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In-Plan Retirement Income: Creating Guaranteed Income with Investment Upside Potential

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CONTACT US

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The analysis and examples contained in this document are for research purposes only and should not be relied upon as advice or recommendations.

ABOUT ALEXINCOME

ALEXIncome is an independent 401(k) guaranteed income product design firm that offers custom design advice to asset managers, carriers, plan sponsors, advisors and consultants. They create tailored TDFs for 401(k)s and other DC plans to deliver both growth potential with lower volatility during accumulation years and reliable, sustainable lifetime income in retirement.

The ALEXIncome solution presented in this paper is structured to address the following primary concerns for plan participants and plan sponsors:

- **Simplicity** – Is the hybrid qualified default investment alternative (QDIA) easy for plan participants to understand and relatively simple for plan sponsors to implement in their existing 401(k) platform?

- **Risk Mitigation** – Is the retirement income amount sufficient to address the most common risks in retirement: longevity, sequence of returns, and inflation? Will there be a hedge against extreme market drops during accumulation and distribution?

- **Retirement Income Security** – Is it easy for a participant to start the annuity at retirement? Does the product deliver annual income as long as the participant is alive? Or will the investment portfolio be fully depleted within the participant's lifetime?

In addition, the ALEXIncome prototype TDF product is designed to deliver benefits that address some challenges plan sponsors face when changing their 401(k) plan from a traditional accumulation plan to one focused on delivering income to retirees including:

- **Sustainable risk profile** for the underlying insurance carriers, ensuring they can offer and support their annuity product for decades.

- **Efficiency** throughout the implementation and ongoing operations.

- Positioned for future **portability and smooth rollovers** as advancing technology enables easier transitions.

Participants don't need to select an insurance company or compare annuities – this screening is handled by their employer or a fiduciary. This streamlined, all-in-one product offers risk mitigation and improved retirement income delivery.

Additional Operational Considerations for Plan Sponsors

While this analysis focused on better outcomes for plan participants, the ALEXIncome product was also built to recognize the operational realities and concerns of the plan sponsor. Several topics may be beneficial to discuss further:

- With a platform-neutral option, a plan sponsor can incorporate an annuity of their choosing into their existing TDF.

- The annuity options are vetted for sustainability – using the best analysis possible to ensure viability of the insurance products for decades.

- Competitive bidding will lead to lower fees, benefiting both the plan and its participants.

- Implementing an enhanced product into your established QDIA is efficient, taking into account a shorter timeline and resource commitment.

The ALEXIncome hybrid TDF addresses the real behavior of employees. The ease of decision-making over a 25-year period will be the most significant reward for participants. Many report how crucial it is to have a pension to achieve the American Dream. By incorporating pension-like income into the familiar 401(k) and making it incredibly easy to activate, the 401(k) will evolve from a savings and accumulation vehicle into a guaranteed income solution for retirement.

More on the Co-Founders of ALEXIncome

Ramsey D. Smith is the CEO and Co-Founder of ALEXIncome, a platform revolutionizing the Defined Contribution retirement market by delivering unmatched guaranteed income solutions tailored for today's workforce. He is also the Co-Founder of its sister company, ALEX.fyi. Ramsey serves as an Independent Director on the Board of Genworth Financial, where he is a member of both the Risk and Nominating & Corporate Governance Committees. Before founding ALEXIncome and ALEX.fyi, Ramsey spent 21 years at Goldman Sachs, where he rose to the role of Managing Director. At Goldman, he pioneered and led several Equity Derivatives businesses, including the development of a groundbreaking franchise that delivered corporate risk management and investment strategies for leading U.S. insurance carriers. Ramsey is deeply committed to education and community service. He has been a Board Member of Sponsors for Educational Opportunity (SEO) since 2008 and previously served for six years as a Trustee of The Dalton School in New York City. He earned his undergraduate degree from Princeton University and an MBA from Harvard Business School. Ramsey can be contacted at ramsey@alex.fyi.

Graham Clark is the Co-Founder and Head of Product at ALEXIncome. Prior to ALEXIncome, Graham had over 25 years of experience in structuring and investment banking primarily covering the insurance industry for derivative products, securitization, reinsurance related transactions, and corporate finance. He has run the Insurance Solutions efforts at Citigroup, BofA Merrill Lynch, and BNP Paribas. He has extensive experience with hedging Fixed Indexed and Variable Annuities, insurance securitization transactions, capital relief transactions, and reinsurance and M&A in the annuity space. Graham is a Chartered Financial Analyst and holds an MBA from the Johnson School at Cornell University and a Bachelor of Science degree in Mathematics and Physics from Wake Forest University. Graham can be contacted at graham@alexincome.com.

While this paper was supported by **ALEXIncome**, the findings, analysis, and conclusions remain independent and are solely those of the author and research analysts.

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EXECUTIVE SUMMARY

Employers and the financial industry acknowledge that current 401(k) plans are limited in their ability to meet retirement income needs of retired workers. New, modern solutions are needed within the existing structure and operations of 401(k)s and other DC plans to deliver both growth potential with lower volatility during accumulation years and reliable, sustainable lifetime income in retirement.

In this paper, we examine how the ALEXIncome Target Date Strategy is able to address these accumulation and lifetime income objectives.

The ALEXIncome prototype hybrid Target Date Fund (TDF) product includes an embedded guaranteed income feature and would be eligible as a Qualified Default Investment Alternative (QDIA). This analysis focused on how the ALEXIncome solution could potentially improve retirement income for plan participants versus other hybrid options available in the marketplace.

Highlights of the results include:

- Compared to a 401(k) invested only in a Traditional TDF and using a retirement strategy of annuitizing the assets allocated to fixed income or fixed annuity, the ALEXIncome solution performs considerably better during extreme market downturns. In particular, if there is an extreme market downturn five years before retirement, an employee could reasonably expect an income payout that is 28% higher.
- The ALEXIncome solution yields a comparable or higher accumulation balance at age 65 in 93% of the cases versus the Traditional TDF.
- The built-in annuity option with the ALEXIncome hybrid TDF produces not only sustainable lifetime income throughout retirement, but also an income of at least 5.5% higher than the Traditional TDF strategy. This occurs in more than half the scenarios.
- A Lifetime Ruin Probability (LRP) — which measures the chance that a retiree's investments could be fully depleted while they are still alive — was calculated for each TDF concept. The ALEXIncome TDF solution consistently showed lower ruin probabilities compared to the other TDFs, especially under normal market conditions. Only in extreme market downturns could another TDF, with a higher fixed annuity allocation, outperform the ALEXIncome strategy in terms of lower lifetime ruin probability. Overall, the ALEXIncome solution provided better protection against running out of money during retirement.

The details, background, and methodology follow in this paper.

The analysis and results presented in the paper were prepared by the research team at **CANNEX Financial Exchanges Limited**. While this paper was sponsored by ALEXIncome, the findings, analysis, and conclusions remain independent and are solely those of the research analysts. For any questions on the methodology and assumptions, the CANNEX research team can be contacted at research@cannex.com.

This paper was also written with the assistance of Marcia Mantell, a nationally recognized expert specializing in simplifying complex retirement concepts like Social Security and Medicare for financial professionals and everyday consumers. Marcia can be contacted at marica.mantell@mantellretirement.com.

CREATING A SECURE RETIREMENT PROVES ELUSIVE

Creating a secure retirement has long been a challenge for employers and employees. The ideal situation for retiring workers includes a pension, Social Security, and personal savings. However, this model is no longer available to most people.

Defined Contribution (DC) plans have largely replaced traditional pensions over the last several decades. DC plans were originally intended to provide employees a tax-advantaged vehicle to accumulate sufficient assets for retirement. After 40 years of trial and error, many would argue the success of the 401(k) has yet to meet the needs of many participants. 401(k)s have largely focused on accumulation rather than directly addressing the greater purpose of providing an adequate secure income throughout retirement.

After 40 years of trial and error, many would argue the success of the 401(k) has yet to meet the needs of many participants.

As a nation, we have shifted the entire burden of creating income security for old age from a group of highly educated, accomplished pension experts to the regular every person. Individuals must now shoulder the tremendous burden of effectively creating their own secure retirement. Unfortunately, this is regardless of how savvy they are as a pension manager, actuary, financial investment manager, and stock-picker.

Overall, the American worker is not doing well as their own pension manager, and they are coming to terms with their dilemma. In fact, the vast majority—82% of Americans—say all workers should have a pension that enables independence and self-reliance in retirement[1]. Furthermore,

- 78% of workers have a favorable view of pensions, up slightly from 77% in 2019
- 65% of workers agree pensions are better than 401(k)s for achieving retirement security, up slightly from 63% in 2019

65% of workers agree pensions are better than 401(k)s for achieving retirement security

Clearly, many employees are dissatisfied with the 40-year experiment of the do-it-yourself 401(k).

[1] *National Institute on Retirement Security, Retirement Insecurity 2024, American's Views of Retirement, Feb 2024, https://www.nirsonline.org/wp-content/uploads/2024/02/FINAL-2024-Public-Opinion-Research.pdf*

BUILDING A BRIDGE TO AN IN-PLAN HYBRID DB/DC SOLUTION

The need for each employee to create secure, reliable, guaranteed income is not an unreasonable objective. But it is not the sole obligation of an employer.

Both employers and the financial industry recognize that collectively, they must meet the real financial needs of retired workers. New and better solutions are needed. Ideally, they should be created within the structure and operations of existing 401(k) and other DC plans. Employer-sponsored retirement plans must deliver both growth potential with lower volatility for the accumulation years as well as lifetime income.

Both employers and the financial industry recognize that collectively, they must meet the real financial needs of retired workers.

The solution involves enhancing the infrastructure within DC plans to seamlessly bridge employees' need for guaranteed income with sustainable withdrawal strategies for a typical 30-year retirement and requires a hybrid model that integrates elements of both Defined Benefit (DB) and DC plans to create a comprehensive, one-stop solution that offers the best of both structures.

Building this bridge will both ease the burdens on employers and provide more income security for retired employees.

NEW, INNOVATIONS FOR INCOME

Several industry players have created hybrid options coupling the best of both DC and DB worlds: appropriate investments for employees at every age plus options for guaranteed pension-like income. They are hybrid Target Date Funds that combine traditional TDF investment strategies and glide paths with the introduction of a deferred annuity (or some other insurance solution) that can be readily accessed and activated at retirement to produce a level of guaranteed, pension-like income.

In this paper, we examine the ALEXIncome prototype hybrid Target Date Fund that integrates the growth-oriented strategy of a traditional TDF with the security and guaranteed income features of a Fixed Annuity. This design embeds the income-generating insurance product in a manner that qualifies it as a Qualified Default Investment Alternative within a 401(k) plan, providing participants with both long-term growth potential and income stability in retirement.

