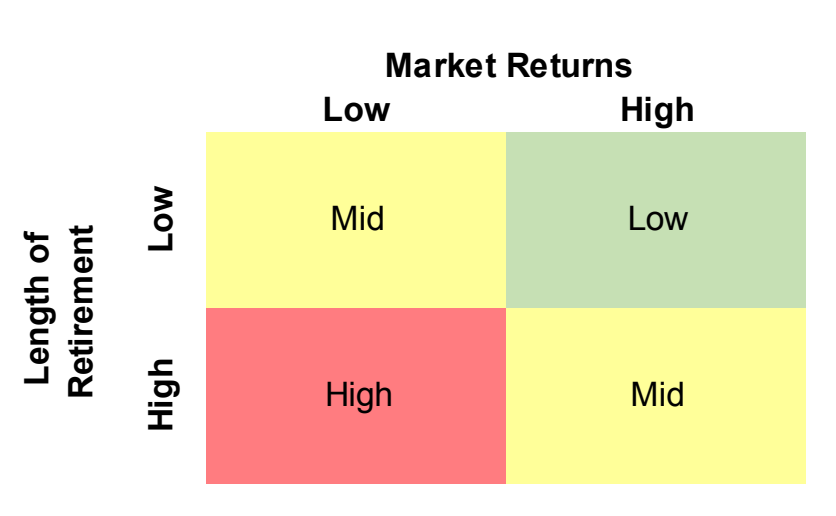


EXHIBIT 1. *Defining Risk from a Retirement Outcomes Perspective by Market Returns and Length of Retirement*

behavioral considerations. The definition of the most "efficient" annuity for a DC plan can change considerably, though, when a more comprehensive perspective is taken. For example, while DIAs (or Qualified Longevity Annuity Contracts, or QLACs, assuming certain provisions are met) are often touted among retirement academics as being the "optimal" annuity given their explicit hedge against longevity risk, but this perspective doesn't consider notable behavioral and product drawbacks affecting their economic efficiency.

Overall, this research suggests there likely isn't a single annuity product structure that is going to work for all DC plans given the notable differences in product features and likely varied preferences among plan sponsors and participants. Therefore, it is essential that DC plan sponsors interested in longevity solutions continue to stay abreast of developments in future as the space continues to evolve, especially since the DC annuity ecosystem is in its infancy.

IMPORTANT RETIREMENT PLANNING CONSIDERATIONS

Before we explore specific types of annuities, we provide an overview of a variety of topics DC plan sponsors and consultants should be aware of when thinking about including an annuity in a DC plan, and annuities more generally. This includes correctly defining risk, mortality pooling, plan sponsor considerations, outside assets, retiree liability, and the implications of gender-neutral pricing in DC plans, topics which are discussed in this section.

DEFINING RISK

Risk exists in a variety of forms and has a variety of definitions. An individual's (or household's) retirement income goal, risk could probably best be defined as simply not achieving the desired income (or lifestyle) for life.

There are a variety of factors that will affect whether the goal is accomplished. Two important considerations are market returns and the length of retirement. The implications of the different environment combinations are summarized in Exhibit 1.

Risk should not be viewed from the lens of mortality or market returns alone. Strong returns may not be enough to overcome a significant longevity of retirement just as a retiree may still not have sufficient retirement income over a relatively short retirement if returns are especially bad. While efficient portfolios should improve the prob-

ability of funding a retirement goal, portfolios cannot typically explicitly address longevity risk, which is why longevity protected solutions, such as annuities, can be especially attractive to certain retiree households.

The potential "cost" associated with allocating to longevity protected solutions also depends on one's perspective. For example, one common way to determine when to claim Social Security retirement benefits is to use a "breakeven calculator" which estimates how long an individual must survive so that higher income from delayed benefits offsets the period (early in retirement) for which benefits are not received. Depending on how a retiree defines risk and its potential economic implications within the context of a retiree's total wealth, however, these tools can provide misleading guidance.

While it's true an individual who delays claiming Social Security retirement benefits until age 70 and dies at age 75 would likely have not maximized the potential Social Security lifetime income benefits,[2] the remainder of his retirement savings should pass along to their heirs. Therefore, while their heirs could have been slightly better off had they claimed benefits earlier, the difference is not that significant in absolute terms. In contrast, if the individual had an unusually long retirement it is possible they may not only deplete their assets, but require economic assistance later in life, perhaps even from their heirs. Therefore, it's important to place the "bad outcomes" in the correct context when considering allocating to longevity protected solutions.

MORTALITY POOLING

While there's a considerable number of differences among the longevity protected solutions reviewed, the one consistent benefit across strategies is the implied benefits of mortality (or longevity) pooling. Similar to the more general benefits of risk pooling in other forms of insurance, combining individuals into a larger pool allows each individual participating in the pool to be less impacted by idiosyncratic longevity risk that individuals face when funding their retirement on their own. This potential benefit, often referred to as the mortality credit component of annuities, can significantly improve expected income compared to strategies where the retiree attempts to fund retirement income solely with savings. However, the potential benefits vary by strategy.

The potential benefits of annuities have increased significantly given the equally significant decline of defined benefit (DB) plans. The shift away from DB plans increasingly requires individuals to be responsible for managing their retirement savings and to determine suitable withdrawal amounts. This requires an incredibly complicated series of decisions for which many retirees are likely not up to the task.

GENDER NEUTRAL PRICING

One important consideration when purchasing an annuity in an employer-sponsored retirement plan is that they must be calculated on a gender-neutral basis. This is because the Supreme Court previously ruled that using gender-based mortality tables would be discriminatory.[3]

Gender-neutral pricing is generally considered to be a disadvantage to males because males tend to have shorter life expectancies and would therefore receive higher benefits if they were to purchase annuities based on their expected mortality. Annuities purchased in IRAs are not subject to the gender-neutral pricing requirement.

While gender-neutral payout rates could, in theory, be based on the simple average between male and female mortality rates, insurance companies must manage adverse selection issues regarding gender-neutral pricing in DC plans and are likely to adjust the payouts accordingly. This effect has been noted by von Gaudecker and Weber (2006), who examined the effect of gender-neutral pricing on single life annuities in Germany. They find that German issuers expected adverse selection issues and priced the contracts closer to the female-only annuities. The gender-neutral pricing only led to a marginal benefit for women, with benefits increasing by 1.2% versus the gender-specific rates, while men received benefits that were 7% lower (due to the gender-neutral pricing). How this will play out in the US DC space is obviously still to be determined.

2. There are some exceptions here when considering spousal survivor benefits.
3. Arizona Governing Committee for Tax Deferred Annuity & Deferred Compensation Plans v. Norris, 463 U.S. 1073.

The impact of gender-neutral pricing can be significantly lower for products that are revocable, including GLWBs and PLIBs, as well as products which include some type of period certain or cash refund provision. We demonstrate these effects in future sections.

One option for those products with payouts that vary by gender (e.g., SPIAs and DIAs) is to purchase the annuity as part of a roll-out of the DC plan into an IRA. This would potentially allow the individual to realize gender-specific pricing, although it has additional pricing considerations.

RETAIL VS INSTITUTIONAL PRICING

One potential benefit to purchasing an annuity inside a DC plan is higher payouts from institutional pricing. There can be significant distribution costs with annuities, in particular the sales commission, that vary by product and reduce the final expected income received by an annuitant. By offering annuities inside a DC plan, it may be possible to increase the effective payouts given things like reduced distribution costs and economies of scale, although the expected benefit is going to vary by product. For example, commissions for SPIAs and DIAs tend to be lower than variable annuities and therefore any type of institutional pricing benefit for SPIAs and DIAs sold within a DC plan is likely to be lower compared to a GLWB.

DECOMPOSING THE RETIREMENT LIABILITY (INTO "NEEDS" AND "WANTS")

The retirement income goal is commonly viewed as a specific amount of money that is treated as being required (typically increased annually by inflation) with absolute certainty. This perspective ignores the reality that a retirement spending goal is a combination of individual expenditures, including healthcare, housing and food, each of which has varying levels of elasticity. Whereas housing and healthcare costs are relatively inelastic, going on vacation or eating out are elastic.

The concept of spending elasticity is not generally relevant to traditional pension plans, where the payments are known and legally mandated and therefore is somewhat unique to households. Considering spending elasticity can have important implications when determining the optimal way to fund retirement. For example, inelastic spending should generally be funded with assets, like annuities, that are longevity protected, while elastic spending can more likely be covered by depleting a portfolio.

