



CANNEX RESEARCH

Historical Pricing Variability in Immediate and Deferred Income Annuities

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Contents

Introduction 1

DIAs, Like SPIAs, but Better? 2

Dataset 4

Variation in Payouts Over Time 5

Economic Value Differences..... 7

Conclusion 11

References 12

Exhibits

Exhibit 1 Payout Rates for Various Income Annuities..... 3

Exhibit 2 Number of Insurance Companies Providing Quotes by Delay Period for a 65 Year Old 4

Exhibit 3 Range in Life Only SPIA Payout Rates for a 65-Year-Old Male 5

Exhibit 4 Variation in SPIA Payouts 6

Exhibit 5 Range in Payout Rates Over Full Period of Analysis 7

Exhibit 6 The Economic Value of Annuities by Delay Period 8

Exhibit 7 Average Implied Gompertz Shift in Annuity Pricing 10

INTRODUCTION

Deferred income annuities (DIAs) are especially popular among retirement academics given their relatively explicit hedge against longevity risk. This paper explores historical pricing considerations of single premium immediate annuities (SPIAs) and DIAs using a dataset of 55,000 bi-weekly annuity quotes from March 2013 to July 2022 provided by CANNEX.

We note considerable variation in the payout rates over the period among insurers, which has increased in 2022 along with the sharp rise in bond yields. The range in payout rates tends to increase as the delay period increases. For example, the variation in single premium immediate annuity quotes has been approximately 10% over the entire period while the variation in DIA quotes with 20 year delay terms has been closer to 50% (i.e., five times as great). This suggests the ability to get best available pricing (i.e., shop around) is especially important for DIAs.

The analysis suggests while there is an economic cost to purchasing an income annuity, which is anticipated since the expected value of insurance should be negative on average, the cost is relatively small. The economic value of income annuities tends to decline as the delay term increases; however, this decline can be largely mitigated through constantly seeking best available pricing.

Overall, this analysis suggests the efficacy of DIAs is likely to be materially affected by the competitiveness of the respective quote. Selecting a single provider for a long-term strategy employing income annuities may result in payout rates that are less competitive than an approach that ensures ongoing best pricing.

With recent considerable increase in variation of payouts among insurers, the importance of shopping around is further exaggerated.

DIAs, LIKE SPIAs, BUT BETTER?

With a SPIA, a lump sum is irrevocably transferred to an insurance company, which promises to pay the annuitant (or annuitants if the payment schedule is 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).

Immediate annuity payout rates are generally constant, in nominal terms, which means they remain at the same dollar value for the life of the annuity. It is possible to add a cost-of-living adjustment (COLA), where the benefit would increase by some fixed percentage each year (e.g., 2%), although these are relatively uncommon. For example, according to CANNEX (2022) only 1.9% of quotes in 2021 included any type of COLA. It is worth noting that 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 (e.g., CPI). While these products existed in the past, none are currently available today. Social Security retirement benefits are the only longevity protected income strategy available today that are explicitly tied to inflation.

DIAs are very similar to SPIAs; however, with a DIA the income starts at some later age (e.g., age 80 if purchased at age 65) versus a SPIA where the income begins immediately. Certain DIAs where the income commences at relatively advanced ages (e.g., age 80) 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 2022, the maximum total QLAC contribution amount is \$145,000 or 25% of the account balance, whichever is less. Recent legislation has explored increasing or eliminating these allocation limits altogether.

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 of the inflation-linked COLA for DIAs can make them riskier for retirees who require some minimum level of inflation-adjusted (real) income.

DIAs are notably popular as they are considered the most efficient hedge against longevity risk.

HISTORICAL PRICING VARIABILITY IN IMMEDIATE AND DEFERRED INCOME ANNUITIES

Despite the wide interest in DIAs, sales remain relatively low, representing only approximately \$2 billion of the approximately \$250 billion in total annuity sales in 2021¹.

Exhibit 1, below, includes a number of quotes obtained from CANNEX on September 8, 2022 for 65 year olds for a male and female annuitant with either life only or cash refund benefits that either start immediately (Panel A) or in 15 years, at age 80 (Panel B).