METHODOLOGY

To evaluate the outcomes for a plan participant who constructs their 401(k) with ALEXIncome compared to three other TDF approaches, an in-depth framework was employed. The results were analyzed based on the following assumptions and methodology:

1. Monte Carlo Simulations

This analysis performed a 1,000-scenario Monte Carlo simulation resulting in a randomized set of possible outcomes. The ALEXIncome hybrid TDF model and three other alternatives were analyzed and compared as follows:

- Case 1—ALEXIncome vs a Traditional TDF where a single premium immediate annuity (SPIA) is purchased at the point of retirement with the fixed income assets
- Case 2—ALEXIncome vs a Traditional TDF where the participant selects a 4% systematic withdrawal plan (SWP) and no annuity option
- Case 3—ALEXIncome vs a Hybrid TDF with a Variable Annuity and a Guaranteed Lifetime Withdrawal Benefit (TDF with VA-GLWB)
- Case 4—ALEXIncome vs a Hybrid TDF with a Fixed Indexed Annuity and Guaranteed Lifetime Withdrawal Benefit (TDF with FIA-GLWB)

2. Plan Participant Profile

For purposes of the analysis, we looked at the inputs and outputs for a plan participant with the following profile:

- Age 40 in 2023
- Has accumulation value of $100,000 in plan assets at age 40, invested in a traditional TDF
- Switches to the ALEXIncome hybrid TDF in 2023
- Contributions continue for 25 years until age 65, the retirement date in this analysis
- Annual contributions start at $10,000 and increase in line with salary at 3% per year until age 65

3. Glide Paths

The glide path used in this analysis is a common structure representative of TDFs in the market today. It includes investments in:

- US Large and Small Caps, International and Emerging Market stocks ("Equities"), and
- Core bonds and Inflation-Protected Securities ("Fixed Income")

Exhibit 1 shows the glide path of the Traditional TDF: the investment allocation begins at age 40 at 90% equities and 10% fixed income and at age 65 and beyond is allocated to 50% equities and 50% fixed income.

This glide path is used as a basis for the other three TDF concepts with the following modifications:

1. ALEXIncome TDF

- Beginning at age 40, allocations to fixed income will be redirected to a group Fixed Deferred Annuity. This Fixed Annuity can be considered a new asset class for the purpose of understanding its role in the hybrid TDF. At quarterly rebalancing, if the allocation to the Fixed Annuity is higher than target then it is maintained, i.e. the Fixed Annuity is not sold.
- Allocations to the Fixed Annuity accumulate at crediting rates calculated as the simulated interest rate plus a 0.75% spread, subject to a guaranteed minimum crediting rate of 1%.

2. TDF with VA-GLWB

- No modifications, glide path used as is.

3. TDF with FIA-GLWB

- Allocations to the group Fixed Indexed Annuity begin at age 50 and is initially targeted at 25% and increases linearly to 65% at age 65. Allocations to the FIA first replace fixed income allocations and then equity allocations. At quarterly rebalancing, if the allocation to the FIA is higher than target then it is maintained, i.e. the FIA is not sold.

Exhibit 1: Traditional Target Date Fund Glide Path

Age	US Large Caps	US Small Caps	International Stocks	Emerging Market Stocks	Core Bonds	Inflation Protected Securities
40	43.20%	13.50%	27.00%	6.30%	10.00%	0.00%
41	42.48%	13.28%	26.55%	6.20%	11.50%	0.00%
42	41.76%	13.05%	26.10%	6.09%	13.00%	0.00%
43	41.04%	12.83%	25.65%	5.99%	14.50%	0.00%
44	40.32%	12.60%	25.20%	5.88%	16.00%	0.00%
45	39.60%	12.38%	24.75%	5.78%	17.50%	0.00%
46	38.88%	12.15%	24.30%	5.67%	19.00%	0.00%
47	38.16%	11.93%	23.85%	5.57%	20.50%	0.00%
48	37.44%	11.70%	23.40%	5.46%	22.00%	0.00%
49	36.72%	11.48%	22.95%	5.36%	23.50%	0.00%
50	36.00%	11.25%	22.50%	5.25%	25.00%	0.00%
51	35.28%	11.03%	22.05%	5.15%	26.50%	0.00%
52	34.56%	10.80%	21.60%	5.04%	28.00%	0.00%
53	33.84%	10.58%	21.15%	4.94%	29.50%	0.00%
54	33.12%	10.35%	20.70%	4.83%	31.00%	0.00%
55	32.40%	10.13%	20.25%	4.73%	32.50%	0.00%
56	31.68%	9.90%	19.80%	4.62%	34.00%	0.00%
57	30.96%	9.68%	19.35%	4.52%	35.50%	0.00%
58	30.24%	9.45%	18.90%	4.41%	37.00%	0.00%
59	29.52%	9.23%	18.45%	4.31%	38.50%	0.00%
60	28.80%	9.00%	18.00%	4.20%	40.00%	0.00%
61	27.84%	8.70%	17.40%	4.06%	40.40%	1.60%
62	26.88%	8.40%	16.80%	3.92%	40.80%	3.20%
63	25.92%	8.10%	16.20%	3.78%	41.20%	4.80%
64	24.96%	7.80%	15.60%	3.64%	41.60%	6.40%
65+	24.00%	7.50%	15.00%	3.50%	42.00%	8.00%

Source: CANNEX Financial Exchanges Limited

Refer to Appendix I – Modelling Assumptions for more details on the economic and mortality assumptions used.

4. TDF Fees

1. Traditional TDF

   • 0.08% during the accumulation and decumulation phases.

2. ALEXIncome TDF

   • 0.08% during the accumulation and decumulation phases. The fee is assessed against the entire accumulation value but only deducted from the non Fixed Annuity assets.

3. TDF with VA-GLWB

   • 0.08% during the accumulation and decumulation phases. Other fees due to various service providers that support this type of solution are not considered here.

   • 1% GLWB fee.

4. TDF with FIA-GLWB

   • 0.21% during accumulation phase and 0.68% during the decumulation phase[2]. The fee is assessed against the entire accumulation value but deducted from the non FIA assets.

[2] *See Fees and Expenses section of https://www.nrsforu.com/rsc/CITFunds/LIBFunds.pdf*

RESULTS

Overview

For each of the comparative cases, a 1,000-scenario Monte Carlo simulation was performed. Results were pulled at the 25th, 50th, and 75th percentiles. Considering the plan participant's point of view and goal to create reliable, sustainable pension-like income from the start of retirement to the end, this study aimed to answer this key question:

If a plan sponsor were to incorporate an annuity option into the popular TDF Qualified Default Investment Alternative, would the plan participant have more secure income throughout retirement?

Specifically, key metrics were analyzed, and the results are compared between each of the two options for the following:

1. Which option resulted in a higher accumulation value at the point of retirement?
2. Which option delivered higher income during retirement?
3. When did the investment side of the portfolio result in "portfolio ruin?"
4. How would each option be impacted by a 2008-type market downturn after retirement?

Topline results are as follows. Detailed commentary and insights are on the following pages.

Exhibit 2: Topline Results

	ALEXIncome Hybrid TDF ("ALEX") vs:			
	Case #1: A Traditional TDF during accumulation + buying a SPIA at retirement	Case #2: A Traditional TDF during accumulation, implementing the common 4% SWP	Case #3: A Hybrid TDF with a VA-style GLWB	Case #4: Hybrid TDF that allocates to a Fixed Indexed Annuity with a GLWB
Which TDF configuration ends up with a higher balance at age 65?	ALEX in 38% of the cases **and** no significant[4] difference in 55% of the cases	ALEX in 38% of the cases **and** no significant difference in 55% of the cases	ALEX in 97% of the cases **and** no significant difference in 3% of the cases	ALEX in 99% of the cases **and** no significant difference in 1% of the cases
On average, how much more Account Value will a participant have at retirement?	ALEX 3% more at the 50th percentile ALEX 7.4% at the 75th percentile	ALEX 3% more at the 50th percentile ALEX 7.4% at the 75th percentile	ALEX 16.3% more at the 50th percentile ALEX 21.3% at the 75th percentile	ALEX 13.8% more at the 50th percentile ALEX 16.5% at the 75th percentile
Which configuration yields a significantly[3] higher monthly income payment at retirement?	ALEX in 53% of the cases and no difference in 42% of the cases	NEITHER – this case sets the same income in both options	NEITHER – this case sets the same income in both options	NEITHER – this case sets the same income in both options
Does the ALEXIncome option deliver higher income?	Yes. 5.5% higher at the 50th percentile Yes. 11.1% higher at 75th percentile	N/A	N/A	N/A
What is the likelihood that participant outlives the investments —Lifetime Ruin Probability (LRP)[5]?	There is no drawdown on investments and therefore no possibility of ruin.	LRP is 3.3% in the Traditional TDF vs. 0.11% in ALEX	LRP is 26.7% in TDF with CDA vs. 2.5% in ALEX	LRP is 20.3% in TDF with FIA vs. 15.0% in ALEX
What is the LRP if there is a 2008-like recession 10 years into retirement?	There is no drawdown on investments and therefore no possibility of ruin.	LRP is 16.6% in the Traditional TDF vs. 0.3% in ALEX	LRP is 50.3% in TDF with CDA vs. 7.65% in ALEX	LRP is 43% in TDF with FIA vs. 28.2% in ALEX

Source: CANNEX Financial Exchanges Limited

[3] The Lifetime Ruin Probability, LRP, is the risk of depleting one's retirement savings to zero while still being alive. See more details in Analytic Framework.
[4] A threshold of ±5% was used to determine significance. No significant difference means that the difference was within this threshold.
[5] The LRP values presented here at the average of the LRP for a male and a female plan participant.