While each household likely has a unique perspective on the elasticity of the retiree spending goal, it is possible to estimate how they vary. We do so by using data from the Consumer Expenditure Survey (CES)[4] and focus on respondents between the ages of 65 and 80 where the household is categorized as being retired. We categorize expenditures as either essential or flexible, based on the author's general perceptions of flexibility by category. While this is obviously an oversimplification of the flexibility associated with the different expenditure groups, it is a useful approach to generalize both overall needs/wants percentages and how the breakdown varies by total expenditure levels. The results are included in Exhibit 2.

Exhibit 2 demonstrates that there can be significant differences in the expected flexibility of expenditures across retiree households. For example, the percentage of total spending that is essential declines at higher expenditure levels. The spread between the lowest and highest income groups is startling: 83% of expenditures would be considered essential for households with total expenditures less than $20,000 versus 41% of expenditures for households with total expenditures greater than $200,000. The standard deviation of essential expenditures as a portion of total expenditures within each expenditure group declines with total household expenditures, from roughly 10% for those households in lowest expenditure group (with total spending less than $20,000) to approximately 20% for those in the highest expenditure group (with total spending over $200,000). In other words, not only do households with higher expenditure levels exhibit higher levels of elasticity, but they also exhibit higher levels of variation.

4. https://www.bls.gov/cex/pumd.htm, more specifically the 2020 Interview file

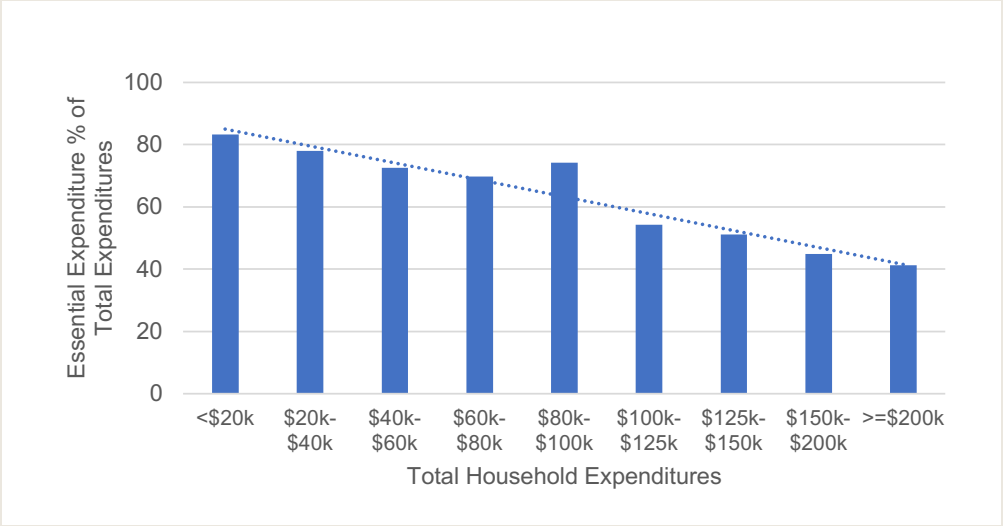


EXHIBIT 2. *Essential Expenditures as a Percentage of Total Expenditures*

Source: *Consumer Expenditure Survey*

This suggests that, to obtain optimal annuity allocation recommendations, models should take a more refined perspective of the liability and account for both inelastic and elastic expenditures.

THE KNOWN UNKNOWN: OUTSIDE ASSETS (AND LIABILITIES)

While the importance of DC plans in funding retirement has been increasing along with the decline of DB plans, relatively few households stay with the same employer for their entire working careers. Job tenure among American workers has been declining for decades[5] which makes it unlikely that a DC plan balance represents the entire accumulated retirement savings for the participant, much less the participant household (e.g., if that participant is married). Therefore, as the average length of employment declines, the portion of total savings represented by the DC balance is likely to decline as well.

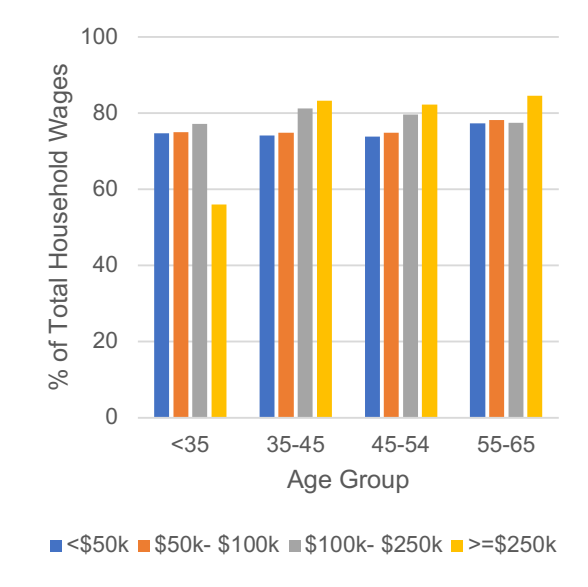
Exhibit 3 illustrates the information that can generally be known about a participant leveraging data from the DC plan based on an analysis using data from the 2019 Survey of Consumer Finances (SCF). The SCF is a triennial cross-sectional survey of U.S. families conducted by the Federal Reserve Board that includes information on families' balance sheets, pensions, income, and demographic characteristics. The analysis only includes respondents who are actively saving in a company-sponsored DC plan (i.e., have a deferral rate greater than 0%) with a DC balance greater than zero. The analysis includes each of the five SCF implicates and the household weights for calculations.

Respondents are grouped into different age and income groups and information about the respondent wages as a percentage of total wages is included in Panel A (of Exhibit 3) and information about the DC balance as percentage of total financial assets is included in Panel B.

While respondent income provides relatively good insight into total household wages (which can be used to estimate the retirement income liability), averaging

5. https://www.ebri.org/docs/default-source/ebri-issue-brief/ebri_ib_474_tenure-28feb19.pdf

PANEL A: RESPONDENT WAGE INCOME
% TOTAL HOUSEHOLD WAGE INCOME



PANEL B: RESPONDENT 401(K) BALANCE
% TOTAL FINANCIAL ASSETS

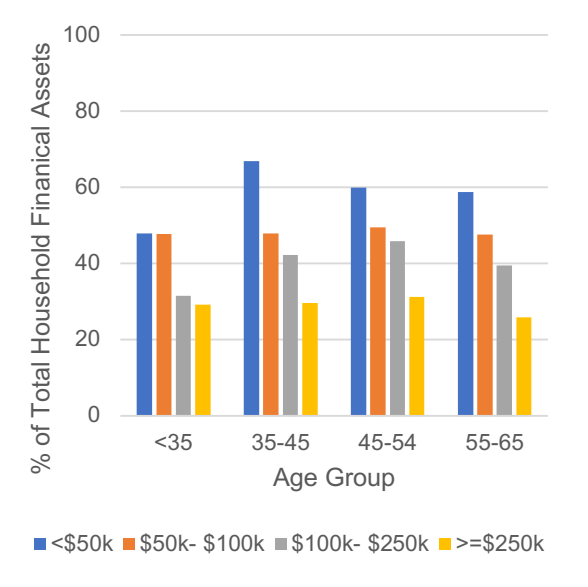


EXHIBIT 3. *The Known Unknown Regarding a Participant's Overall Situation*

Source: *Consumer Expenditure Survey*

approximately 75% and relatively consistent across age and income groups, DC balances provide much lower information about total household financial assets.

For respondents with incomes less than $50,000 (in 2019 dollars) the DC plan balance represents about 50% of total household financial assets. In contrast, for respondents with incomes greater than $250,000, the DC balance only represents approximately 30% of total financial assets. Regardless, for none of the groups do assets represent the majority of savings for retirement. The relatively low percentage DC assets represent of total financial assets is likely to get even lower given higher turnover today (i.e., participant information is becoming less reflective of overall household economic resources to fund retirement).

Overall, this analysis suggests that DC plan sponsors are unlikely to have an accurate, complete of perspective of participants' financial situations. They should be careful when extrapolating participant data, including age, income, balance, total savings and gender when gauging retirement readiness. Factoring in future savings will tighten the gap, to some extent (e.g., depending on participant age), but does not resolve this issue.

PLAN SPONSOR/FIDUCIARY CONSIDERATIONS

Plan sponsors have been hesitant to add annuities to DC plans for a variety of reasons, such as perceived lack of participant interest, administrative challenges, fiduciary concerns. This hesitancy could be addressed by including an annuity as part of the default investment. For example, demand for target-date funds tends to be relatively low in DC plans where they aren't used as the default investment, but significant when they are. Likewise, an annuity could receive significantly more attention if it were included in the default investment.