Exhibit 1: Payout Rates for Various Income Annuities

Panel A: Purchase at Age 65, Income Starts at Age 65 (SPIA)

Type	Male		Female	
	Life Only	Cash Refund	Life Only	Cash Refund
Avg Top 5	6.93	6.51	6.63	6.28
Max	7.07	6.79	6.80	6.52
Min	5.38	4.85	5.09	4.67
Max/Min%	31.31	40.11	33.54	39.53
Std Dev	0.43	0.49	0.42	0.47
Count	20	18	20	18

Panel B: Purchase at Age 65, Income Starts at Age 80 (DIA)

Type	Male		Female	
	Life Only	Cash Refund	Life Only	Cash Refund
Avg Top 5	25.44	22.47	22.58	20.33
Max	26.31	24.86	23.39	22.39
Min	21.09	17.60	18.76	16.05
Max/Min%	24.75	41.25	24.68	39.50
Std Dev	1.50	1.98	1.41	1.69
Count	11	11	11	11

Source: CANNEX Financial Exchanges Limited

As expected, payout rates are higher for annuities that have delayed start ages (i.e., DIAs), males (who tend to have shorter life expectancies), and for life only quotes. There is considerable variation in the quotes, where the highest payouts (i.e., the maximum) is 30% more than the lowest (i.e., the minimum).

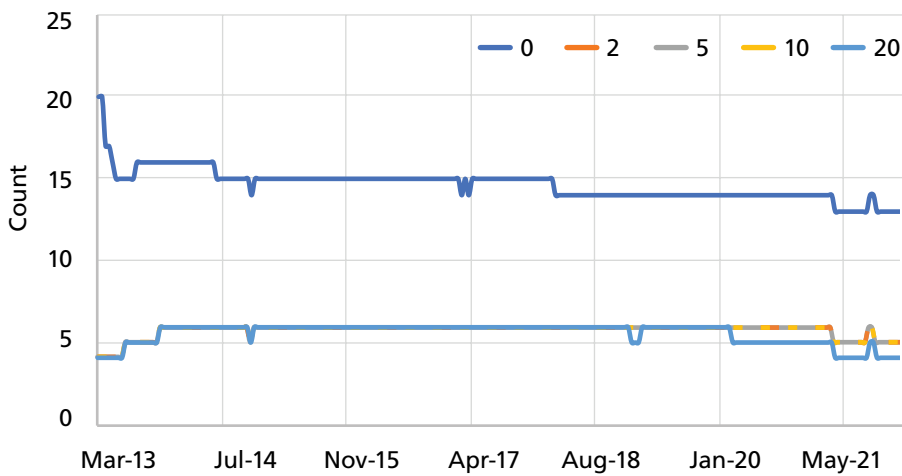
In previous research Blanchett, Finke, and Nikolić (2021) explored how competitiveness of single premium immediate annuities changed from November 2013 to August 2020. Here, we extend the period of analysis through the first half of 2022 and expand the analysis to incorporate income annuities with various delay periods (i.e., deferred income annuities).

¹ <https://www.limra.com/en/newsroom/news-releases/2022/secure-retirement-institute-total-annuity-sales-jump-16-in-2021--marking-highest-sales-since-2008/>

DATASET

Data for this analysis comes from CANNEX, an independent research and analytics business that provides an online marketplace for annuities both in the U.S. and Canada. The dataset includes bi-weekly life-only annuity payout rates for 38 U.S. insurance companies from March 3, 2013 to July 10, 2022 (246 dates). The number of insurers on the CANNEX platform varied in this period and we summarize that for the relevant annuities in Exhibit 2, below.

Exhibit 2: Number of Insurance Companies Providing Quotes by Delay Period for a 65 Year Old



Source: CANNEX Financial Exchanges Limited

We are particularly interested in four potential payment delay periods: two years, five years, 10 years, and 20 years. Even though in our dataset we have income purchase and start ages from 45 to 85, in five-year increments and where delay periods are not available for each age, we focus primarily on annuities that would be purchased by a 65 year old, although we do provide some context around economic values for different start ages for SPIAs later in the paper.