Case 1: ALEXIncome vs a Traditional TDF with SPIA at retirement

Model Set-Up and Assumptions

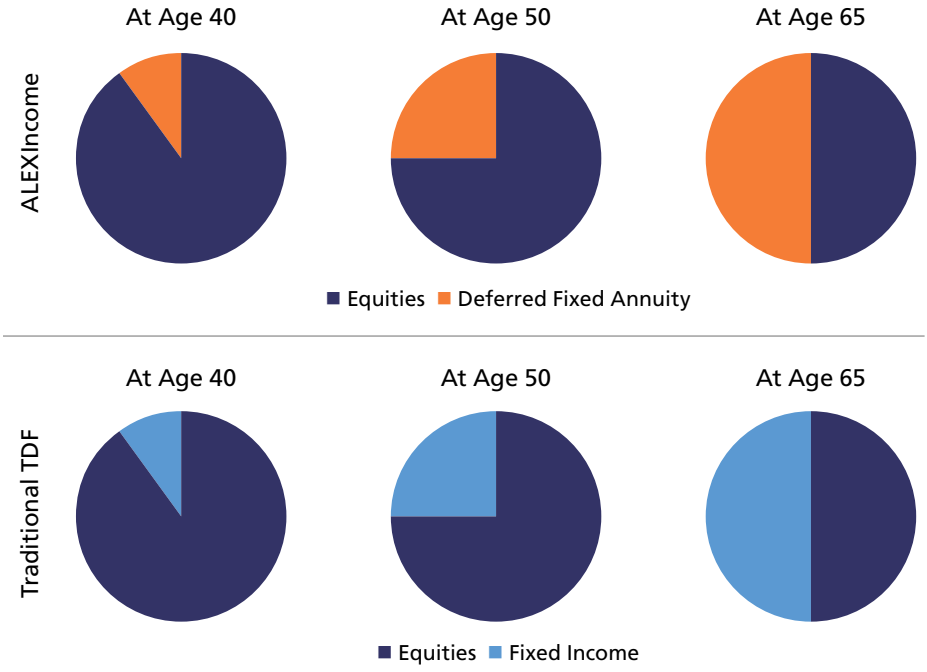
In this base case, we assessed the outcomes for typical plan participants if they selected the ALEXIncome hybrid TDF in their 401(k) versus a Traditional TDF and applied the same glide path in both cases.

> *The goal of this comparison was to evaluate differences in outcomes by replacing fixed income assets with a fixed annuity.*

The analysis assumes:

- Participant #1 chose the ALEXIncome hybrid TDF at age 40 and annuitizes the entire allocation to the fixed annuity at age 65 into a life-only income annuity which provides guaranteed income throughout retirement[6].
- Participant #2 chose to stay invested in the Traditional TDF and annuitizes the 50% of the portfolio invested in fixed income assets into a life-only income annuity.

Exhibit 3: **Snapshot of asset allocation at specific ages in both TDFs (Case 1)**



Source: CANNEX Financial Exchanges Limited

Both decisions result in the individual participant locking in a stream of guaranteed fixed income that simulates a pension. But which avenue results in better outcomes?

[6] *In an actual plan, the participant has the option to annuitize some or all of the fixed annuity or to transfer to another investment.*

Results of Key Metrics

1) Accumulation Value in the 401(k) at the point of retirement

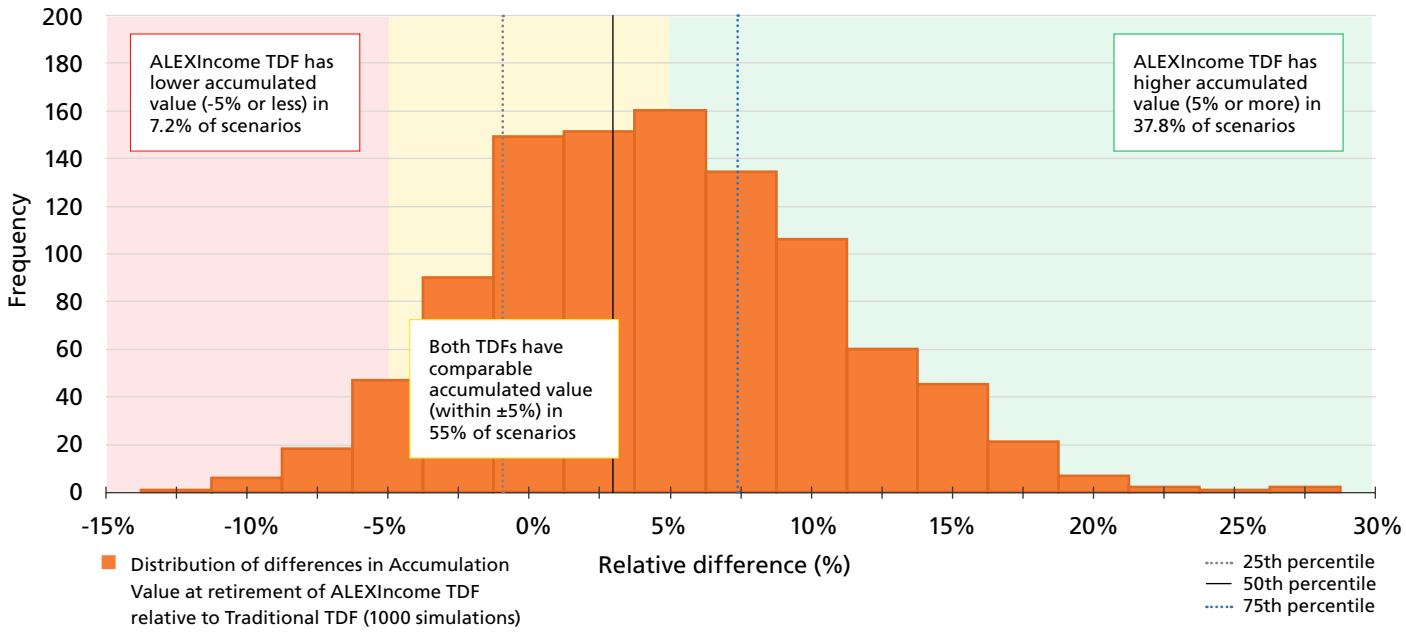
One measure of success, certainly from a participant's point of view, is to have as large a "nest egg" as possible at the beginning of retirement. Comparing the accumulation value results of both TDFs from the Monte Carlo simulation showed that at retirement (see Exhibit 4 below) that the ALEXIncome TDF was:

- 3% higher than the Traditional TDF, at the 50th percentile
- 7.4% higher than the Traditional TDF, at the 75th percentile

Furthermore, in 38% of the scenarios, the ALEXIncome TDF yielded a 5% or higher accumulation value and in 55% of the scenarios, results were comparable (within +/- 5%).

ALEXIncome TDF has higher accumulated value (5% or more) in 37.8% of scenarios.... [and] comparable accumulated value in 55% of scenarios.

Exhibit 4: **Distribution of differences in Accumulation Value at retirement of ALEXIncome TDF relative to Traditional TDF (1000 simulations)**



Source: CANNEX Financial Exchanges Limited

2) Decumulation of the 401(k) throughout retirement

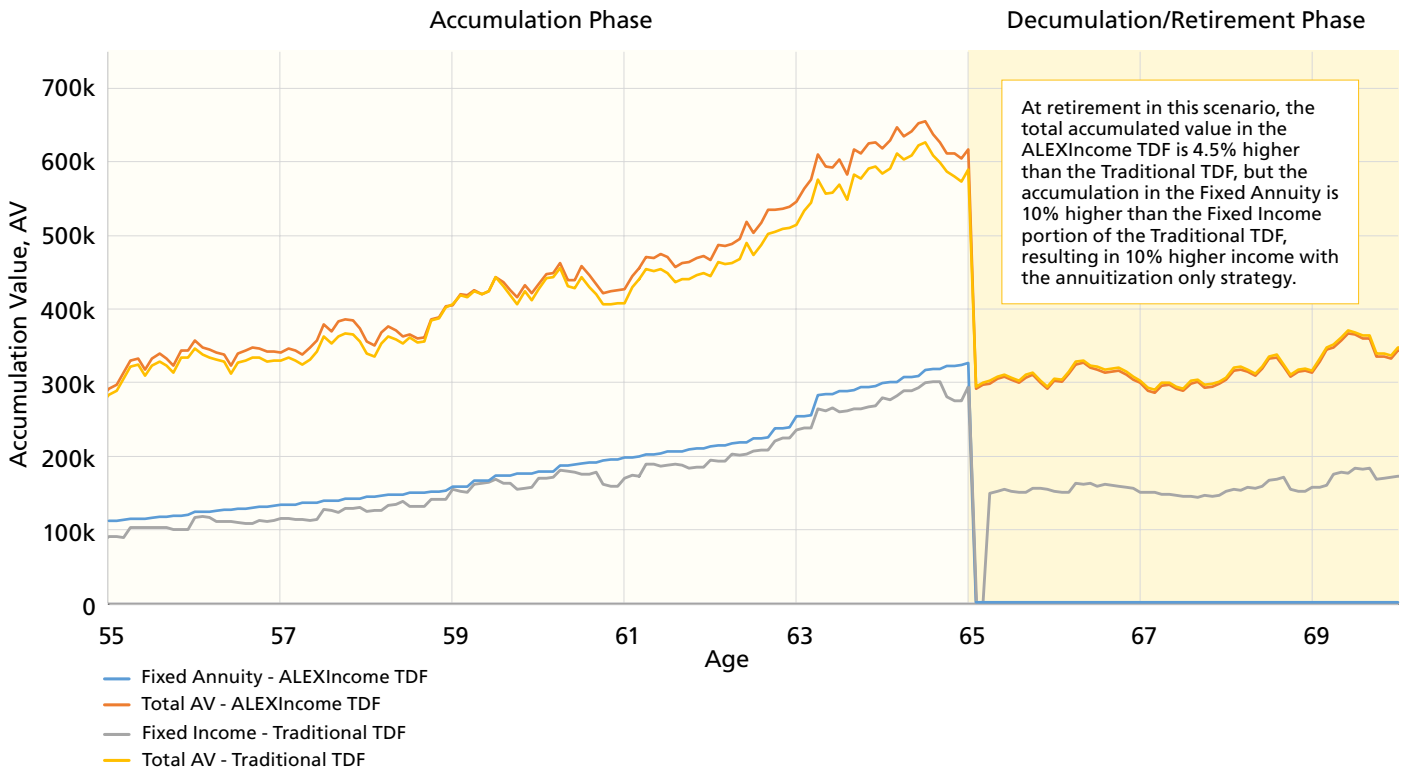
After executing the income strategy of this case at retirement, the participant choosing the ALEXIncome hybrid TDF saw:

- A 5.5% higher income at the 50th percentile, and up to 11.1% higher income at the 75th percentile, and
- Significantly higher incomes, by a relative difference of 5% or more, occurred in 53% of the scenarios.

[ALEXIncome TDF had] 5.5% higher income at the 50th percentile, and up to 11.1% higher income at the 75th percentile.

It would be reasonable to expect a 3% higher payout versus the 5.5% result, given that the accumulation value was about 3% higher at the median. But one of the benefits of the ALEXIncome hybrid TDF structure comes from the rebalancing rules. If the allocation to the deferred annuity is higher than the glide path, the annuity portion is not surrendered. As a result, in many scenarios, a participant would accumulate more at retirement compared to a traditional TDF and have a higher-than-target 50% allocation to the deferred fixed annuity. Both of these factors contribute to the relatively higher income produced by annuitizing the fixed annuity in the ALEXIncome TDF – see Exhibit 5 (below) which shows a single scenario selected from the Monte Carlo simulation illustrating this outcome.