Many companies are working on the administrative issues required to offer an annuity in a DC plan, including portability, a feature allowing participants to transfer the underlying benefits of the annuity to an IRA if the participant were to leave the DC plan (or the plan changes recordkeepers).

Fiduciary risk has been a notable hurdle given the significant implied relationship duration associated with an annuity. Investments can be removed from a DC plan without having any kind of residual relationship. With an annuity, though, the insurance company could easily be required to make payments for more than 30 years, creating a relatively longer-term relationship with participants and the plan than more traditional products of investments.

Until the Setting Every Community Up for Retirement Enhancement (SECURE) Act 1.0 was enacted on December 20, 2019, there was little clarity on the due diligence requirements for offering an annuity in a DC plan. Section 204 of the legislation now provides specific guidance for a plan sponsor seeking a fiduciary safe harbor for the selection of an insurance provider. Specifically, it clarifies how the insurance provider, not the plan sponsor, would be liable for losses realized by the participant or beneficiary due to an insurer's inability to satisfy its financial obligations under the contract.

The safe harbor provisions allow the plan sponsor to rely on written representations from insurers, does not require the selection of the lowest cost contract, and does not require the review of a contract after it's been purchased, among other things. The plan sponsor must satisfy certain steps, including engaging in a thorough search, considering the financial capacity of the insurer to satisfy their obligations under the contract, and consider the respective costs and benefits. For readers interested in learning about this particular topic see Reish and Ashton (2022).[6]

There are a number of additional considerations not covered in this piece we'd recommend plan sponsors consider more fully when determining whether to add an annuity to a DC plan.

REVIEWING COMMON ANNUITY CHOICES FOR DC PLANS

This research focuses on four generic types of annuities: single premium immediate annuities (SPIAs), deferred income annuities (DIAs), guaranteed lifetime withdrawal benefit (GLWB) strategies, and protected lifetime income benefit (PLIB) strategies, in addition to the potential benefits of delayed claiming of Social Security retirement benefits. We introduce each of these options/strategies in this section.

SINGLE PREMIUM IMMEDIATE ANNUITY (SPIA)

With a SPIA, a lump sum is generally irrevocably transferred to an insurance company which promises to pay the annuitant (or annuitants if the payment schedule based on the lives of more than one individual) some benefit for life.

Immediate annuities are one of the simplest and oldest strategies for creating a guaranteed lifetime income. Contracts known as "annua," that promised an individual a payment stream for a fixed term, or possibly for life, in return for an up-front payment, were issued in ancient Rome (see James 1947) and single-premium life annuities were available in the Middle Ages (Poterba 1997).

While researchers have primarily focused on immediate annuities when determining the potential benefit of annuitization, sales of immediate annuities are relatively small compared to total annuity sales. For example, roughly $6 billion of the $255 billion total annuity sales in 2021 were in SPIAs,[7] according to LIMRA.

Additionally, while research often assumes retirees purchase "life only" annuities where the payments cease upon the death of the annuitant, most annuities include some type of period certain or cash refund provision. For example, among the 614,468 annuities quoted by CANNEX (2022) in the 2021 calendar year, only 11.22% were life only. With period certain products, the in-

6. https://www.protectedincome.org/wp-content/uploads/2022/04/RP-04-ReishAshton_r2.pdf
7. https://www.limra.com/en/newsroom/news-releases/2022/secure-retirement-institute-total-annuity-sales-jump-16-in-2021--marking-highest-sales-since-2008/

Gender	MALE		FEMALE	
Type	Life Only	Cash Refund	Life Only	Cash Refund
Avg Top 5	7.22	6.72	6.86	6.51
Max	7.44	6.83	7.10	6.73
Min	5.38	4.85	5.09	4.67
Max/Min%	38.28	40.97	39.35	44.07
Std Dev	0.52	0.55	0.50	0.55
Count	20	18	20	18

EXHIBIT 4. *Payout Rates for Immediate Annuities (SPIAs) for a 65-year-old*

Source: *CANNEX as of March 20, 2023*

surance company guarantees some minimum period or payments, most commonly 10 years, regardless of whether the insured is still alive. With a cash refund provision, the annuitant is guaranteed to receive the initial premium back if the annuitant should die before the initial premium has been received.

While these "money back" provisions generally[8] reduce the payout of an annuity, they also reduce the potential loss associated with purchase (from a net present value perspective) should the annuitant pass away earlier in retirement, thereby easing the psychological pain of purchasing an annuity.

Exhibit 4 includes information about a series of SPIA quotes obtained from CANNEX,[9] a company that supports the exchange of pricing information for annuity and bank products across North America, on November 30, 2022. Four different quotes are obtained, which vary by gender and whether the annuity is life-only or includes a cash refund provision. All four quotes are for a 65-year-old. The payout rate is defined as the annual income divided by the initial premium, which is assumed to be $100,000.

There is a notable variation in SPIA quotes among providers. For example, when focusing on the life-only payout rates for a 65-year-old male, the highest payout is 7.44% (which means an individual would receive $7,443 a year, for life, for a $100,000 premium) is 38.28% higher than the lowest payout rate of 5.38%. The financial strength rating of the insurance company offering the highest payout is slightly lower than the lowest payout, at B++ and A+, respectively, but the financial strength rating of the second highest payout (at 7.37%) is also rated A+. While financial strength ratings are obviously only one of many ways to assess the ability of an insurer to meet claims, they may not be indicative of which insurer will provide the highest payout rate.

The payout rates for males are higher than females, which is consistent with expectations since males have shorter life expectancies. The difference in the payouts between males and females narrow, though, when a cash refund provision is included. For example, the average life-only payout rate for males (7.22%) is 5.20% higher than the average life-only payout rate for females (6.86%), but the average payout rate for males with a cash refund provision is only 3.22% higher. This is because a cash refund (or period certain) provision effectively reduces the duration of the contract.

Immediate annuity payout rates are generally constant, in nominal terms, which means they remain at the same dollar for the life of the annuity. It is possible to add

8. There have been instances when payouts for 10-year period certain annuities have been higher than life only annuities among certain providers.
9. https://www.cannex.com/

a cost-of-living adjustment (COLA), where the benefit would increase by some fixed percentage each year (e.g., 2%), although these are not typically used. For example, only 3.6% of CANNEX quotes in 2022 including any type of COLA. However, while it is possible to include a fixed COLA with an annuity (where payments increase by some predetermined amount per year), there are no companies currently offering a COLA feature where the income benefit increases explicitly with inflation. Social Security retirement benefits are the only longevity protected income strategy available today that is explicitly tied to inflation.

The vast majority of SPIAs are effectively irrevocable, whereby the annuitant permanently cedes the premium to the insurance company. However, it is technically possible to offer some type of "commutation" feature whereby the annuitant could access some or all of the initial premium. One strategy that is similar to a commutation provision that could be offered with a SPIA would be some type of ability for the annuitant to change their mind regarding the annuity purchase, for example where a refund of the premium was available for some period. These are also relatively uncommon today, though.

DEFERRED INCOME ANNUITY (DIA)

DIAs are very similar to SPIAs, but their income commences at a later age (e.g., age 80 if purchased at age 65) whereas the income for a SPIA commences immediately. DIAs where the income commences at relatively advanced ages are often referred to as "longevity insurance." DIAs purchased in qualified accounts which meet certain provisions may be classified as a qualified longevity annuity contract (QLAC) and therefore not be subject to required minimum distributions (RMDs). As of 2023, the maximum total QLAC contribution amount is $200,000, and there is no longer a percentage restriction due to the recently passed Secure Act 2.0 legislation.

DIAs are notably popular among retirement academics because they are widely considered to be the most efficient hedge against longevity risk. Given an uncertain lifespan, a DIA can create an "end age" for retirement planning, where at that point the role of the portfolio is minimized or potentially no longer even necessary. The lack of availability for an inflation-linked COLA for DIAs can make them riskier for retirees who require some minimum level of inflation-adjusted income.

Similar to SPIAs, cash refund provisions are common in DIAs, especially in DC-focused strategies, and cash refund provisions can significantly reduce the payout available. Exhibit 5 includes a number of quotes obtained from CANNEX on March 20, 2023 for various annuitant purchase ages (55 and 65) with various start ages (65 and 80) for a male and female annuitant with either life only or cash refund benefits.