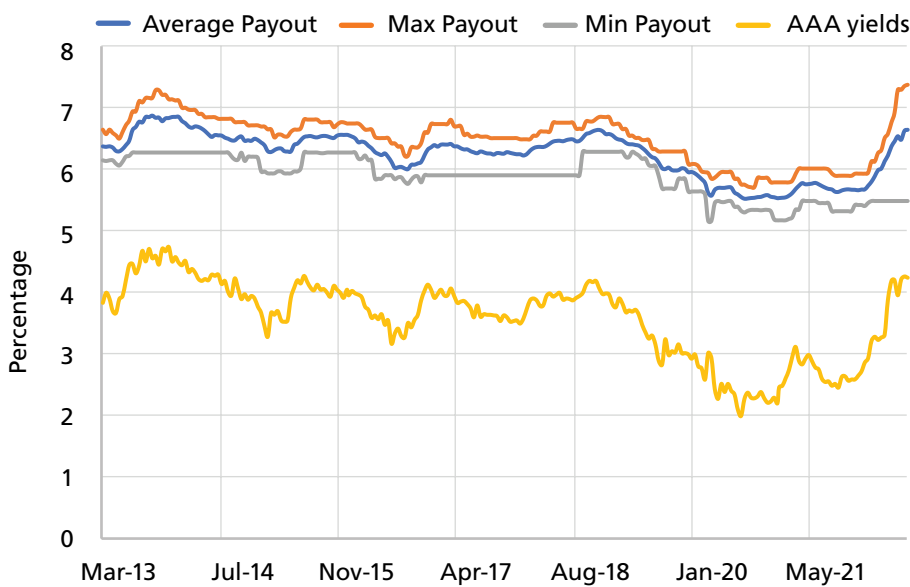
The analysis focuses entirely on immediate annuities with life only payouts (i.e., does not consider period certain or cash refund provisions). While only 11.2% of the 614,468 quotes at CANNEX (2022) were life only (i.e., virtually all included some type of potential residual benefit upon death), we choose to focus only on annuities with life only payouts to increase our opportunity set, especially for different delay periods. In the future, we hope to update the analysis to include (or focus entirely) on products with cash refund or installment refund provisions. The premium for the annuities considered for the analysis is always \$100,000.

VARIATION IN PAYOUTS OVER TIME

Exhibit 3, below, provides insight into how the payout rates have evolved over the period of analysis. The minimum average payout rate among those available was 5.53% on August 16, 2020 and the maximum average payout was 6.87% on September 29, 2013. As of July 10, 2022, the average payout was 6.65%. The Moody's Seasoned Aaa Corporate Bond Yield² is included in Exhibit 3 for reference purposes.

Quotes are highly correlated with interest rates, but their variation not much at all.

Exhibit 3: Range in Life Only SPIA Payout Rates for a 65-Year-Old Male



Source: CANNEX Financial Exchanges Limited, Federal Reserve Bank of St. Louis.

The variation in quotes has changed over time but is highly correlated to interest rates, with a full period correlation of .96. There hasn't really been any relationship between the level of variation and interest rates over the period, especially before 2022 (i.e., the range between the maximum and minimum quotes hasn't really been higher or lower).

As we demonstrate in the Exhibit 4, page 6, though, the recent rise in interest rates has led to a dramatic increase in the range of payout rates (i.e., dividing the maximum payout by the minimum payout) that is unprecedented over the period of the analysis. This phenomenon has been noted previously by Charupat, Kamstra, and Milevsky (2016) where some insurers are slower to react to the change in interest rates.

² <https://fred.stlouisfed.org/series/DAAA>

Exhibit 4: Variation in SPIA Payouts



Source: CANNEX Financial Exchanges Limited

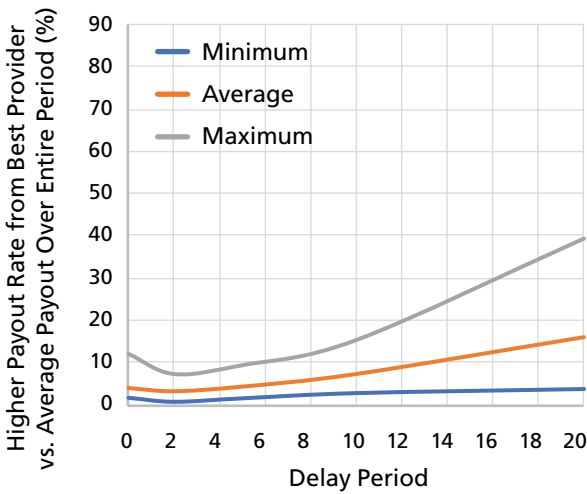
The median and average variability over the entire period has been approximately 10%; however, the variation was 33.7% on July 10, 2022, which is more than three times the historical average, with a minimum payout rate of 5.5% and a maximum payout rate of 7.35%.