Exhibit 5: **Scenario showing impact of no surrender constraint on the Fixed Annuity allocation**



Source: CANNEX Financial Exchanges Limited

3) Probability of Ruin: Will the Investments Run Out?

Participant #1 allocated contributions to a deferred annuity in incremental, smaller blocks for 25 years then converted the accumulation in the deferred annuity to an income annuity at retirement. Participant #2 decided to purchase an income annuity using the fixed income assets at the point of retirement. There is no additional drawdown on the portfolios and, therefore, there is no potential for overall portfolio ruin. Guaranteed income will continue as long as the participant lives.

There is a reasonable chance of starting retirement with a slightly larger portfolio value with the ALEXIncome hybrid TDF.

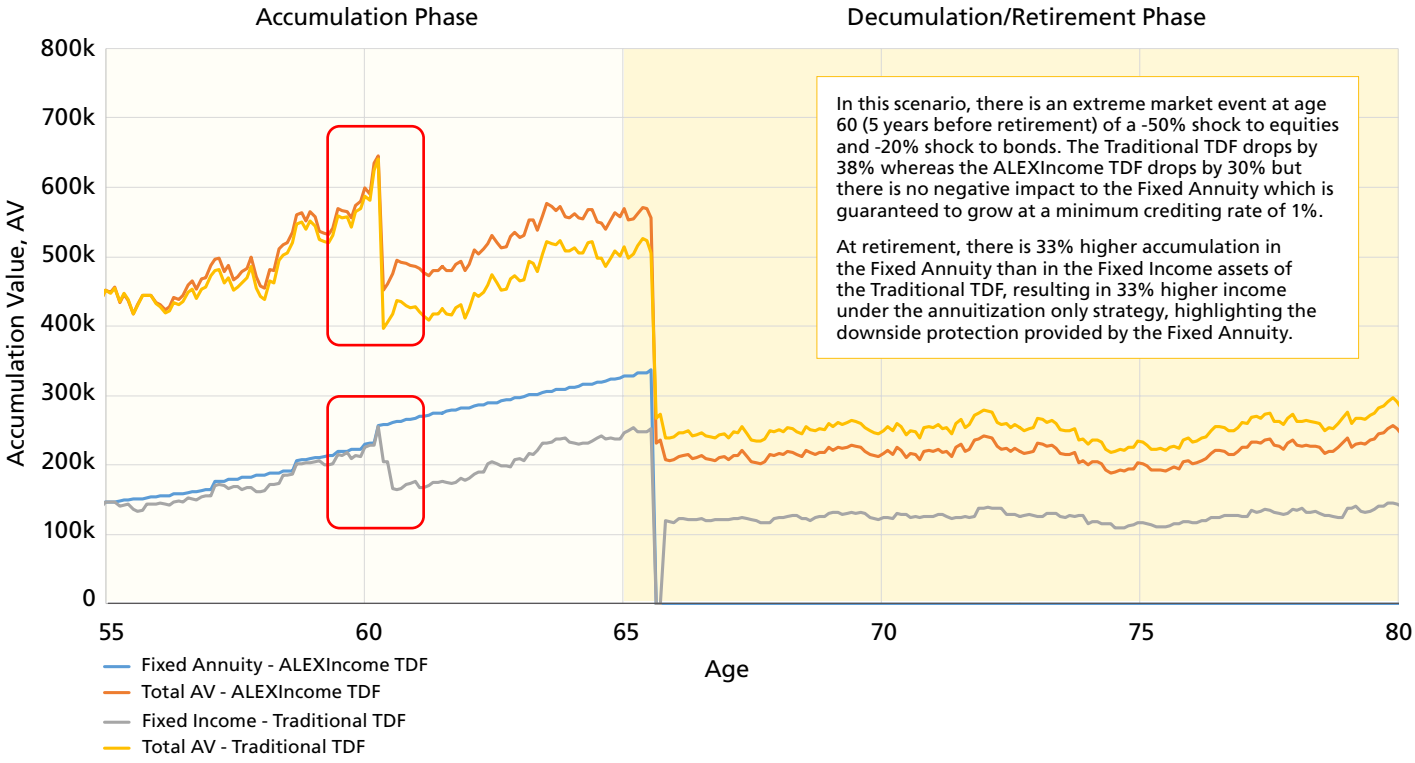
Model Case #1: Insights and Comparisons

The results of this case suggest that both investment options help plan participants build a retirement portfolio. However, there is a reasonable chance of starting retirement with a slightly larger portfolio value with the ALEXIncome hybrid TDF and both options lock in some income guaranteed to last throughout retirement.

- Conventional wisdom assumes that diverting investments to an annuity during accumulation years could result in a smaller portfolio for retirement. However, in this model, our results show when shifting from traditional investments to purchasing a deferred annuity beginning at age 40, the accumulation value is comparable or higher than an all-investment portfolio in 93% of the cases as illustrated in Exhibit 4.
- Income sustainability is critical—yet often not achievable—without pension-like income. The built-in annuity option within the ALEXIncome hybrid TDF provides sustainable retirement income and delivers at least 5.5% higher income than the Traditional TDF in more than half of the scenarios.
- If a recession similar to the 2008 great recession were to hit during the accumulation years, the downside protection provided by the fixed annuity in ALEXIncome results in a less dramatic drop in portfolio value. Exhibit 6 shows a scenario in which there is an extreme market event at five years before retirement resulting in a 38% drop in the Traditional TDF and a 30% drop in the ALEXIncome TDF. There was no negative impact to the Fixed Annuity in the ALEXIncome TDF and at the retirement age the accumulation in the Fixed Annuity was 33% higher than the Fixed Income assets in the Traditional TDF.

If a recession similar to the 2008 great recession were to hit... There was no negative impact to the Fixed Annuity in the ALEXIncome TDF and at the retirement age the accumulation in the Fixed Annuity was 33% higher than the Fixed Income assets in the Traditional TDF.

Exhibit 6: **Scenario showing impact of a pre-retirement extreme market shock to accumulation and income from annuitization at retirement**



Source: CANNEX Financial Exchanges Limited

Case 2: ALEXIncome vs a Traditional TDF with 4% SWP

Model Set-Up and Assumptions

In case #2, we explored outcomes based on a common approach retirees take today: setting up a standard 4% withdrawal from an all-investment Traditional TDF. All assets remain in the market throughout retirement and are rebalanced quarterly to a 50/50 equity/fixed income portfolio.

> *The goal of this scenario is to measure how much impact an annuity might have on retirement income vs a standard 4% SWP from an investment portfolio when paying out the same dollar amount.*

This analysis assumes:

- Participant #1 in the ALEXIncome hybrid TDF chooses to annuitize all of the fixed deferred annuity. Withdrawals from the remaining TDF assets are used as necessary to replicate the same level of income as the TDF with 4% SWP.
- Participant #2 in the Traditional TDF chooses to keep all investments in a 50/50 equity/fixed income investment portfolio and will withdraw a set amount each year until the portfolio is depleted.

We determined the distribution amount at age 65—4% of the entire Traditional TDF portfolio. This dollar amount will be paid throughout retirement.[7]

But because 4% of the entire traditional portfolio is expected to generate a higher monthly income than the income annuity from the ALEXIncome hybrid product, we needed to make the payments equal. To do so, we have had to withdraw a small amount from the investment side of ALEXIncome. This withdrawal as a proportion of the investments is expected to be considerably less than 4%, with a median withdrawal of 1.94%.[8]

Results of Key Metrics

1) Accumulation Value in the 401(k) at the point of retirement

There are no changes in the contributions or investments during the accumulation phase and the results for this case at retirement are the same as Case 1, refer to Exhibit 4:

- At the 50th percentile, ALEXIncome TDF was 3% higher than in the Traditional TDF.
- At the 75th percentile, ALEXIncome TDF was 7.4% higher than the Traditional TDF.

2) Decumulation of the 401(k) throughout retirement

This case was designed to show how the ALEXIncome solution has the flexibility to replicate the same income stream as a 4% SWP while incorporating guaranteed income for life. In most scenarios and throughout retirement the income is the same:

- There is only a very small likelihood (1%) that the income from the income annuity will be significantly higher than the 4% SWP.
- In 9% of scenarios, the Traditional TDF is unable to sustain the 4% withdrawal strategy to age 95 and beyond (assuming the participant survives to those ages).

3) Probability of Ruin: Will the Investments Run Out?

The key difference between these two participant choices for income is in the likelihood of running out of money in retirement.

- For participants who used the hybrid TDF as designed, they have less than a 0.2% chance of running out of money on the investment portfolio side and even if ruin occurs, the guaranteed income stream from the income annuity still continues throughout retirement.

[7] This analysis did not consider increased withdrawals for inflation or RMDs.
[8] Based on the 1000 simulations, the withdrawal rate required from the remaining assets in ALEXIncome TDF to replicate same income as the 4% SWP as at the retirement age ranges from a minimum of 0% to a maximum of 4.24%. In 95% of the scenarios, the rate fell in the range 0.08% to 3.53%

- Those choosing to become their own investment managers and using the 4% SWP have a higher probability of investment portfolio ruin, but it may not be catastrophic. The lifetime ruin probability for a male is 2.7% vs. a female at 3.8%.

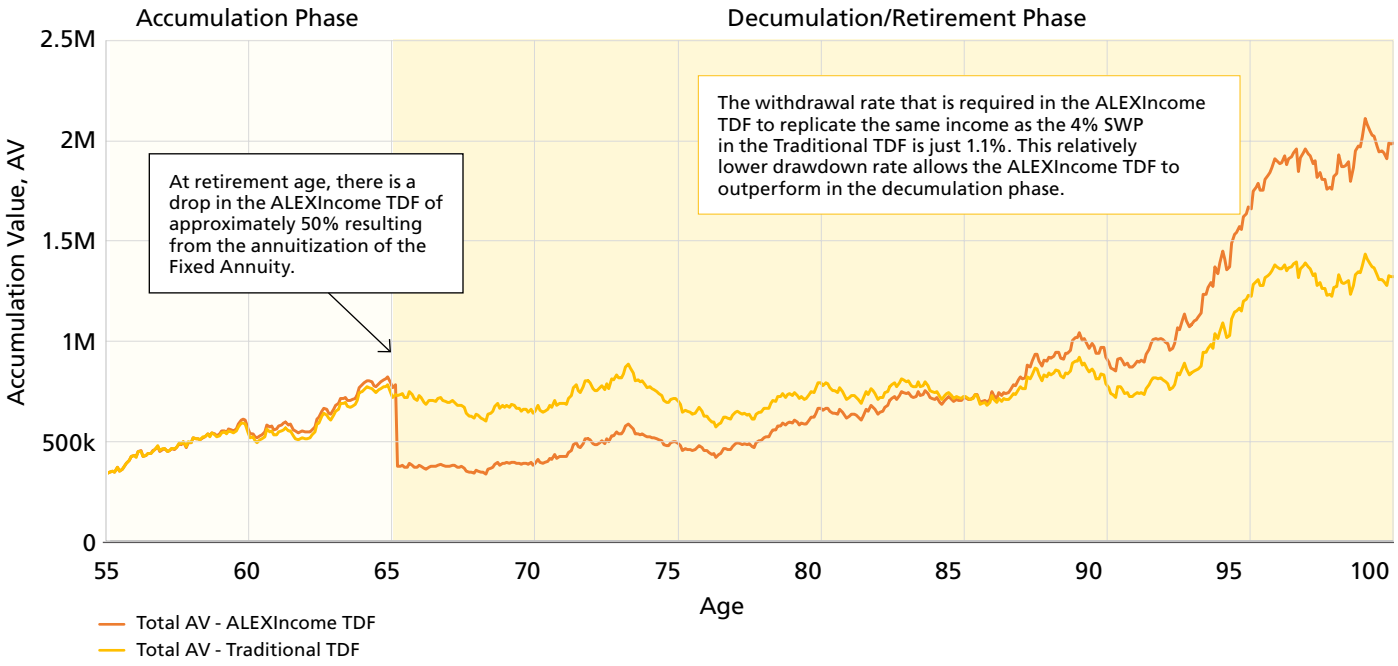
Model Case #2: Insights and Comparisons

The significant advantage illustrated in this case is how powerful the ALEXIncome model is with an annuity to provide guaranteed income.