Generally, the variation in payouts increases as the delay period increase. For example, the range in payouts for DIAs with a 25 year payment delay period is approximately 32% (Exhibit 5, Panel C), while the delay for 15 year (Panel A) and 10 year (Panel B) delays tends to be smaller.

While including a cash refund or period certain provision reduces payouts, it is generally less than would be suggested by actuarial tables alone. For example, the differences in the life only and cash refund payouts, especially for the more pronounced delay period (i.e., purchasing at age 55 where income commences at age 80, or 25 years later) are lower than would be implied from including the guarantee. This can be attributed to the adverse selection issues associated with individuals who are likely to choose a pure life-only DIA versus one with a cash refund—relatively healthy people would purchase a life-only DIA where income commences in 25 years, for example. This is an important pricing reality that may not be captured in an analysis that uses a theoretical annuity pricing model.

GUARANTEED LIFETIME WITHDRAWAL BENEFIT (GLWB)

A guaranteed lifetime withdrawal benefit" (GLWB) feature, also sometimes referred to as a "guaranteed minimum withdrawal benefit" or GMWB, is common in both variable annuities (VAs) and fixed indexed annuities (FIAs). We expect both products will be increasingly available as a contingent deferred annuity (CDA).

PANEL A: PURCHASE AT AGE 65, INCOME STARTS AT AGE 80

Gender	MALE		FEMALE	
Type	Life Only	Cash Refund	Life Only	Cash Refund
Avg Top 5	27.98	25.09	24.74	22.52
Max	29.71	28.78	25.97	24.54
Min	24.63	20.85	22.07	19.11
Max/Min%	20.62	38.04	17.71	28.41
Std Dev	1.41	2.13	1.15	1.56
Count	11	11	11	11

PANEL B: PURCHASE AT AGE 55, INCOME STARTS AT AGE 65

Gender	MALE		FEMALE	
Type	Life Only	Cash Refund	Life Only	Cash Refund
Avg Top 5	11.71	11.13	11.04	10.64
Max	12.06	11.42	11.52	11.06
Min	10.54	9.82	10.14	9.42
Max/Min%	14.42	16.30	13.59	17.41
Std Dev	0.47	0.51	0.42	0.46
Count	11	11	11	11

PANEL C: PURCHASE AT AGE 55, INCOME STARTS AT AGE 80

Gender	MALE		FEMALE	
Type	Life Only	Cash Refund	Life Only	Cash Refund
Avg Top 5	45.62	41.88	39.71	37.18
Max	48.50	47.31	41.86	40.41
Min	37.30	32.85	33.79	30.25
Max/Min%	30.03	44.00	23.88	33.58
Std Dev	3.38	3.80	2.55	2.89
Count	11	11	11	11

EXHIBIT 5. *Payout Rates for Deferred Income Annuities (DIAs)*

Source: *CANNEX as of March 20, 2023*

Introduced in the 2000s, GLWBs allow access to the contract value and guarantee a minimum level of lifetime income that could potentially increase even if the underlying account value goes to zero. This product type has arguably gained the most traction in the DC space where there have been a number of GLWB strategies available for over a decade.

The income level of a GLWB is based on the payout rate, also known as the lifetime distribution factor, to the income base. The payout rate is commonly based on the age of the annuitant at the time of the first withdrawal, or the younger of the two annuitants if it's a joint life GLWB. GLWB payout rates typically increase at older ages at varying increments and are typically higher for single versus joint annuitants. A common payout rate for a single annuitant with a GLWB at age 65 is typically around 5%. The benefit base is a type of "notional value" used to determine the income level. The benefit base is typically based on the greatest of the contract policy values at each anniversary dates.

Some GLWB products have additional valuation methods, such as guaranteed crediting rates, which guarantee minimum increases in the benefit base through time. For example, if a male retiree, age 65, invested

Year#	Gross Return	Net Return	Begin Contract Value	Begin Benefit Base	Income	End Contract Value
1	10.0%	8.5%	$100,000	$100,000	$5,000	$103,075
2	0.0%	-1.5%	$103,075	$103,075	$5,154	$96,452
3	10.0%	8.5%	$96,452	$103,075	$5,154	$99,059
4	0.0%	-1.5%	$99,059	$103,075	$5,154	$92,497
5	10.0%	8.5%	$92,497	$103,075	$5,154	$94,767
6	0.0%	-1.5%	$94,767	$103,075	$5,154	$88,269
7	10.0%	8.5%	$88,269	$103,075	$5,154	$90,180
8	0.0%	-1.5%	$90,180	$103,075	$5,154	$83,751
9	10.0%	8.5%	$83,751	$103,075	$5,154	$85,278
10	0.0%	-1.5%	$85,278	$103,075	$5,154	$78,923

EXHIBIT 6. *Income Example for a VA+GLWB for 10 Years*

$100,000 in a GLWB with a 5% payout rate, he would be guaranteed at least $5,000 per year for life even if the underlying contract value goes to zero. If the annuity portfolio value were to increase to $110,000 (on an anniversary date) the benefit base would "step up" to $110,000 and the guaranteed lifetime income amount would increase to $5,500 and stay at least that level for life, regardless of future performance. The benefit base, and corresponding income level, could subsequently increase if the portfolio value reached a new high on a future anniversary date, although the step up opportunities for become less likely once withdrawals begin.

Exhibit 6 includes an example of how the income would change over time for a GLWB attached to a variable annuity (VA) assuming a $100,000 initial contract value. The gross returns are assumed to alternate between 10% and 0% each year and the fee is 1.5%, which is assumed to be assessed against the contract value (effectively reducing the credited return). The initial payout for the GLWB is assumed to be 5.0%, which reflects existing market payout dynamics for a 65-year-old single annuitant.

While the income from the GLWB increases in the first year, there are no subsequent increases because the contract value never again reaches a new highwater mark. It is relatively common for GLWBs, where the probability of achieving a new highwater mark quickly approaches zero as the contract value is depleted by the annual distributions and the fees once distributions begin.

GLWB fees and provisions vary by provider and product-type. Since the rider is essentially a lifetime put option, if the fee associated with the GLWB rider didn't vary by equity allocation investors would be best served by investing in the most aggressive portfolio possible within the annuity. However, behavioral considerations may limit the desired risk exposure.

The investment options in GLWBs have changed over time. Whereas early GLWBs were primarily VAs with relatively unrestricted investment options, today VAs that offer GLWBs typically only allow a limited number of diversified portfolios once the income has commenced (e.g., a 60% equity portfolio).

GLWBs attached to VAs have fallen out of favor recently, with several providers exiting the business because of rising administrative costs, although the recent rise in interest rates could result in a resurgence in their popularity. For example, Munich RE (2021) released research estimating how the reinsurance cost of VA+GLWBs has

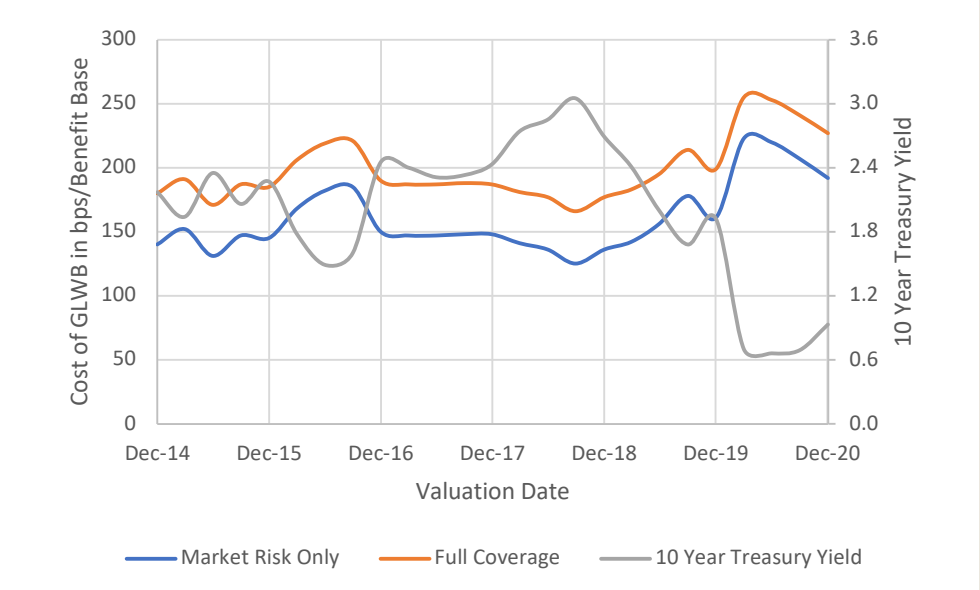


EXHIBIT 7. *The Cost of Reinsuring a VA+GLWB*

Source: *Munich RE (2021)*

changed from January 2000 to December 2020, which is included in Exhibit 7.[10] The yield on 10 year Treasury bonds has been included for reference purposes.