This recent spike in quote variability has incredibly important implications for financial advisors, retirees, DC sponsors, and really anyone interested in potentially using SPIAs to generate retirement income for their clients. There is a clear “risk” involved in working with a single (or relatively few) provider(s) in that doing so could lead to dramatically less guaranteed income than if a larger number of providers were considered. For example, by selecting only a few providers to make available to participants it is possible that a plan sponsor could inadvertently dramatically reduce the amount of guaranteed lifetime income a participant could receive in retirement.

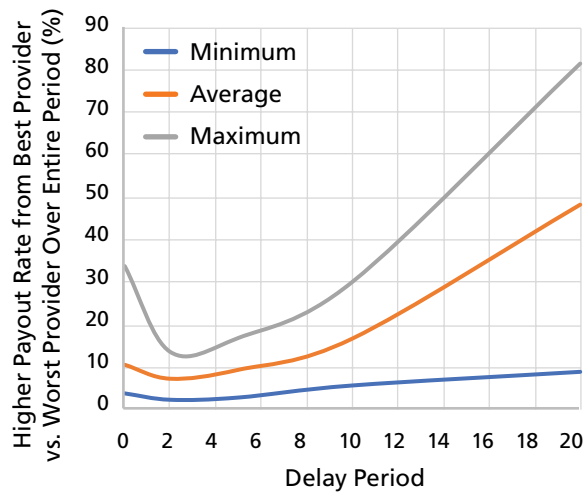
In Exhibit 5, page 7, we provide some context around the variation in payout rates, either comparing the best quote to the average quote (among all companies providing quotes) for the entire period in Panel A, as well as the best quote to the worst quote in Panel B.

Exhibit 5: Range in Payout Rates Over Full Period of Analysis

Panel A: Best Payout vs Average Payout



Panel B: Best Payout vs Worst Payout



Source: CANNEX Financial Exchanges Limited, Authors' Calculations

There is a relatively clear effect that as the delay term increases the variation in quotes increases dramatically. While the average variation in the best SPIA (i.e., a zero year delay) quote versus the worst SPIA quote was averaging 10% (Panel B), the variation for DIAs with a 20 year delay period was over 50% (or five times larger than SPIAs). This suggests selecting a single DIA provider could be especially problematic because DIA payouts are likely to be materially higher if a retiree has access to a competitive pool of potential insurers versus a more limited list.

Insurance should not be wealth maximizing.

There are also notable differences in the competitiveness of the respective insurance companies over time. Part of this effect could be related to the relatively small number of companies providing quotes over the period, especially for DIAs with longer delay periods. The variations in the range of payouts should likely be revisited in the future if the market becomes increasingly competitive.

ECONOMIC VALUE DIFFERENCES

Insurance, by definition, should not be wealth maximizing. People buy insurance to transfer risk and insurance companies must make a profit or they would not be able to pay future claims. Given these relatively simple facts, though, not all insurance products are created equal.

One approach that is commonly used to determine the potential benefit of insurance is to estimate the economic value of the product, where

HISTORICAL PRICING VARIABILITY IN IMMEDIATE AND DEFERRED INCOME ANNUITIES

the expected benefits are weighed against the costs (i.e., the premium). Researchers have been providing some context on economic values for decades, especially for annuities that provide guaranteed lifetime income, such as single premium immediate annuities.

