QS Investors

June 2020

DRIVE-with-Annuities: Taking a Smoother Road in Retirement

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EXECUTIVE SUMMARY

- Solving for longevity risk, or the prospect of outliving your savings, is a daunting financial challenge. Annuities are the only commonly available financial tool that guarantees income payments throughout one's lifespan – enabling a retiree to avoid fully depleting his or her retirement income.
- Annuities also increase the certainty of a retiree's financial prospects as they convert present wealth into guaranteed future income. However, they are sophisticated financial tools that must be well understood to be used properly.
- The QS DRIVE-with-Annuities framework can successfully incorporate these tools into its solution set while maintaining its original goal of determining the optimal asset allocation and spending recommendation for individuals – one that is dynamic and customized.
- While QS DRIVE-with-Annuities recommendations vary for different individuals based on specific characteristics and personal situations, our research concludes that most retirees will benefit from the inclusion of annuities in their retirement portfolio, in particular:
  - Retirees with greater wealth relative to their guaranteed income, since these individuals need less growth assets in their portfolios.
  - Retirees with a preference for greater retirement income certainty over the potential to grow wealth
- Our research finds that retirees exhibiting average income and savings will benefit from gradually annuitizing between 10% - 20% of their wealth during the first twenty years of their retirement.
- However, the optimal timing and amount allocated to annuities are intricate and nuanced decisions. Our DRIVE-with-Annuities framework removes the guesswork and achieves a balanced outcome best suited for each retiree.

Why Does Longevity Risk Matter?

Longevity risk refers to the uncertainty generated by the prospects of outliving one's retirement savings. This concern is more prominent for today's retirees than any generation coming before it. Firstly, retirees today count on fewer sources and smaller amounts of guaranteed income than they have in the past. In addition to social security benefits, past generations of retirees often had access to defined benefit ("DB") pension plans that provided additional guaranteed income. With the decreasing prevalence of DB plans, many retirees now face a decline in guaranteed income. The potential future decline in social security benefits further exacerbates this concern.[2] From this perspective, an annuity helps retirees create a personal pension plan that minimizes the risk of outliving one's retirement savings.

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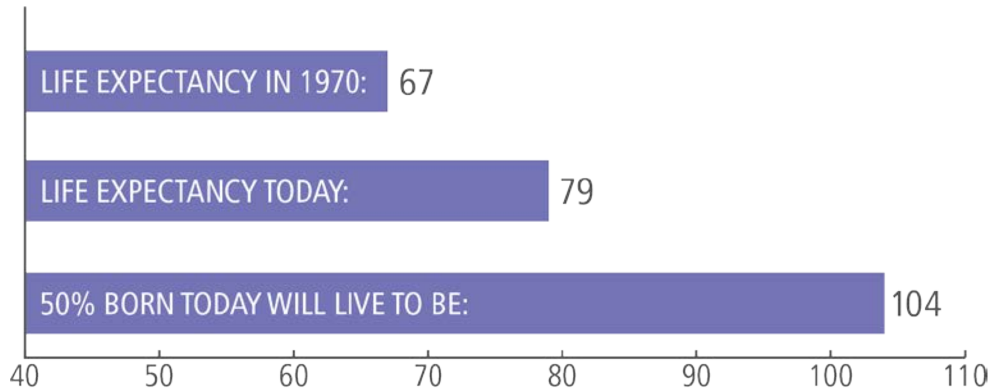
[2] Assuming no policy changes, social security trust fund reserves are expected to be exhausted by 2037. (https://www.ssa.gov/policy/docs/ssb/v70n3/v70n3p111.html)

Secondly, mirroring a global trend, Americans are spending more years in retirement today than they have in the past. While most investors are aware of increasing life expectancy, the dramatic continuation of this trend may surprise some: recent data from the U.S. Census Bureau revealed that 50% of Americans born today will spend nearly 40 years in retirement.[3]

EXHIBIT 1: CHANGES IN LIFE EXPECTANCY OVER TIME



Source: W.H.O., *The Lancet*.

The primary benefit of an annuity is its ability to offset longevity risk since the annuitant will receive payments for life.