Munich RE has two potential cost estimates[11] and the cost of both has increased significantly, recently exceeding 200 bps—well above current fee levels, which tend to be 150 bps less. There is a relatively clear relationship where the costs are inversely related to bond yields and therefore the recent rise in rates has likely resulted in lower costs.

There have been two primary ways providers have responded to the new environment. The first is reducing the attractiveness of provisions for GLWBs attached to VAs (e.g., eliminating the frequency of the "step-up" provision), a product type I've characterized as "GLWB Lite" in a past article.[12] to the contract value only at retirement, and that is the value used to determine the lifetime income amount. While these GLWB lite products typically have lower fees, the reduced step-up approach can significantly dilute the expected income benefit.

The second has been the increased introduction of GLWBs on fixed annuities, which include both fixed annuities (FAs), which are annuities that pay a guaranteed annual return, or fixed indexed annuities. We include FAs that include GLWBs as a separate potential category because they represent a hybrid version of a SPIA and a VA+GLWB.

With a FA+GLWB there is typically some type of minimum fixed rate return, such as 3.0% and a fixed fee for the rider (e.g., 1.0% per year). Given the fixed nature of the credited return it is highly unlikely the benefit would ever increase after payments have commenced; howev-

10. https://fred.stlouisfed.org/series/DGS10
11. The "Market Risk Only" level of the RCI uses a reinsurance structure that provides similar risk protection to a complete market-risk hedging program covering all relevant greeks, while also reinsuring all cross-greeks and operational risks associated with a hedging program. The "Full Coverage" level of the RCI uses a reinsurance structure that transfers all material risks, including non-hedgeable risks such as behavior risk and basis risk (with the exception of post-claim longevity risk which is not transferred because the reinsurance claim is paid as a lump sum).
12. https://www.advisorperspectives.com/articles/2022/04/18/glwb-lite-lower-costs-but-much-worse-benefits

er, the initial payout for a FA+GLWB tends to be significantly higher than a VA+GLWB. For example, the payout rate for a 65-year old individual (payout rates for GLWBs are generally gender-neutral) for a FA+GLWB would be approximately 7.0% today, which is significantly higher than the payout rate for a VA+GLWB (which is around 5.0% or 5.5%).

The payout rates for a FA+GLWB are actually higher than the payout rates for SPIAs, especially those issued at younger ages (typically age 70 is the approximate breakeven), especially SPIAs that include some kind of cash refund provision (which are especially common). For example, the highest available SPIA payout for a 65 year old in Exhibit 4 is 6.83% and 6.73% for a male and female, respectively. This is lower than the FA+GLWB. In addition, the FA+GLWB offers complete liquidity and a guaranteed return. While many insurers may offer a commutation provision if some type of residual benefit is included with a SPIA (e.g., cash refund), the FA+GLWB would still be considered to economically dominate many SPIAs because it offers both a higher income benefit and complete liquidity.

While this might seem like a free lunch, the higher payouts can largely be attributed to expected lapsation, i.e., some portion of annuitants are expected to pay the annual rider fee but not realize an explicit benefit from the longevity protection. However, since the annual credited fee exceeds the rider fee (generally 3% and 1%, respectively), the internal rate of return from owning a FA+GLWB would not expected to be negative regardless of holding period. In other words, while the annuitant could almost definitely make money if the FA+GLWB is not held for life on a relative basis, it's not really possible to lose money on an absolute basis.

Additionally, GLWBs do not typically qualify for exclusion ratio taxation like with SPIAs. With exclusion ratio taxation any gains are effectively amortized over the life expectancy of the annuitant, while GLWBs are typically subject to "worst in, first out" (WIFO) taxation, in which all gains are taxed first. This could be especially valuable for someone with a large unrealized gain in an annuity (but is less valuable for someone seeking immediate income).

PROTECTED LIFETIME INCOME BENEFIT (PLIB)

In response to GLWBs (especially VA+GLWBs) falling out of favor among some insurers, new products are being introduced where the guaranteed income amount "evolves" during the payout phase based entirely on the returns of the account. We refer to this product as a "protected lifetime income benefit" (PLIB).

PLIBs are similar to VA+GLWBs, where the annuitant has access to the contract throughout retirement, but the income benefit varies each year based on the credited performance of the account for the previous year (which is generally net of fees). For example, if the PLIB income amount in a given year was $10,000 and the net return of the account for the prior period was +20%, the income level would increase by 20% to $12,000. The income from a PLIB continues even if the initial premium is fully depleted as long as the annuitant is still alive. The payout structure for the PLIB included in this analysis is structurally equivalent to an immediate variable annuity with an assumed interest rate (AIR) of 0% that is fully revocable.

Exhibit 8 provides an example of how the income would change over time for a PLIB assuming a $100,000 initial contract value. The gross returns are assumed to alternate between 10% and 0% each year and the fee is 1.5%, which is assumed to be assessed against the contract value (effectively reducing the credited return). The initial payout for the PLIB is assumed to be 4.5%, which is lower than the initial assumed VA+GLWB payout of 5%. The initial income level is higher for the VA+GLWB ($5,000 versus $4,500); however, by the end of the 10-year test period the PLIB income level is higher ($6,370 versus $5,154). This can primarily be attributed to the positive average return over the period (5% gross and 3.5% net).

With the PLIB, the income level changes annually based on realized returns, increasing in years with positive net returns and decreasing in years with negative net returns. The PLIB structure generally provides more upside than a VA+GLWB, since increases in income are based entirely on account performance and do not have to overcome distributions. However, the annuitant is going to have more downside as well, since,

Year#	Gross Return	Net Return	Begin Contract Value	Income Change	Income	End Contract Value
1	10.0%	8.5%	$100,000	n/a	$4,500	$103,618
2	0.0%	-1.5%	$103,618	8.50%	$4,883	$97,254
3	10.0%	8.5%	$97,254	-1.50%	$4,809	$100,303
4	0.0%	-1.5%	$100,303	8.50%	$5,218	$93,658
5	10.0%	8.5%	$93,658	-1.50%	$5,140	$96,042
6	0.0%	-1.5%	$96,042	8.50%	$5,577	$89,109
7	10.0%	8.5%	$89,109	-1.50%	$5,493	$90,723
8	0.0%	-1.5%	$90,723	8.50%	$5,960	$83,492
9	10.0%	8.5%	$83,492	-1.50%	$5,871	$84,219
10	0.0%	-1.5%	$84,219	8.50%	$6,370	$76,682

EXHIBIT 8. *Income Example for a PLIB for 10 Years*

unlike a VA+GLWB, a PLIB doesn't have minimum income floor. This can create a more complex process to determine the optimal portfolio allocation for a PLIB and VA+GLWB, where it typically makes sense to take the maximum level of risk allowed. In contrast, a more balanced allocation (e.g., 50% equities) is likely more optimal within a PLIB structure given the implications on income variability.

One common concern with the PLIB structure is the potential income variability during retirement. While an important consideration, potential variability needs to be placed in a more holistic context, including the fact that most retirees already receive some type of fixed guaranteed lifetime income in the form of a public pension or Social Security. Therefore, the implications of the income variability for the PLIB should be considered in this context, in addition to other types of longevity protected income which are relatively certain and to some extent represent a compromise between fully fixed guaranteed income (e.g., a SPIA) and self-funding with a portfolio (which offers no explicit longevity protection).

The PLIB structure is not new. Indeed, one of the oldest PLIB products is a tontine—an annuity structure devised in the 17th century where annuitants share in a pool's investment and mortality experience. With a tontine, not only would the investment performance affect the income level, but so too would mortality experience. While mortality experience is not assumed to impact the income payments of PLIBs in this analysis, future PLIB products could incorporate this feature as well, which should both increase income levels but also potential income variability.

DELAYED CLAIMING OF SOCIAL SECURITY BENEFITS

Few financial planning decisions are more widely touted by retirement academics as delay claiming of Social Security retirement benefits. When discussing strategies to increase guaranteed income levels for retirees in a DC plan, delayed claiming is not often considered because it is not a product per se; however, providing guidance on delayed claiming, as well as pursuing strategies to actively encourage delayed claiming is something a plan sponsor could explicitly offer (e.g., a sleeve in the default option, such as a target-date fund).