- The interesting twist in this scenario is that the accumulation value drops roughly in half at the point of retirement in the ALEXIncome hybrid TDF—the result of annuitization. However, because the withdrawal rate from the remaining assets is expected to be less than 4%, the investment portfolio will likely outperform in retirement and eventually catch up to and exceed the Traditional TDF—this outcome is illustrated in Exhibit 7 (this page) and Exhibit 8. By age 95, the assets in ALEXIncome are comparable or higher in 69% of scenarios.

Those choosing to become their own investment managers and using the 4% SWP have a higher probability of investment portfolio ruin.

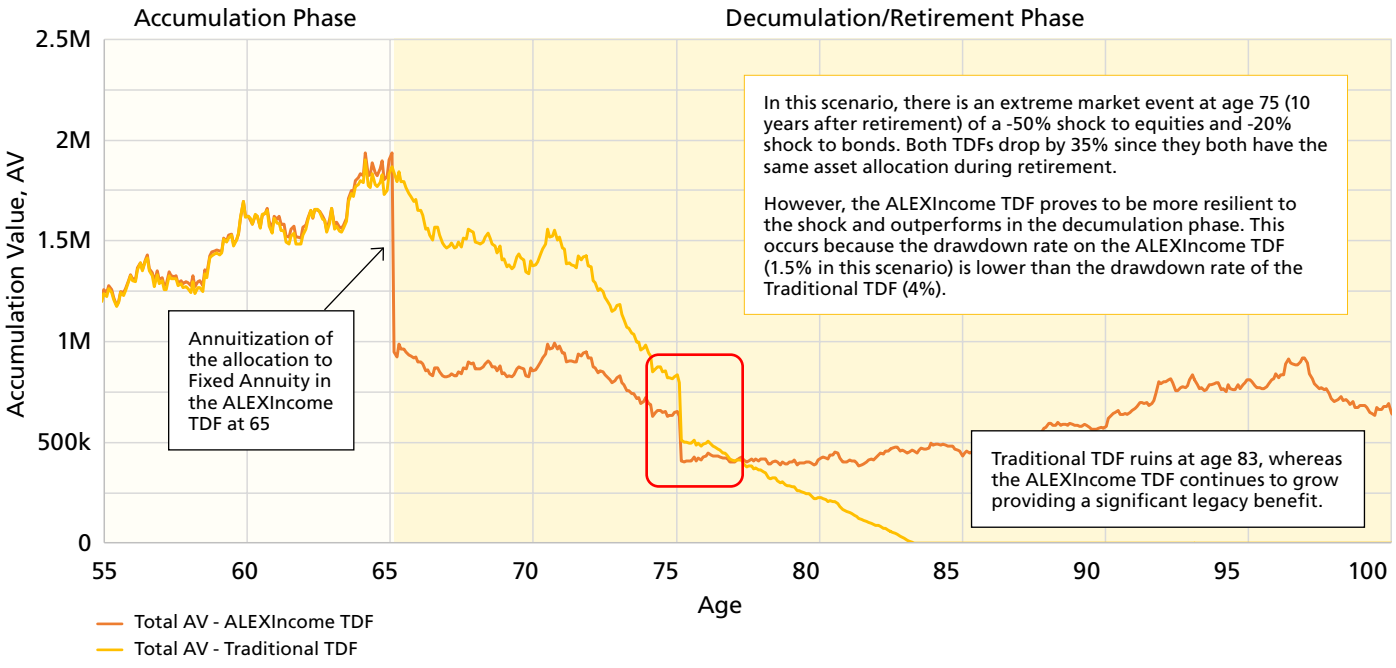
Exhibit 7: **Scenario showing outperformance of the ALEXIncome TDF in retirement phase as a result of lower drawdown rate (Case 2)**



Source: CANNEX Financial Exchanges Limited

- The creation of a pension-like income with a hands-off approach for the participant is a powerful combination and the ALEXIncome hybrid TDF offers additional value beyond delivering a level of protected income:
  - Much more liquidity without jeopardizing the desired income amount,
  - Significantly more from long-term investment earnings and a higher portfolio value over decades in retirement, and,
  - A significant opportunity to leave a legacy.
- If the market experiences a significant downturn during retirement, the protection provided by the ALEXIncome Fixed Annuity is tremendous. It's the difference between having assets at the end of life or running out of income—see Exhibit 8 (below).

Exhibit 8: Scenario showing impact of post-retirement extreme market shock to accumulation during the retirement phase



Source: CANNEX Financial Exchanges Limited

Case 3: ALEXIncome vs a Hybrid TDF with a Variable Annuity and GLWB

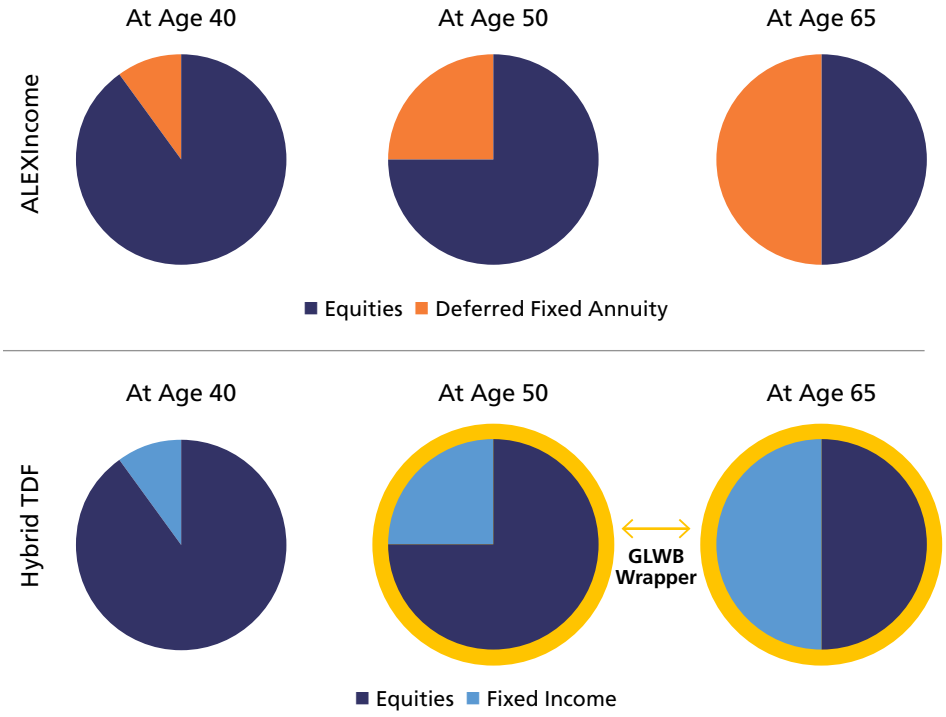
Model Set Up and Assumptions

In this test case, we compared the ALEXIncome hybrid TDF against a hybrid TDF with a Variable Annuity-style Guaranteed Lifetime Withdrawal Benefit (GLWB). The GLWB is added to the TDF at age 50.

The VA-GLWB offers a contingent longevity provision: if the participant's assets are depleted, the insurer will continue to pay an agreed upon income amount. The terms of the GLWB are rigid and cannot be altered without jeopardizing future payments.

> *The goal of this analysis was to assess the ability of the ALEXIncome hybrid TDF to replicate the same income a participant would receive by adding a VA with a GLWB to a traditional investment TDF, and not deplete the investment portfolio in the process.*

Exhibit 9: **Snapshot of asset allocation at specific ages in both TDFs (Case 3)**



Source: CANNEX Financial Exchanges Limited

At age 65, the assumed retirement date, the income base of the VA-GLWB was established by assessing the values of these two options:

1) The initial valuation of the Traditional TDF at age 50 plus all subsequent contributions made up to age 65; or,

2) The market value of the account at age 65.

This calculation determines which method yields the higher total value and it is used to determine the withdrawal amount. In this model, a 5% withdrawal rate was used.

Since each plan participant chose an annuity option during the accumulation years, once they reach retirement this model assumes they "turn on" the annuity portion as follows:

- Participant #1 in the ALEXIncome TDF chooses to annuitize all of the fixed deferred annuity. The drawdown on the investment side is calculated to match the income determined in the hybrid TDF with VA-GLWB.
- Participant #2 in the hybrid TDF with VA-GLWB will take the maximum annual income each year allowed by the terms of the contract without violating the lifetime guarantee terms.