Our introductory white paper on the QS DRIVE (Dynamic Retirement Investment Vehicle) framework (https://www.qsinvestors.com/insights/qs-drive-your-roadmap-in-retirement), explains how DRIVE solves for the optimal asset allocation and annual consumption amount for individuals during their retirement years. In this paper, we expand on our original research by incorporating guaranteed income via annuities as a decision variable in our solution set.

How Does an Annuity Work?

Annuities exist in many varieties with a myriad of features. In its simplest form, commonly known as an immediate annuity, the purchaser provides an insurance company with a lump sum payment (known as the premium) in exchange for receiving a stream of guaranteed[4] future payments. This can be seen as a transfer of wealth from an individual's "retirement balance sheet" to bolster his or her future "retirement income statement." The cumulative amount of income ultimately paid to the annuitant is unknown in most cases, as it is ultimately determined by the actual number of years he or she lives, and given ex ante uncertainty about life expectancy, this may be more or less than the premium paid.[5] Common features of annuities include adjustment for inflation, flexible premium payment schedules and survivorship benefits.[6]

[3] Assuming an average retirement age of 65.
[4] Guaranteed payments are subject to the credit worthiness of the insurer (the annuity issuer).
[5] Intuition suggests that retirees with a longer life expectancy than average will benefit more from annuities due to the fact they would receive a greater amount of cumulative income. This is correct, but our research also found that even individuals with a shorter life expectancy may still benefit from incorporating an annuity into their retirement portfolio. For these individuals, our research suggests they should begin annuitizing at a younger age and annuitize less wealth compared to an individual with a longer life expectancy.
[6] It may be helpful to consider how an annuity is fundamentally different from traditional fixed income assets. Both instruments provide regular cash flow payments, but annuity payments are a combination of interest and principal that continue for life. In contrast, a bond pays interest over a finite period and returns principal at a stated maturity date.

What are the Advantages of Annuities?

The primary benefit of an annuity is its ability to offset longevity risk since the annuitant will receive payments for life. Thus, even in a scenario where the annuitant has depleted his or her retirement savings, income payments will be made as promised by the annuity issuer. In addition to the tangible value of these future payments, annuity purchasers often speak of the "peace of mind" associated with an annuity – that is, the intangible value of removing anxiety associated with depleting one's savings.

In addition, annuities convert wealth into a guaranteed income stream which offers more stability and predictability than income generated by most financial assets (for example, a traditional portfolio of stocks and bonds). This benefits retirees by reducing the volatility of their financial future.

Annuities benefit retirees by reducing the volatility of their financial future, but as with all asset classes or financial products, they have limitations.

What are the Limitations of Annuities?

As with all asset classes or financial products, annuities have limitations. While annuities provide regular cash payments, once they are purchased, they typically cannot be altered, liquidated, or sold. Additionally, in exchange for a guaranteed stream of payments in perpetuity, on average, annuities pay lower returns compared to traditional assets, making opportunity cost a limitation of annuities.

This point is expanded upon in Exhibit 2, where we compare the cumulative payouts between:

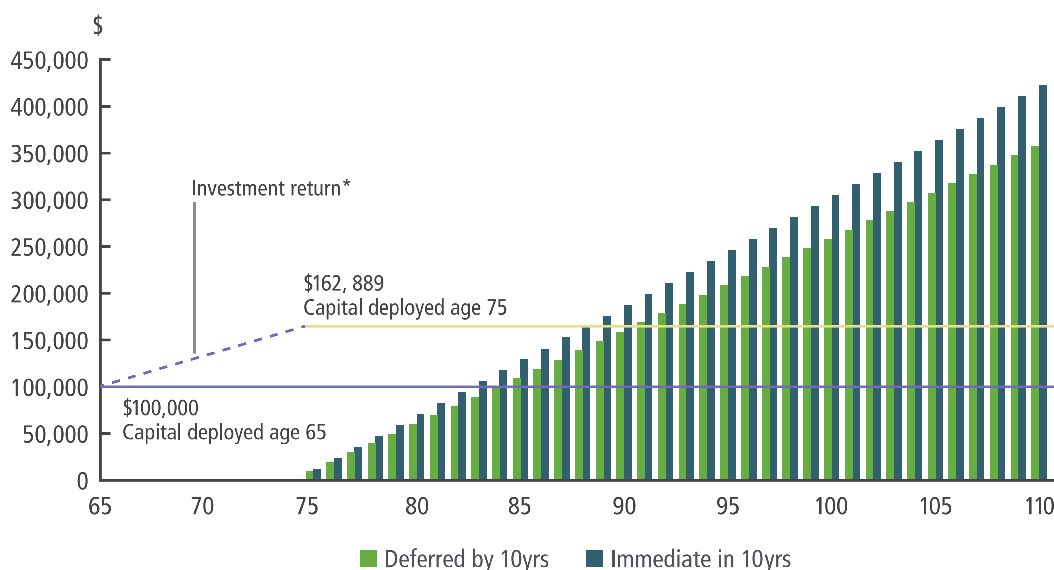
- Purchasing a $100,000 annuity today and deferring the payout start date by ten years (a "deferred income annuity").
- Investing $100,000 today[7] and using the proceeds in ten years to purchase an annuity whose payout begins immediately (an "immediate annuity").

A $100,000 portfolio of stocks and bonds grows to nearly $163,000 after ten years. This investment return provides a larger premium base for the immediate annuity and so will pay higher cumulative income across retirement compared to the deferred income annuity. While the deferred annuity locks in a known level of guaranteed income in advance, it also forgoes the higher expected returns available in traditional investments prior to the payout period in this example.

[7] Assumes a 5% annual investment return.

The objective of DRIVE-with-Annuities remains the same as DRIVE. Both frameworks strive to determine the optimal asset allocation and consumption strategy that maximizes an individual's lifetime spending, while minimizing the risks of portfolio depletion.

EXHIBIT 2: ANNUITIES ARE NOT A FREE LUNCH: CUMULATIVE ANNUITY PROJECTION



Source: https://www.immediateannuities.com/, December 2019.

What Type of Investors Benefit the Most from an Annuity?

Annuities can potentially benefit any type of investor, but certain preferences or characteristics are likely to magnify this effect. Some of these investor characteristics include:

- More conservative investing preferences (i.e., greater risk aversion)
- Have accumulated greater retirement savings, and therefore, have less need for capital growth
- Have low guaranteed income relative to total wealth
- Are in the middle years of their expected retirement

Moving from DRIVE to DRIVE-with-Annuities

Our initial white paper introduced the DRIVE framework, where we presented a traditional investment opportunity set including stocks, bonds, and cash. Here, we demonstrate findings from DRIVE-with-Annuities, an extension of our initial decumulation research that now incorporates annuities as a potential "asset class" alongside the original solution. In our first installment discussing DRIVE, we demonstrated DRIVE's superior investment results against existing market alternatives, namely the 4% Rule and the 70% Income Replacement Ratio. Here, we show how these results can be further enhanced when annuities are incorporated into the optimal solution. The objective of DRIVE-with-Annuities remains the same as DRIVE. Both frameworks strive to determine the optimal asset allocation and consumption strategy that maximizes an individual's lifetime spending, while minimizing the risks of portfolio depletion.

What is the Optimal Annuity Purchase Decision?

The original DRIVE framework recommends more conservative asset allocations with higher wealth levels, holding other variables such as age and guaranteed income constant. This conforms to conventional wisdom – that a wealthier person's retirement is more-or-less "fully funded" and they need only take modest investment risk. DRIVE points out that a less wealthy individual should have a higher exposure to equities since this individual has a relatively large ratio of guaranteed income (a risk-free asset) to investment assets (a risky asset). This individual should take more investment risk in order to grow their assets and improve expected consumption throughout their retirement.

Our research builds on these takeaways and focuses on the most critical variables impacting the annuity purchase decision: age of the retiree and his or her level of wealth. Importantly, we define wealth as a retiree's ratio of total wealth to annual guaranteed income ("wealth to G.I."). [8] Thus, an individual who has $400,000 of total wealth and receives $20,000 of annual guaranteed income has a wealth level of 20.