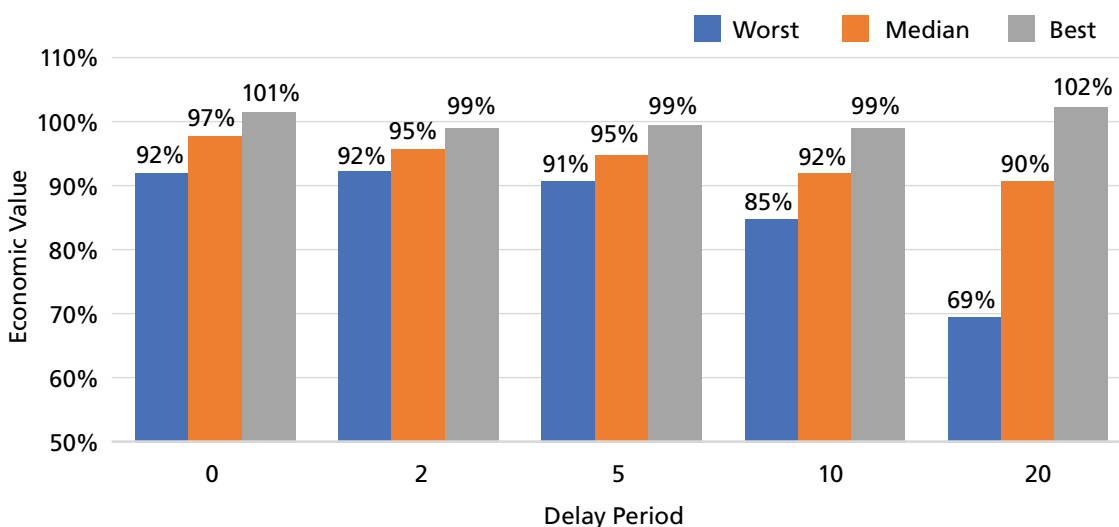
For the analysis we estimate the “actuarially fair” payout for the annuity based on the respective features where the discount rates are based on the Treasury High Quality Market (HQM) Corporate Bond Yield Curve and mortality is based on the Society of Actuaries Individual Annuity Mortality (2012 IAM) Table, incorporating forecasted improvement.

We use mortality rates based on those individuals who actually purchase an annuity (i.e., realized experience among actual policyholders) versus more general mortality tables (e.g., Social Security Administration tables) because unhealthy people don’t typically buy annuities. There are obvious adverse selection issues at play that should be considered when estimating the economic value of an annuity (or any insurance contract) and to use general population mortality rates ignores this fact.

The Exhibit 6, below, includes an estimate of the average economic value of annuities for a 65-year-old annuitant over the full period. Each (bi-weekly) available quote is compared to the estimated economic value and the best, median and worst available percentages are provided. For clarity, a value of 100% would suggest that the benefits of the annuity are equivalent to the cost, using this valuation model.

People who purchase annuities are healthier than average.

Exhibit 6: The Economic Value of Annuities by Delay Period



Source: CANNEX Financial Exchanges Limited, Authors' Calculations

There is a clear effect where both the overall economic value is highest for those annuities with lower delay periods (e.g., SPIAs versus DIAs) and that the variation is highest as the delay period increases. The median economic value of SPIAs of 97% suggests that these are relatively attractively priced from the perspective of consumers. While the median economic value of a DIA with a 20-year delay is lower (90%), the economic value is still relatively high. The wider spread in DIA pricing also suggests the potential benefits of purchasing a DIA are likely to vary more than for SPIAs.

The reason for high values has to do with our assumptions. We use better than average mortality assumptions to reflect the natural adverse selection effects associated with individuals who actually purchase annuities. While some retirement researchers use more general population mortality estimates when gauging the value of an annuity (e.g., Social Security Administration tables) doing so ignores the implied choice in the decision to annuitize and the fact if the average Americans actually purchased annuities (since they are less than the average annuitant), annuity payout rates should increase considerably.

While the economic values clearly vary by provider, it is not necessarily clear to what extent the underlying mortality assumptions vary by product. To better understand this, we leverage the Gompertz mortality model, as noted by Milevsky (2006) where the probability of survival to age t , conditional on a life at age (a) , is given by equation 1, where m is the modal lifespan and b is the dispersion coefficient.

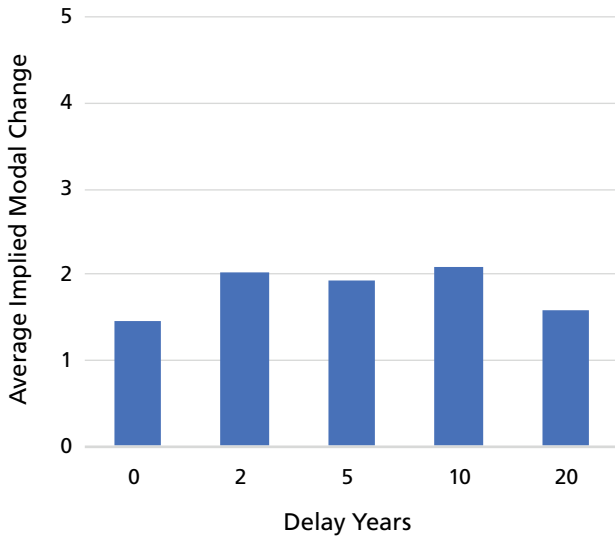
$$q_t = \exp \left\{ \exp \left\{ \frac{a - m}{b} \right\} \left(1 - \exp \left\{ \frac{t - a}{b} \right\} \right) \right\}$$

For each annuity quote in our dataset we estimate the required modal change in lifespan to generate the same payout rate using our pricing model. This provides how much longer (or potentially shorter) the annuitant is implied to live across quotes. As the modal lifespan increases the effective cost of the insurance increases.