Results of Key Metrics

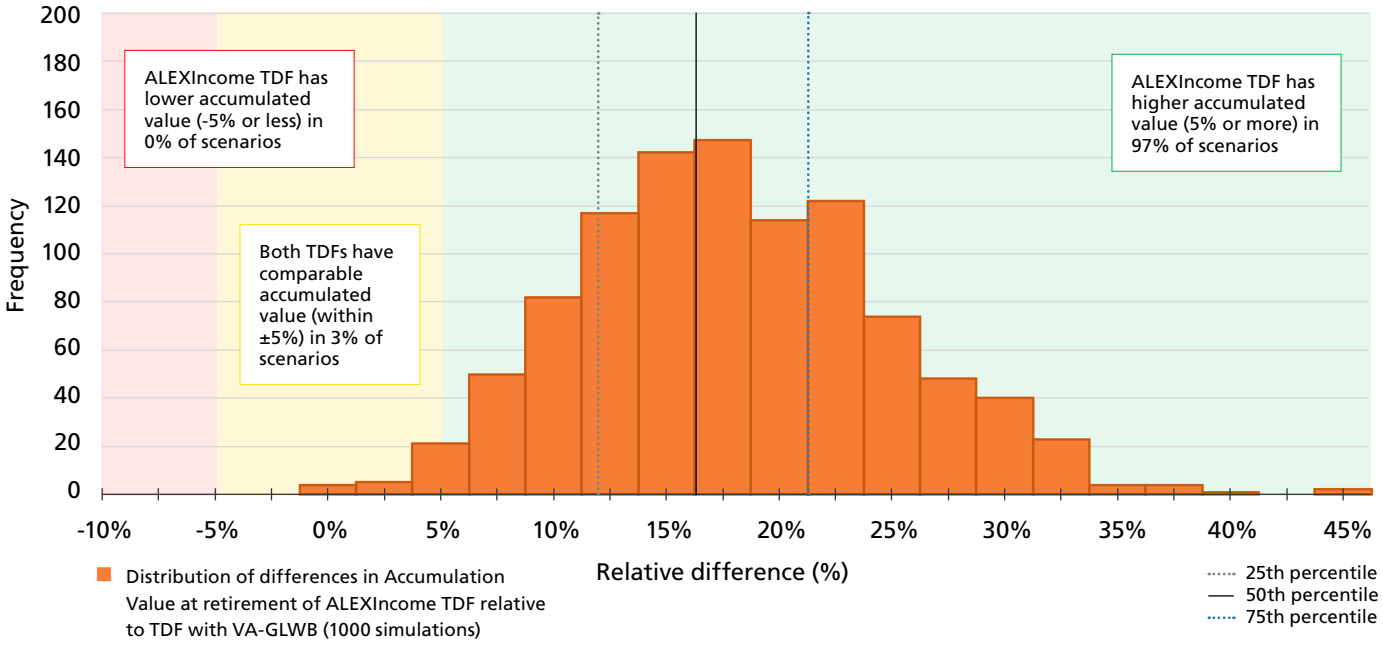
1) Accumulation Value in the 401(k) at the point of retirement

Here we see a dramatic difference in accumulation value at the point of retirement. The ALEXIncome hybrid TDF delivers a substantially higher account balance at 65:

- In 97% of the scenarios, the 401(k) balance is significantly higher:
  - o At the 50th percentile, the portfolio is 16.3% higher
  - o At the 75th percentile, the portfolio is 21.3% higher
- This is a direct result of the VA-GLWB's higher fee structure that has eroded the accumulation value.

In 97% of the scenarios, the 401(k) balance is significantly higher.

Exhibit 10: Distribution of differences in Accumulation Value at retirement of ALEXIncome TDF relative to TDF with VA-GLWB (1000 simulations)



Source: CANNEX Financial Exchanges Limited

2) Decumulation of the 401(k) throughout retirement

To compare these two income options, the income payouts were kept the same. The TDF with VA-GLWB sets the total annual income. The equivalent income amount was then constructed from the ALEXIncome hybrid TDF by combining the income from the fixed income annuity with withdrawals needed from the investment portfolio.

3) Probability of Ruin: Will the Investments Run Out?

The odds of the TDF with the VA-GLWB running out of assets are meaningful, especially if a participant lives a long time.

Exhibit 11: Lifetime Ruin Probability

Lifetime Ruin Probability (non VA assets)		
	Male	**Female**
Hybrid TDF with VA-GLWB	23.90%	29.50%
ALEXIncome hybrid TDF	2.20%	2.80%

Source: CANNEX Financial Exchanges Limited

While the potential for portfolio ruin is high with the VA-GLWB, the participant would continue to receive the same amount of income established under the terms of the GLWB.

Model Case #3 Insights and Comparisons

In both of these options, the plan participant is buying a type of lifetime income. With the ALEXIncome product, the participant contributes gradually over a long time, then switches on his lifetime income at the point of retirement.

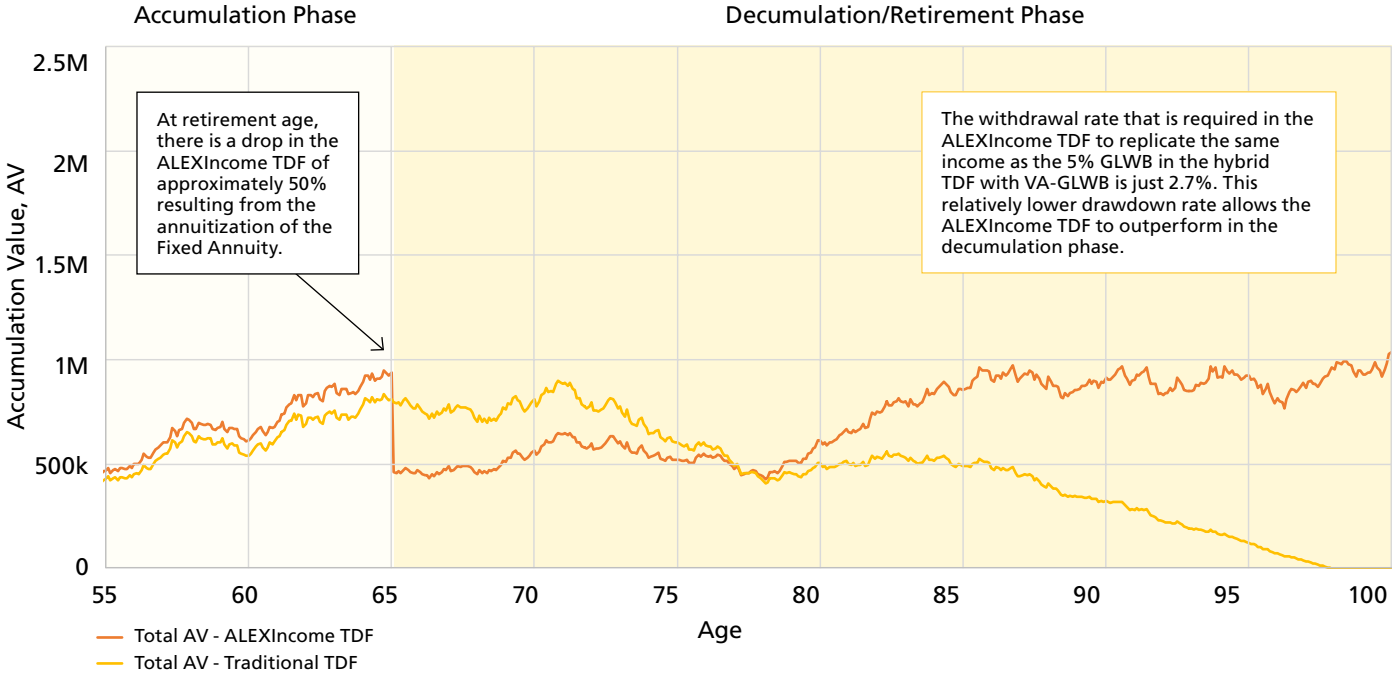
In the TDF with VA-GLWB, participants add an insurance component to their investment strategy to safeguard against the risks of outliving their savings or facing poor market performance. This insurance feature ensures that, regardless of how the investment performs or how long the participant lives, they will receive a continuous income stream even if their portfolio is depleted.

Is one option better than the other? They each have pros and cons. A primary consideration is the fee that a participant will need to pay for the VA-GLWB insurance. Other in-plan fixed annuity options are likely less expensive, such as the ALEXIncome option.

In retirement, the ALEXIncome TDF is expected to outperform the hybrid TDF with VA-GLWB, despite both having the same asset allocation. By age 85, the ALEXIncome TDF holds significantly higher investment assets than the TDF with VA-GLWB in 91% of scenarios. This advantage stems from a key design difference: splitting the accumulation value and maintaining a relatively low withdrawal rate versus wrapping the entire portfolio with a longevity insurance product.

In retirement, the ALEXIncome TDF is expected to outperform the hybrid TDF with VA-GLWB, despite both having the same asset allocation.

Exhibit 12: **Scenario showing outperformance of the ALEXIncome TDF in retirement phase as a result of lower drawdown rate (Case 3)**



Source: CANNEX Financial Exchanges Limited

Both are interesting options and provide protection. But we want the protection to be provided in the most cost-effective manner. And we must consider how a participant may want to control at least some portion of their investments throughout retirement.

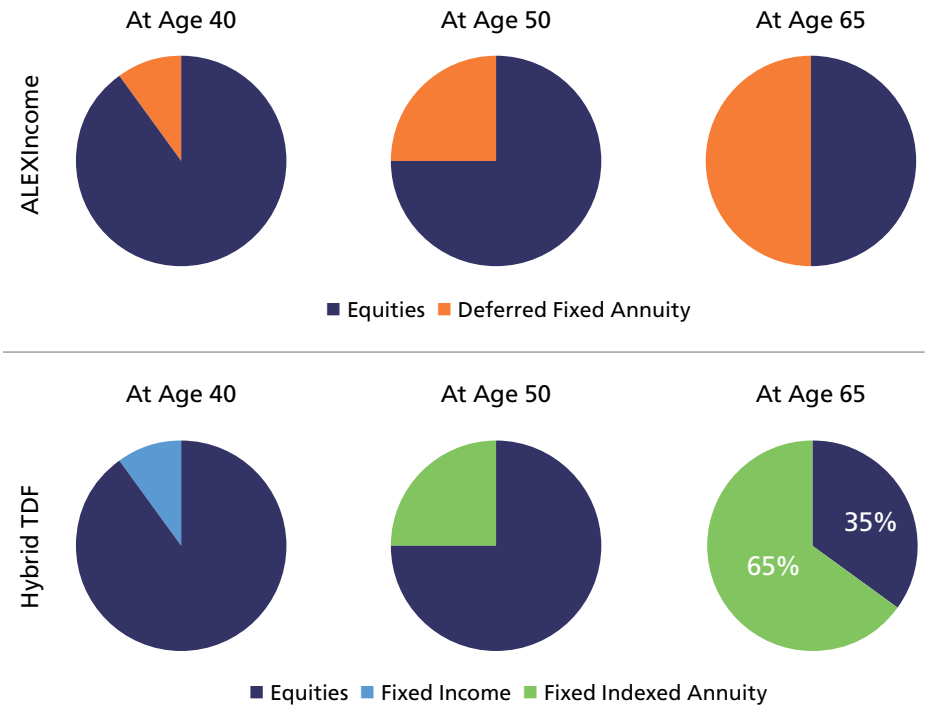
Case 4: ALEXIncome vs a TDF with Fixed Indexed Annuity and GLWB

Model Set Up and Assumptions

In this test case, the ALEXIncome TDF is compared to a Hybrid TDF with Fixed Indexed Annuity (FIA) and a Guaranteed Lifetime Withdrawal Benefit (GLWB) rider included. The participant's contributions begin buying the FIA at age 50 by replacing the core bonds and inflation-protected securities portion of the glide path, and then later replacing some of the equity allocations to reach a total FIA allocation of 65% by age 65.