Our Key Conclusions are:

Annuity purchases are more attractive mid-way through retirement

- When the retiree is young, growth assets are preferred in the optimal portfolio. This is due to both:
  - Lower risk of immediate depletion since retirement assets are typically at their greatest point at the start of one's retirement
  - Opportunity cost: a younger retiree has a longer investment horizon, which favors higher return assets
- When the retiree is at an advanced age, the benefits of purchasing an annuity diminish due to the annuitant having a decreased life expectancy, therefore decreasing the need for longevity hedging.

Regardless of age, annuities are more attractive when the retiree has greater wealth

- The diminishing marginal utility of wealth and consumption suggests a reduced need for portfolio growth at higher levels of wealth to G.I. and hence requires less exposure to equities and bonds.
- After basic spending needs are met, it may be advantageous to exchange higher marginal consumption for a higher guaranteed floor of consumption.
- Since greater wealth makes annuitization more attractive, periods of sustained positive market performance are an impetus to increase annuity exposure.

Contrastingly, we find that retirees with lower wealth relative to their guaranteed income should annuitize less since these individuals need greater exposure to growth assets in their retirement portfolio. In terms of age, DRIVE recommends annuitizing after the initial years of retirement but not after the age of 90. [9]

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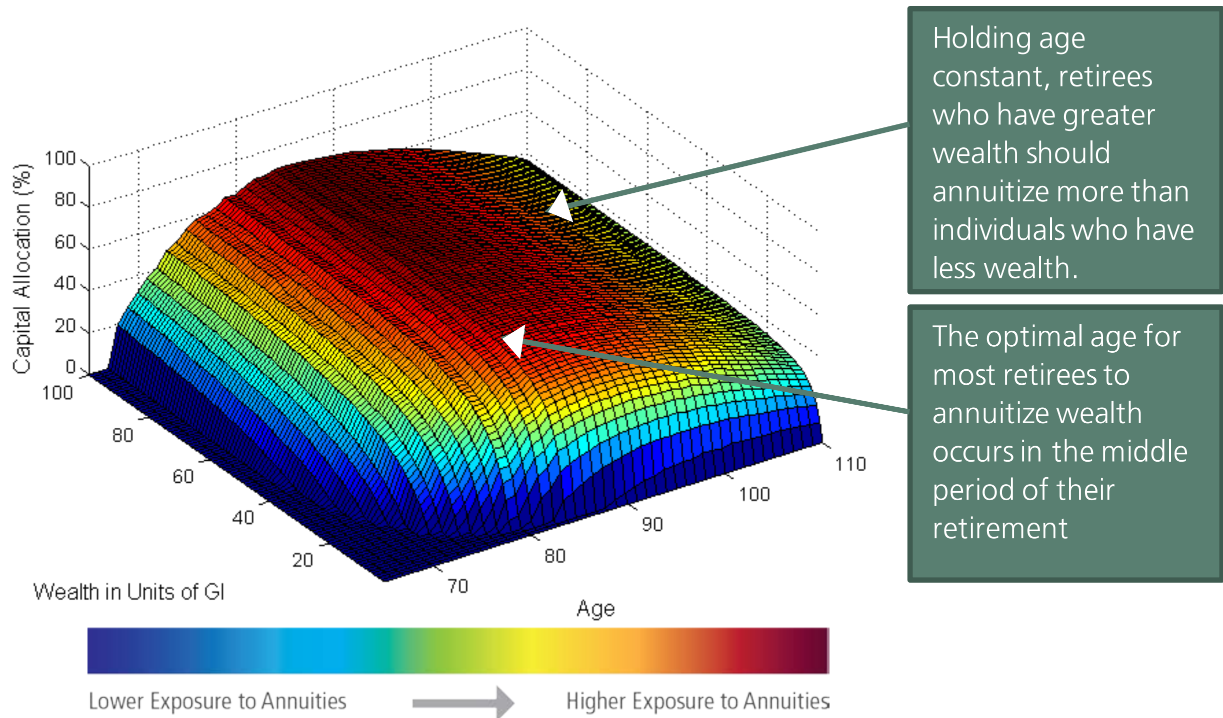
[8] Sources of guaranteed income include social security, annuity and defined benefit payments.