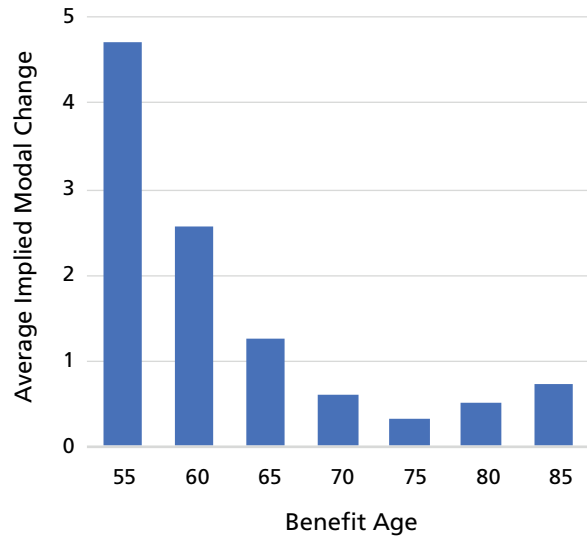
In Exhibit 7, page 10, we calculate the average modal values for the average DIA quotes for the 65 year old over various delay periods in Panel A and the average modal values for the average SPIA quotes with income commencing from ages 55 to 85 in Panel B.

Exhibit 7: Average Implied Gompertz Shift in Annuity Pricing

Panel A: DIAs for 65 year old, Various Delays



Panel B: SPIAs With Different Purchase Ages



Source: CANNEX Financial Exchanges Limited, Authors' Calculations

The underlying mortality assumptions appear to be relatively similar across the different delay periods for the 65-year-old annuitant (Panel A); however, this affects the DIA payouts more since the income is effectively backloaded. In contrast, there are notable differences in the modal lifespans for SPIAs, which appear to be highest at younger ages (e.g., a 55 year old). This likely reflects the additional adverse selection associated with individuals purchasing income annuities at relatively younger ages.

Annuities are in general a "good deal."

Overall, though, this analysis suggests that income annuities have been a relatively "good deal" for consumers since they have a somewhat high economic value. As a reminder, though, this generalization focused on the average over the entire period, and previous analysis clearly demonstrates that the payouts have varied considerably historically. Therefore, it's important for investors to ensure they are getting the most competitive quote possible before purchasing an annuity.

CONCLUSION

This analysis provides context on the historical variation in income annuity payout rates, in particular the differences that have existed across delay periods moving from SPIAs (with no delay) to DIAs (where income begins 30 years after purchase). The variability increases and the expected economic value decrease as the delay term increases (i.e., for DIAs). This suggests there could be significant implicit costs for retirees who do not continually ensure best available pricing.

These findings have important implications for a variety of parties, especially defined contribution (DC) plan sponsors given the increased focus among plan sponsors in offering annuity solutions to participants. While a solution strategy that relies on SPIAs or DIAs with a single provider has the potential to offer mortality credits (e.g., if purchased during accumulation), depending on design, these benefits are likely to be (significantly) outweighed by the likely lower payout offered by that provider versus if a platform of competitive quotes are available.

In summary, there has been significant variation in historical payout rates for income annuities, especially DIAs with longer delay periods; therefore, before purchasing an annuity it is important for households to ensure they are getting the best available pricing.

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ABOUT CANNEX

CANNEX supports the exchange of **pricing information** for annuity and bank products across North America. We provide financial institutions with the ability to evaluate and compare various guarantees associated with retirement savings and retirement income products.

Our **quantitative research** team provides methodologies that help optimize the selection and allocation of annuity and insurance guarantees in support of retirement programs and practices.

Our pricing and analytic services can be deployed to support a variety of processes, including:

- Research & Market Intelligence
- Financial Planning & Education
- Sales & Compliance
- Transaction Processing
- Product Service & Administration

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