> *The goal of this analysis was to compare similar insurance-investment hybrid solutions that provide guaranteed income and assess if the ALEXIncome hybrid TDF can generate and sustain the same level of income as the FIA-GLWB.*

Exhibit 13: **Snapshot of asset allocation at specific ages in both TDFs (Case 4)**



Source: CANNEX Financial Exchanges Limited

To produce income throughout retirement, a plan participant has two different structures to select from. In this model, the amount of income produced at retirement by either path is the same.

1) If the participant chooses the ALEXIncome hybrid TDF, income is produced first by the fixed annuity half of the plan assets, then increased as needed by distributions from the investment side of the plan.

2) If the participant chooses the FIA-GLWB, annual income is calculated by a set formula and anchored at age 65:

   a. 4.5% of a quarterly high-water mark of all fund assets[9]. This is the withdrawal benefit provided by the GLWB and is taken out of the FIA. It continues for life even after the FIA is ruined; plus,

   b. 1.5% of a quarterly high-water mark of all fund assets, this withdrawal is taken from the non-FIA assets. If those assets are depleted, that portion of his income will stop.

In all cases, the guaranteed income from the FIA-GLWB (part a) continues throughout retirement.

Results of Key Metrics

1) Accumulation Value in the 401(k) at the point of retirement

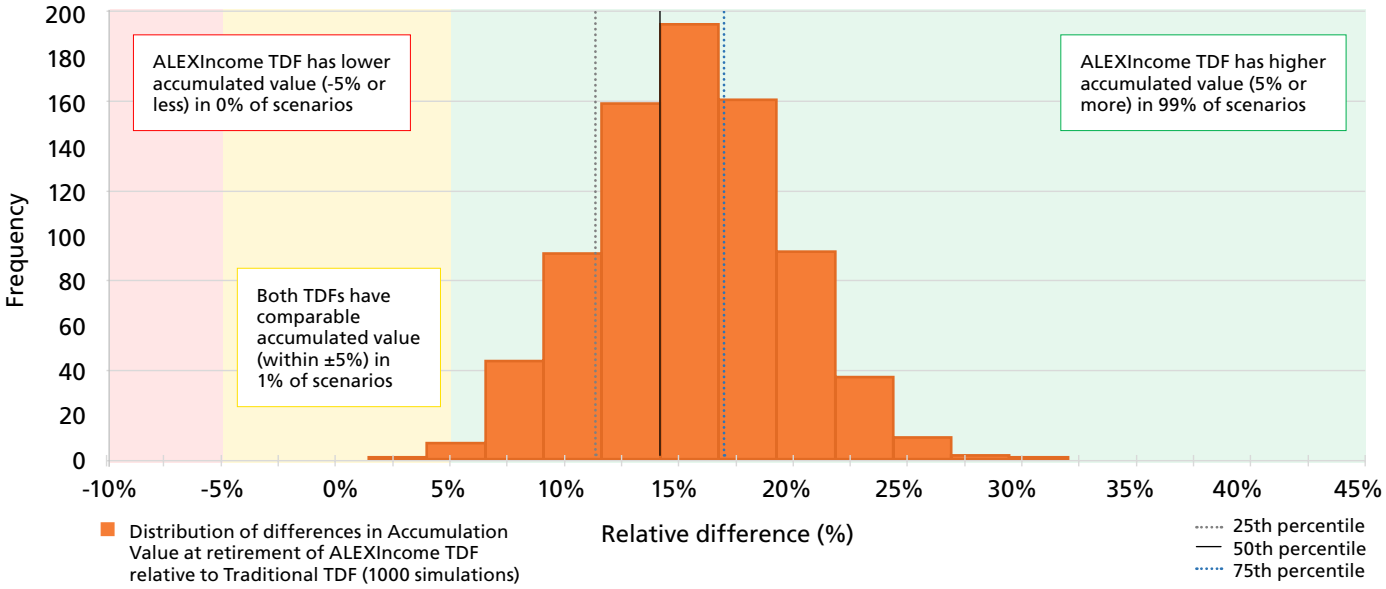
In this model, we see a dramatic difference in accumulation value at the point of retirement. In the ALEXIncome TDF:

- The accumulation value is higher in 99% of the scenarios.
  - At the 50th percentile, the balance is 13.8% higher.
  - At the 75th percentile, the balance is 16.5% higher.
- This is a direct result of the FIA-GLWB's higher fee structure and limited upside potential during the last 15 accumulation years.

The accumulation value is higher in 99% of the scenarios.

[9] *See 2031 Fund Specification https://www.nrsforu.com/rsc/CITFunds/LIBFunds.pdf*

Exhibit 14: Distribution of differences in Accumulation Value at retirement of ALEXIncome TDF relative to TDF with FIA-GLWB (1000 simulations)

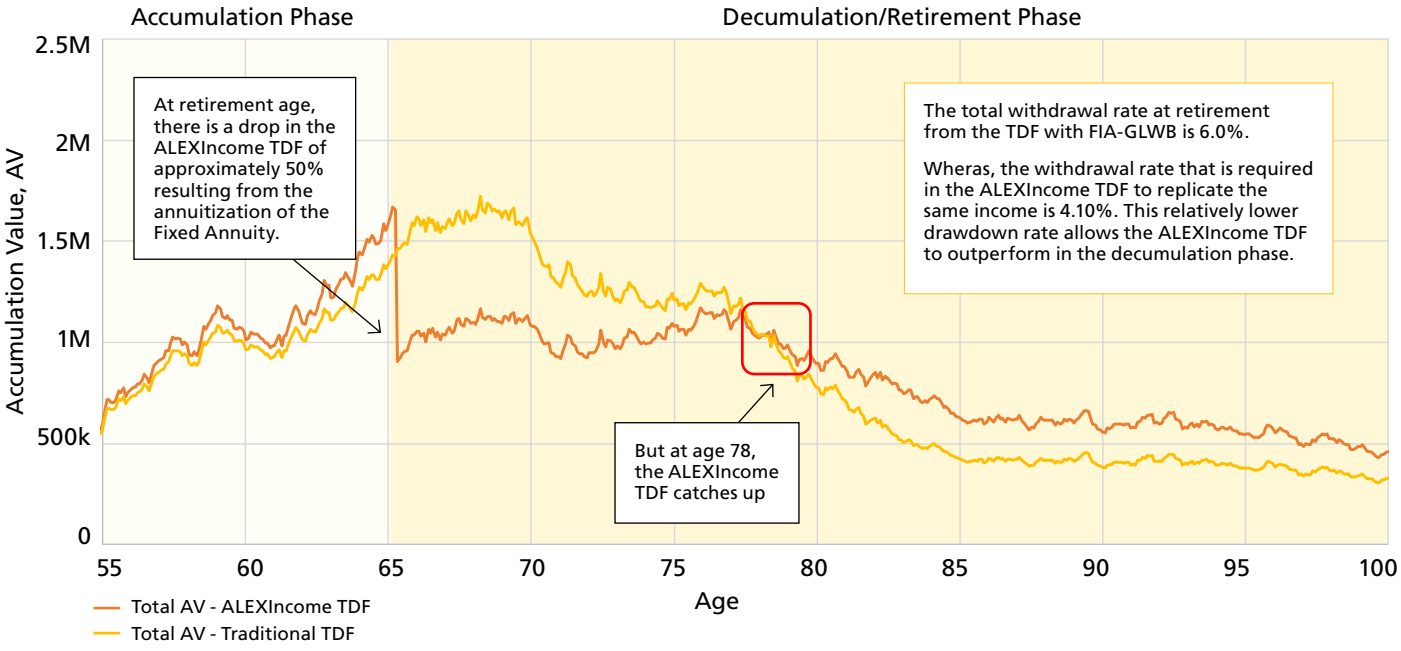


Source: CANNEX Financial Exchanges Limited

At retirement, half the account value is allocated to an income annuity, reducing the initial accumulation balance but securing guaranteed income. However, the ALEXIncome TDF's accumulation value catches up over time:

- At age 75, the accumulation value is 20.8% lower at the 50th percentile
- At age 85, the accumulation value is 31% higher at the 50th percentile

Exhibit 15: Scenario showing outperformance of the ALEXIncome TDF in retirement phase as a result of lower drawdown rate (Case 4)



Source: CANNEX Financial Exchanges Limited

This can be explained by the relatively lower withdrawal rate required from the investment side of the ALEXIncome TDF in order to meet the same income being delivered via the TDF with FIA-GLWB.

2) Decumulation of the 401(k) throughout retirement

The income payouts are identical in each model. For example, if the FIA-GLWB was established at age 65 to deliver $30,000 per year—paid with a combination of the FIA plus the investment side of the portfolio—we created the equivalent income amount on the ALEXIncome hybrid TDF side by combining the income from the income annuity with withdrawals needed from the investment side.

The longer the participant lives, the more likely the investments will be depleted and the insurance feature of the GLWB will be implemented in the FIA-GLWB option. Overall payments will decrease to 4.5% from the annuity portion that remains.

3) Probability of Ruin: Will the Investments Run Out?

With an overall withdrawal rate of 6% at retirement, the odds of the non-FIA investment assets in the hybrid TDF with FIA being depleted during retirement is significant:

Exhibit 16: **Lifetime Ruin Probability**

Lifetime Ruin Probability (non FIA assets)		
	Male	**Female**
TDF with FIA-GLWB	18.60%	21.90%
ALEXIncome hybrid TDF	13.50%	16.40%

Source: CANNEX Financial Exchanges Limited

The ALEXIncome option has a lower probability of exhausting investment assets during retirement, as a higher withdrawal from this portion of the portfolio is generally required versus the drawdown in Case #3.

The ALEXIncome option has a lower probability of exhausting investment assets during retirement.

Model Case #4 Insights and Comparisons

In both of these options, the plan participant is buying lifetime income. With the ALEXIncome product, the participant contributes in small blocks for a long time, then switches on lifetime income at the point of retirement.

In the TDF with the FIA-GLWB, the participant buys another fixed annuity in the 401(k) plan, but this time the insurance company invests the underlying contributions in investments tied to a specific index. Even with a much higher concentration of contributions being directed to the annuity side by design—at age 65, the portfolio is 35% investments, 65% fixed indexed

annuity—the income amount generated is no higher than that from the ALEXIncome hybrid TDF. This is by design so we could assess the flexibility of the ALEXIncome TDF to deliver similar income and see how long it can be sustained.