The mechanics behind delayed claiming are reviewed in this section. An individual can claim Social Security retirement benefits as young as age 62 and receives an

Claiming Age	Benefit	% Increase vs Age 62
62	$700	0%
63	$750	7%
64	$800	14%
65	$867	24%
66	$933	33%
67	$1,000	43%
68	$1,080	54%
69	$1,160	66%
70	$1,240	77%

EXHIBIT 9. *Monthly Social Security Retirement Benefit by Claiming Age*

Source: *Social Security Administration*

increase in the lifetime income amount for each year he or she delays claiming benefits up to age 70. There is no benefit to claiming benefits after age 70.

Exhibit 9 provides context about how the monthly Social Security retirement benefits would evolve based on a $700 monthly benefit at age 62.

An individual who claims benefits at age 70 would receive a lifetime income benefit that is approximately 77% higher than if benefits are claimed at age 62. While the increase in benefits is significant, the individual would have to fund income from the ages of 62 and 70, respectively. If the individual were to pass away during the period the foregone benefits of delayed claiming would be lost (ignoring any kind of spousal survivor benefit). Therefore, while delayed claiming is generally considered economically advantageous, it is by no means a "free lunch."

There are several items that push the benefits of delayed claiming into the retiree's favor. For example, Social Security benefits are not adjusted based on the current bond yield environment, unlike most other insurance and investment products. This means that while the payout rates on immediate annuities change with interest rates, the benefits associated with delayed claiming Social Security retirement benefits have effectively remained constant.

Social Security retirement benefits are explicitly linked to inflation, specifically the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W), which is calculated by the Bureau of Labor Statistics.[13] There are no annuities available today which offer a guaranteed lifetime income benefit directly linked to inflation (as noted previously), although some annuities, including a PLIB, have a higher likelihood of a benefit increase.

A retiree interested in generating an increasing amount of guaranteed income could purchase a SPIA with a fixed COLA level. While a fixed increase is very different than an income benefit explicitly tied to inflation, including a COLA can significantly reduce the initial payout rate for a SPIA.

13. https://www.ssa.gov/oact/cola/latestCOLA.html

ANNUITY DISCOUNT RATE	ANNUITY COLA RATE 0%	1%	2%	3%	4%
0%	4.10%	3.57%	3.09%	2.66%	2.27%
1%	4.66%	4.10%	3.58%	3.10%	2.67%
2%	5.26%	4.66%	4.10%	3.58%	3.11%
3%	5.88%	5.25%	4.65%	4.10%	3.59%
4%	6.53%	5.87%	5.24%	4.65%	4.10%
5%	7.19%	6.50%	5.85%	5.23%	4.64%
6%	7.87%	7.16%	6.48%	5.83%	5.21%
7%	8.56%	7.83%	7.13%	6.45%	5.81%
8%	9.26%	8.52%	7.79%	7.10%	6.43%

EXHIBIT 10. *Estimated Annuity Payout Rates for Different Discount Rates and Annuity COLA Rates Based on a Life Only Annuity for a 65-Year Old*

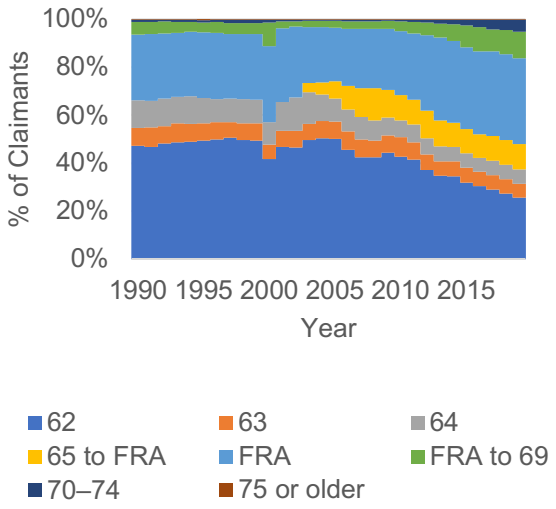
Exhibit 10 provides some context about how estimated payout rates for an immediate annuity would vary assuming a life only annuity based on gender-neutral pricing (Social Security benefits do not vary by gender) for a 65-year-old based on a model fit to actual historical payout rates (based on data from CANNEX) for various discount rates and assumed cost-of-living adjustments (COLAs).

Lower interest rates increase the potential benefit associated with delayed claiming, and vice versa. For example, if we assume a 0% COLA, the payout for an immediate annuity is 5.88% if interest rates are 3% versus 7.19% if interest rates are 5%. Therefore, higher interest rates result in more income from annuities while they have no effect on Social Security retirement benefits (other than potentially some residual impact based on inflation levels). Higher assumed inflation, as proxied through the assumed COLA, also increase the potential benefit of delayed claiming.

The average age for claiming Social Security benefits has been increasing over time, which suggests retirees have increasingly become aware of the potential benefits associated with delayed claiming. This effect is demonstrated in Exhibit 11, which includes information about the distribution of claiming ages (Panel A) and the average claiming age (Panel B) of males from 1990 to 2019 based on data from the Social Security Administration.

One reason claiming ages have increased over period is because the "full retirement age" for benefits has increased over the period, from age 66 for those born between the years of 1943 and 1954, and increasing to age 67 for those born in 1960 or later, with two month increases for each year in between. Consequently, the "cost" associated with claiming at age 62 has been increasing, as explored by Mastrobuoni (2009). The potential benefits associated with delayed claiming vary by household. Individuals who are in poor health would receive the higher delayed benefit for a shorter period of time), although

PANEL A: DISTRIBUTION OF CLAIMING AGES



PANEL B: AVERAGE CLAIMING AGE

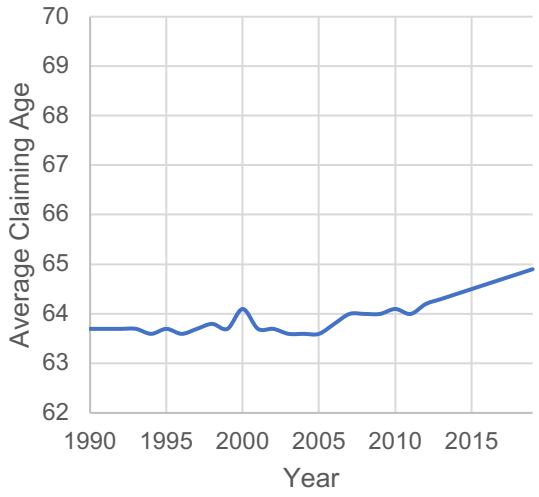


EXHIBIT 11. *Male Retirement Benefit Claiming Decisions: 1990-2019*

Source: *Social Security Administration*

it could still make sense for them to delay claiming benefits because of the spousal survivor benefit.

There are two potential shortfalls to delayed claiming of Social Security benefits versus other strategies. First, the decision is effectively irrevocable. While each retiree has the option to withdrawal benefits once for a 12-month period, once the decision to claim has been made, it is effectively final like a SPIA. Second, unlike a SPIA, there is no type of "money back" provision if you die early during the claiming period. As noted previously, cash refunds and period certain features are common with SPIAs, but Social Security is effectively a life-only annuity. This creates a behavioral barrier compared to other approaches which provide a higher residual guarantee should death happen earlier in retirement.

Delayed claiming and allocating to an annuity are not necessarily mutually exclusive. For example, many retirees would likely benefit from both delayed claiming as well as purchasing additional longevity protected income. However, funding the retirement income benefit during the delay period has the potential to exhaust savings for many DC participants. Therefore, the decision to delay claiming should also be made in the context of existing savings, especially since retirees should typically have some amount in cash for emergences equal to twice the total retirement income goal.

It bears underscoring that plan sponsors who actively encourage DC participants to set aside funds to delay claiming Social Security benefits create choices around the final decision to annuitize. While a participant building a reserve fund to delay claiming Social Security would not be explicitly benefiting from a mortality component over time, mortality credits are typically relatively small under the age of 65, and the participant may decide another type of guaranteed income is more attractive, or not even necessary, based on how their economic situation evolves up until retirement.