The ALEXIncome TDF's higher concentration in investible assets at 65 allows for a sustainable withdrawal rate in many cases. But if the employee lives to age 95, there is a 30% probability that the ALEXIncome solution will not generate the same amount of income as the FIA.

Is one option better than the other? They each have pros and cons. But a key consideration is the fee that a participant will need to pay for the FIA-GLWB insurance. Other in-plan fixed income annuity options are likely less expensive, such as the ALEXIncome option.

Both are viable options and provide protection. But the plan participant likely ends up with better odds of income success when the underlying annuity is provided in the most cost-effective manner.

BOTTOM LINE ASSESSMENT

The goal of this research was a proof-of-concept analysis, stacking the ALEXIncome protoype hybrid TDF against four established, known alternatives. Could the new product deliver the same level of income, or more, when compared to existing alternatives?

The simple answer is yes. The ALEXIncome hybrid TDF performs favorably relative to each of the other prevailing options in creating a hybrid DB/DC model within a 401(k).

Additional benefits were also uncovered:

- A plan participant's 401(k) overall accumulation balance is not reduced by swapping out typical fixed income core bonds and inflation protected securities with a fixed deferred annuity in 93% of the scenarios. Even when starting the annuity contributions as early as age 40, the final balance meets or exceeds a traditional investment strategy in the majority of cases.

- The ALEXIncome hybrid TDF can indeed deliver the same, if not greater, income as the other four alternatives. However, an important consideration with the other products is the drag on portfolio value caused by the higher fees required for insurance contract protection—fees that do not apply to the ALEXIncome option.

- Overall income risk is significantly reduced for plan participants by fully incorporating a single push-of-a-button to initiate income from a fixed income annuity at the point of retirement.

Overall, the ALEXIncome product is as **simple** a concept as a TDF, but with a focus on delivering income in retirement. The combination of an appropriate TDF investment coupled with an annuity product covers key **risks in retirement**: longevity, market volatility, inflation, and sequence of returns.

The ALEXIncome hybrid TDF performs favorably relative to each of the other prevailing options in creating a hybrid DB/DC model within a 401(k).

APPENDIX I: MODELING ASSUMPTIONS

This section provided some detail into the analytic framework and the assumptions used to generate the results discussed in this paper.

Analytic Framework

Each TDF concept considered in this paper is modelled and simulated for the hypothetical plan participant (described in Methodology) under three hypothetical market outcomes:

1. **Normal market conditions** – a 1,000 scenario Monte Carlo simulation of market scenarios generated based on the forward-looking capital market assumptions described on page 30.
2. **Pre-retirement market shock** – each of the 1,000 normal market scenarios were adjusted so that at five years before retirement there is a -50% shock to equities and -20% shock to fixed income assets.
3. **Post-retirement market shock** – each of the 1,000 normal market scenarios were adjusted so that at 10 years into retirement there is a -50% shock to equities and a -20% shock to fixed income assets.

The ALEXIncome TDF is compared to the other TDF concepts based on the following outcomes:

1. **Accumulation Value** at retirement and growth during retirement
2. **Decumulation** – comparison of the income generated in retirement based on the assumed income strategy. The table below provides a summary of the income strategy employed in each of the comparative cases:

Case #	Income Strategy of ALEXIncome TDF	Income Strategy of the compared TDF
1	**Annuitization:** At retirement, convert the entire Fixed Annuity allocation into a life-only income annuity, which provides guaranteed payments for the retiree's lifetime.	**Annuitization:** At retirement, convert the allocation to Fixed Income assets into a life-only income annuity, which provides guaranteed payments for the retiree's lifetime.
	Note that in both TDFs, the same income annuity pricing is used to compute the payout of the life-only annuity.	
2	**Annuitization + Systematic Withdrawals:** The life-only income annuity and systematic withdrawals to replicate the same level of income produced from the compared TDF.	**4% Systematic Withdrawal Plan:** At retirement, determine the withdrawal amount as 4% of the accumulation value at retirement and withdraw this amount every year until ruin.
3		**5% GLWB:** At retirement, determine the maximum annual lifetime withdrawal amount allowed under the GLWB.
4		**4.5% GLWB + 1.5% Systematic Withdrawals**

Source: CANNEX Financial Exchanges Limited

3. **Lifetime Ruin Probability** (LRP) is the risk of depleting one's retirement savings to zero while still being alive. This metric evaluates the sustainability of a retirement income strategy considering factors such as withdrawal rates, investment performance and longevity risk (see Mortality Model). A lower LRP indicates a higher likelihood that the retirement savings will last throughout the retiree's lifetime, reducing the risk of financial shortfall in retirement years. In this analysis, ruin is defined as ruin of the equity and bond assets that remain in the TDF, i.e. ignores allocations to the insurance products (such as income annuity, FIA, FA).

Income Annuity Pricing

The annuitization rate of the life-only income annuity (at annuitization of the Fixed Annuity in the ALEXIncome TDF or the fixed income assets in the Traditional TDF) is determined using the following pricing basis:

- Unisex mortality table that is a 50/50 blend of the 2012 IAM Basic Male and Female Tables.
- Unisex mortality improvement that is a 50/50 blend of the G2 Male and G2 Female Projection Scales.
- Static mortality projection from the base year of 2012 to the year of annuitization. The analysis assumes that the current year is 2023 i.e. the hypothetical participant will be 65 in the year 2048.
- A flat pricing interest rate that is set to the simulated interest rate at the time of annuitization plus a pricing spread of 0.75%.
- See sample annuitization rates below for a plan participant who will be 65 in the year 2048:

Pricing Interest Rate	Annuitization Rate
1.00%	4.55%
1.50%	4.85%
2.00%	5.16%
2.50%	5.48%
3.00%	5.80%
3.50%	6.14%
4.00%	6.48%
4.50%	6.83%
5.00%	7.18%
5.50%	7.54%
6.00%	7.90%
6.50%	8.27%
7.00%	8.65%
7.50%	9.02%
8.00%	9.40%
8.50%	9.79%
9.00%	10.17%
9.50%	10.56%
10.00%	10.95%

Source: CANNEX Financial Exchanges Limited

Interest Rate

Interest rate, specifically the 10-year U.S. Treasury, is simulated using a Vasicek model. The Vasicek model is a stochastic interest rate model that is appropriate for this analysis because of its mean-reversion feature and its simplicity to calibrate and simulate. One of the limitations of the model is that it allows for rates to be negative; while this is entirely possible in the current environment, we have imposed a floor of 0% on simulated interest rates.

The model was calibrated to the interest rate environment post-2008 financial crisis and has the following characteristics:

- Long term mean level of interest rate of 2.14%
- Changes in the interest rate had a standard deviation of 0.77%
- The speed at which the rate returns to the long term mean level was 0.4901
- The initial value of the interest rate in each simulated scenario was 3.06% (average monthly close of the 10-year U.S. Treasury over the period September 2021 to September 2023)

Capital Market Assumptions

Six asset classes representative of the investments available in retirement savings portfolio are considered for this analysis. Each asset class is simulated using a Geometric Brownian Motion (GBM) model.

GBM is a widely used model for asset prices as it is simple and straightforward to implement. It relies on the assumption that price returns follow a normal distribution with constant expected return and constant volatility. In reality, price return distributions have fatter tails compared to a normal distribution and volatility is not constant but changes over time and may also change based on price level. In this analysis, we are not concerned with any application that could suffer from these simple assumptions such as replicating market prices of options or assessing tail risks; we are concerned with the long-term price behavior of assets as well as capturing the dynamics in price return between different assets and so the GBM model is appropriate.

Parameter values for each asset class are taken from the JP Morgan Long-Term Capital Market Assumptions 2021, 25th edition (US Dollar Assumption Matrix page 118).

Asset Class	Average Annualized Return	Annualized Volatility
US Large Caps	5.13%	14.80%
US Small Caps	6.33%	19.44%
International Equity	7.80%	16.92%
Emerging Markets Equity	9.19%	21.14%
US Aggregate Bonds	2.16%	3.43%
Inflation Protected Securities	1.64%	5.29%

Source: CANNEX Financial Exchanges Limited

Asset correlations, among the assets in the table above, are also taken from the JP Morgan Long-Term Capital Market Assumptions 2021, 25th edition; correlations between the 10-year US Treasury and asset classes were estimated using the historical data.

Asset Class	10 Year U.S. Treasury	US Large Caps	US Small Caps	International Equity	Emerging Markets Equity	US Aggregate Bonds	Inflation Protected Securities
10 Year Treasury	1.00						
US Large Caps	0.29	1.00					
US Small Caps	0.37	0.91	1.00				
International Equity	0.30	0.88	0.79	1.00			
Emerging Markets Equity	0.25	0.77	0.69	0.88	1.00		
US Aggregate Bonds	-0.84	0.00	-0.07	0.07	0.12	1.00	
Inflation Protected Securities	-0.62	0.09	0.03	0.16	0.25	0.74	1.00

Source: CANNEX Financial Exchanges Limited

Mortality Model

Annuitant mortality is simulated by the Gompertz-Makeham mortality model, which states that the death rate for humans can be attributed to two categories of causes:

1. Age-dependent causes of death that increases with age, and
2. Age-independent causes, which are attributable to accidents

This model has been widely used to create mortality tables within the insurance industry over the last century. For this study, the model has been calibrated to the Retirement Plan Mortality Tables of 2014 which have been projected to the year 2017 using a 2014 improvement scale, which is widely used in the pension.

Gompertz-Makeham Parameter	Male	Female
Accidental death rate	0.003148	0.001982
Modal value of life	89.50	91.60
Dispersion coefficient	8.60	8.50

Source: CANNEX Financial Exchanges Limited

DISCLOSURES

1. *The results presented in this report are based on the set of assumptions used for the analysis and documented herein. CANNEX retains the discretion to update these assumptions in the future.*

2. *All product specifications are based on the information provided to CANNEX by ALEXIncome, the sponsor of this report.*

3. *CANNEX is not a fiduciary. CANNEX is not providing any investment or other financial advice of any kind. All material contained in this report is for informational purposes only. No action should be taken solely on the contents of this report. CANNEX does not guarantee any use of this information.*

4. *The financial strength of the participating insurers has not been considered.*

5. *The effect of taxes (if any) has not been considered.*

6. *CANNEX expressly disclaims any and all liability for any direct, indirect, consequential, special, exemplary, or other damages arising from any direct or indirect reliance on the contents of this report.*

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In the U.S., CANNEX provides **annuity data, analytics, illustrations and research services** to help their clients (insurance companies, banks, brokers and service providers) improve their various products and processes to better serve the public. We invest resources in the **research & development of services and concepts** that will assist in the evaluation and comparison of protections embedded in savings and income products.

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