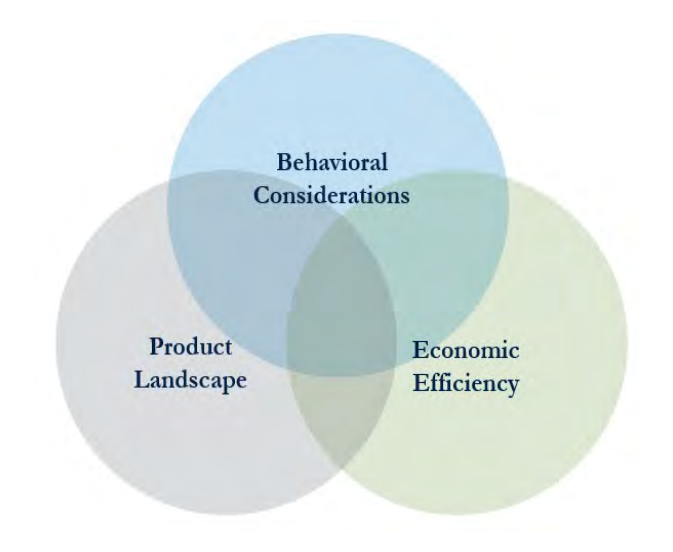


EXHIBIT 12. *The "Optimal" Annuity*

DEFINING THE "OPTIMAL" ANNUITY

Historically, most Americans annuitize relatively little wealth at retirement despite consensus among economists that holding retirement assets in an annuity structure is more efficient than an investment portfolio (Benartzi, Previtero, and Thaler (2011). The avoidance of annuities by Americans was dubbed the "annuitization puzzle" by Franco Modigliani (1986) in his Nobel Prize acceptance speech. The lack of a transition from accumulation to efficient decumulation has been cited as a primary deficiency of the defined contribution system compared to the tradition defined benefit pension (Bodie, Marcus, and Merton 1988).

This lack of annuitization is important context when attempting to determine the "optimal" annuity for an individual participant, as well as an entire DC plan. Research on annuitization has largely focused on the economic benefits of a given strategy (e.g., should the retiree annuitize), which ignores the general preferences of retirees and the actual product landscape. Therefore, an analysis to determine the truly "optimal" annuity would require actively considering these separate domains, and effect illustrated in Exhibit 12.

It is unlikely a single product could be considered optimal across all three domains. For example, while DIAs are often described as the most economically efficient annuity (especially by retirement academics), there are a significant number of product and behavioral considerations that should be considered before selecting the product for a plan, which will be discussed in greater detail next.

Annuity payouts reflect the profile of the individuals who purchase them, so there can be notable differences in the mortality attributes of annuitants across products affecting their relative efficacy. We demonstrate this effect regarding mortality in Exhibit 13, which includes data on mortality rate experience in the Society of Actuaries 2009-2013 Individual Payout Annuity Mortality Experience Report[14] for deferred and immediate annuities, and the Ruark 2018 Variable Annuity Industry Mortality Experience Study[15] for variable annuities.

14. https://www.soa.org/resources/experience-studies/2016/2009-13-invidual-payout-annuity/
15. https://ruark.co/ruark-consulting-releases-variable-annuity-mortality-study-results/

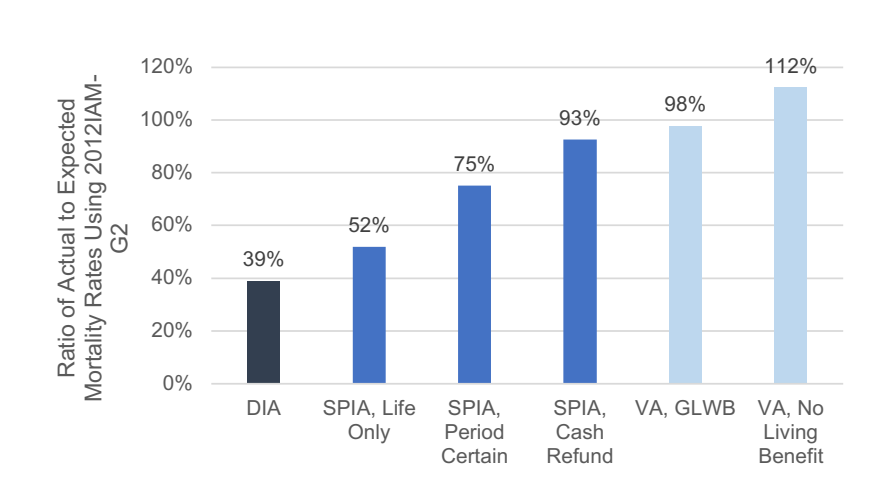


EXHIBIT 13. *Ratio of Actual to Expected Mortality Rate Experience for Various Annuity-Types*

Source: *Society of Actuaries, Ruark Consulting*

There is a relatively monotonic relationship between the ratio of actual and expected mortality experience and the "commitment" with respect to annuitization among the products included in Exhibit 13. For example, individuals who have purchased DIAs have tended to be the healthiest (i.e., have the lowest ratio of actual to expected mortality rates) while individuals who purchase GLWBs have been the least healthy. These differences in mortality experience are going to affect income levels, since payments are expected to last longer for DIAs than VA+GLWBs, on average.

While defaulting participants in a DC plan into any form of an annuity has the potential to reduce adverse selection effects, something explored by Blanchett and Finke (2022), the decision to annuitize savings is typically still up to each participant. Therefore, while adverse selection effects may be reduced by including an annuity as part of the default investment, they remain, which has important implications on pricing (or relative value)

The expected value of an annuity can be estimated using a concept commonly referred to as the "money's worth ratio." Blanchett and Nikolic (2022) analyze the historical pricing variability for income annuities with delay periods from zero year (i.e., an immediate annuity) to 20 years (e.g., a DIA), using historical quotes from March 2013 to August 2021. Their analysis finds that while base mortality assumptions appear to be relatively consistent across delay periods, averaging approximately a two-year modal shift in life expectancies, the impact of a two-year shift in life expectancy for an annuity with 20-year delay has significantly greater pricing implications than an immediate annuity given the structure of the payments (i.e., they are significantly backloaded). They estimate the implied load on a SPIA to be approximately 3.4% (i.e., the average annuitant actually gets 96.6% of the premium back in payments, on average), while the average load for a DIA is closer to 11.9%. In other words, DIAs appear to offer slightly less income, on a total economic value basis compared to SPIAs.

Insurance providers' competitiveness varies over time for different products. In their analysis of the variation in SPIA payout rates based on CANNEX data (2021), Blanchett, Finke, and Nikolic find that the average payout rate is approximately four percentage points less than the highest available rate on the platform, and the transition from highest (best) to lowest (worst) payout is relatively random over the period. In other words, insur-

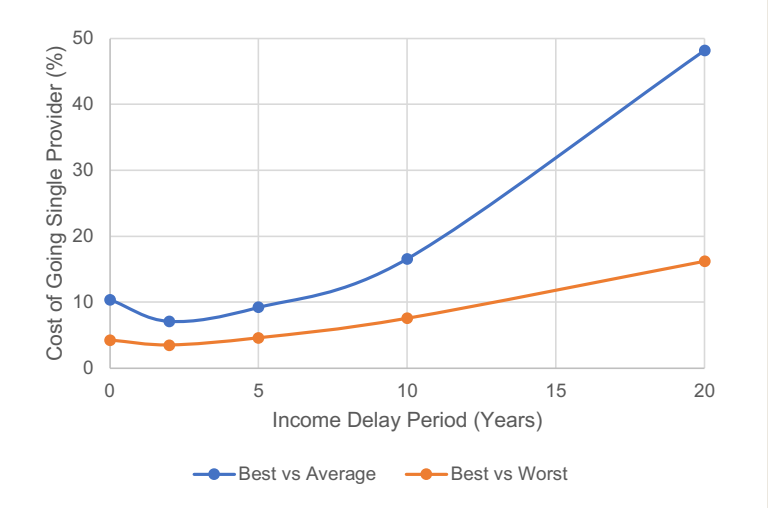


EXHIBIT 14. *Average Difference in Payout versus the Highest Payout by Income Delay Period*

Source: *Blanchett and Nikolic (2023)*

ers clearly seem to favor SPIAs at varying points in time, offering relatively competitive quotes at some points in time and then offering relatively uncompetitive quotes at other points in time. In an update that includes DIAs, Blanchett and Nikolic (2023) find an even greater variation in payouts, especially as the delay period for the DIA increases.

Exhibit 14 demonstrates that the cost of selecting a single annuity provider, defined as the payout that would be received versus had a more competitive marketplace been used, increases dramatically as the delay period increases. This suggests selecting a single provider, or relatively few providers, could result in payout rates that are significantly lower than a solution where it's possible to select the best payout among competing providers. Therefore, it is important to conduct ongoing due diligence on provides offered in a DC plan.

Individuals' decisions impact annuity pricing, especially for products where an annuitant may pay for a potential benefit and then cancel the policy before the benefit can expected to be realized. This issue is most important for annuities with optional income benefits, such as GLWBs or PLIBs, but can also be important for products that are purchased in the accumulation phase if the income benefit is never activated for, say, GLWBs. Many annuitants who purchase a GLWB may cash in the policy before fully realizing benefits, known as lapsation. This could be a particular concern if the product is used within a default investment structure, since many participants can end up allocating to the product without realizing exactly how it works (or what they are paying for).

There can also be notable differences in the appeal of various annuity structures to retirees. For example, the irrevocable aspect of buying a SPIA or a DIA (or delaying claiming Social Security benefits) is likely to be unattractive to many retirees. In a survey among DC participants between the ages of 50 and 70, Blanchett and Finke (2022) ask[16] about which type of guaranteed lifetime income product sounds most appealing by describing the attributes (versus naming them directly) of a SPIA, DIA, or GLWB. The favorability selections were 46%, 12%, and 42%, respectively. This suggests a clear behavioral bias against DIAs.

16. The specific survey question is included in Appendix 1.

PANEL A: LEVEL OF PLAN SPONSOR COMMITMENT	
LOW	Provide general guidance and education around the benefits of claiming Social Security benefit. This could include allocating monies as part of the default investment into some type of liquid (unallocated) sleeve that could be eventually used to purchase an annuity.
MODERATE	Making an annuity window available for participants who want to use it. This will likely result in very low uptake, but allows a plan sponsor to "check the box" in terms of availability of an in-plan solution.
HIGH	Including some type of annuity as part of a default investment. Note, the allocation method here is important, whereby a target-date fund may be riskier than an approach that can determine a more personalized allocation (such as managed accounts).
PANEL B: LEVEL OF PARTICIPANT COMMITMENT	
LOW	Have money set aside to eventually purchase an annuity at retirement, or delay claiming Social Security, where the monies are not allocated to any specific product.
MODERATE	Revocable strategy such as GLWB or PLIB
HIGH	Allocating to a SPIA or DIA pre-retirement without any type of commutation provision

EXHIBIT 15. *Commitment Levels and Optimal Strategies*

While we perform a quantitative analysis across various annuities in the following section, the qualitative aspects of selection process (reviewed briefly in this section) are perhaps equally, if not more important. It doesn't matter how "optimal" or "efficient" a given product is if few participants use it correctly, or as intended.

A FRAMEWORK FOR SELECTING THE OPTIMAL GUARANTEED INCOME STRATEGY

This section of the paper summarizes some of the key differences between the various annuitization options available to plan sponsors so they can determine which best meets their needs.

Given the additional complexities associated with annuities, and since annuities are not designed to be wealth maximizing like other forms of insurance, a plan sponsor should generally ensure that the plan is "retirement friendly" before actively incorporating a longevity protected income solution. This includes offering a variety of distribution options (e.g., allowing partial withdrawals), plenty of retirement-focused funds, and access to advice.

Plan sponsors who remain interested in adding an annuity to a DC plan have a number of different considerations to weigh. The optimal annuity is likely to vary for each plan based on the unique situation and preferences of the plan sponsor, participants, etc.

One way to determine the right approach would be to consider the desired level of commitment to a strategy by either the plan sponsor or participant. While some plan sponsors may be interested in including some type of longevity protected product, the level of commitment is likely to vary. Additionally, the desired level of commitment a plan sponsor wants among participants may vary as well. We provide context on three different commitment tiers (low, moderate, and high) for plan sponsors and participants in Panel A and Panel B of Exhibit 15, respectively.

When using commitment as a way to segment options, it's interesting that the approach that requires the lowest commitment, including the delayed claiming of Social Security benefits, is also the best from an economic value perspective because it resulted in the highest economic values among the strategies considered. For

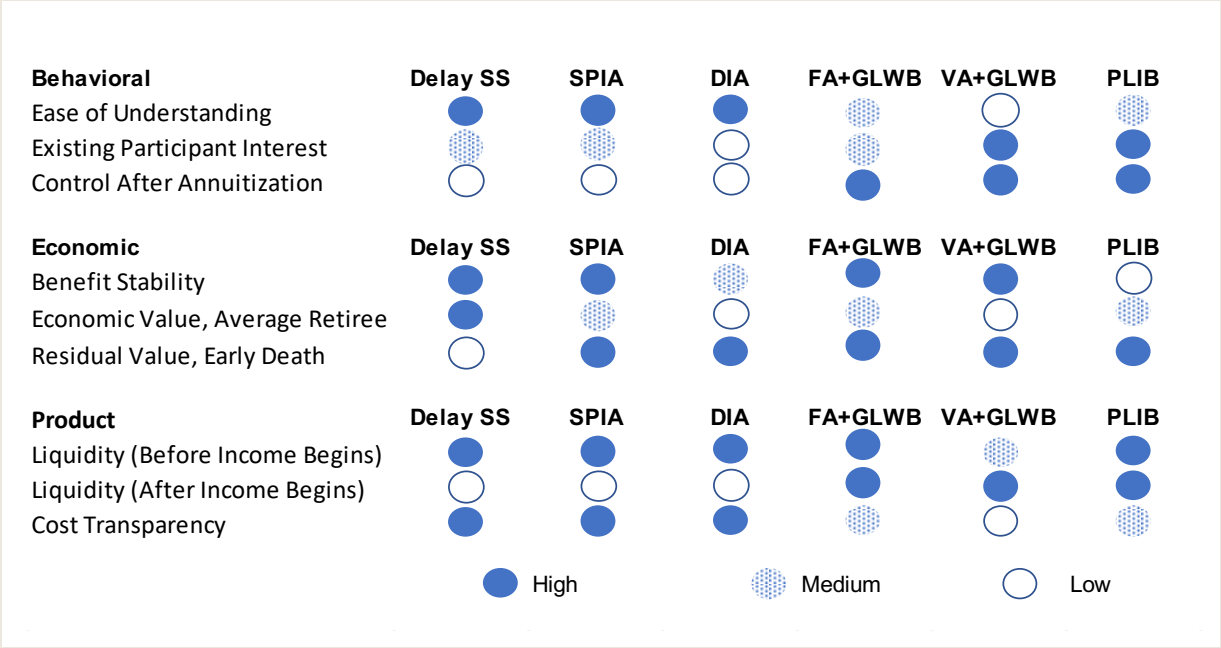


EXHIBIT 16. *Attractiveness Across Dimensions, Specific Factors*

example, plan sponsors who are interested in higher levels of commitment, both for themselves and participants, could consider embedding a DIA as part of the default investment. Alternatively, a plan sponsors who are interested in a relatively low level of commitment, both for themselves and participants, could consider creating some of unallocated sleeve within a target-date fund that targeted towards helping the participant delay claiming Social Security retirement benefits. These are obviously two very different potential courses that imply very different commitment levels.

Next, we rank the respective strategies across the economic, behavioral, and product dimensions introduced previously (in Exhibit 12) for specific factors, with the results included in Exhibit 16.

The grades in Exhibit 16 are obviously somewhat subjective and are based on the current pricing environment (which could obviously change). For example, SPIAs and DIAs are graded as relatively attractive from a cost transparency perspective versus a VA+GLWB which receives the lowest score. This is based on the simplicity associated with determining the quality of the expected income benefits. With a SPIA the payout rates from the providers can easily be compared. Alternatively, payout rates from a VA+GLWB are only one part of the product, which need to be assessed in their entirety.

CONCLUSIONS

While DC plan sponsors are increasingly focused on keeping participants in the plan post-retirement, there are a variety of perspectives on what it takes to make a DC plan retirement friendly. Annuities or other products that provide protected lifetime income are under increasing consideration by plan sponsors as one way to simplify the retirement income generation process for participants and explicitly protect retirees from longevity risk.

Determine the most appropriate annuity to include in a DC plan requires a plan sponsor to weigh a variety of considerations. We find that it is unlikely that there will be a single product or strategy that is going to work

all DC plans, given the notably different product (and benefit) structures and varied preferences among plan sponsors. Therefore, it is important to understand the goals of the plan, the participants, and product landscape in their entirety before selecting an approach and staying abreast of market developments to ensure whatever strategy selected remains the best fit for a given DC plan and its participants.

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