[9] Theoretically, DRIVE-with-Annuities finds annuitization opportunities for those older than 90, however there are practical limitations concerning an annuity's maximum purchase age set by most insurers.

Exhibit 3 summarizes the DRIVE-with-Annuities optimal annuity conversion decisions across wealth and age. In this exhibit and subsequent illustrations, wealth is defined in units of guaranteed income ("G.I."). The axis label "Wealth in Units of G.I." represents the ratio of a retiree's total wealth to annual guaranteed income (including social security, annuities and pension income).

EXHIBIT 3: OPTIMAL ANNUITY PURCHASE ACROSS WEALTH AND AGE



Source: QS Investors.

How do Annuities Change Your Spending Potential?

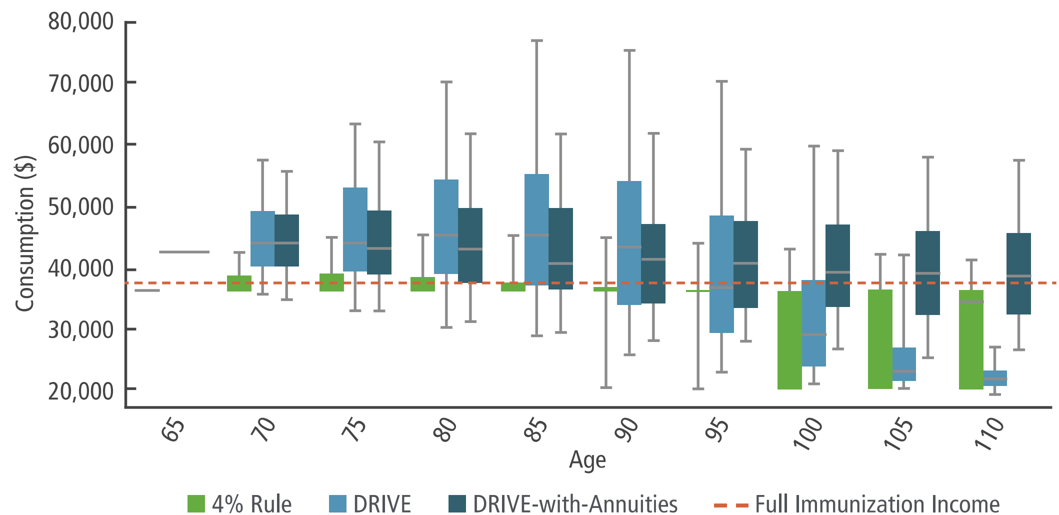
While most retirees recognize the tradeoff between capital growth and downside risk protection (in this case, downside risk also includes longevity risk), our framework provides much needed intuition. In Exhibit 4,[10] we compare the distribution of consumption outcomes in retirement for DRIVE, DRIVE-with-Annuities, and a decumulation rule-of-thumb known as the "4% rule."[11] The dashed red line indicates the annual income received by fully annuitizing the retiree's wealth at the start of retirement (age 65). The results demonstrate a full distribution of outcomes, including the 5th, 25th, 50th, 75th, and 95th percentile outcomes.[12] Differences in the outcomes are driven by a range of simulated market performance paths.

- In the initial five years of retirement, DRIVE and DRIVE-with-Annuities perform similarly as the benefits of annuitization do not materialize in the early years of retirement.

[10] The simulation assumes an individual with $400,00 of wealth at retirement (65 years old) and annual guaranteed income of $20,000.
[11] We define the 4% rule as the greater of 4% of your pre-retirement portfolio value or 4% of current portfolio
[12] In Exhibit 4, the Worst Case Scenario represents the average of the worst 5 percent of outcomes with regards to simulated portfolio wealth for an individual with 20 G.I. wealth at the start of their retirement. Since G.I.-to-wealth is defined as the ratio of total wealth to annual guaranteed income, one example of 20 G.I. wealth is a retiree with $300,000 of total wealth who receives $15,000 of annual guaranteed income at the start of retirement.

- At advanced ages (mid-nineties and beyond), DRIVE-with-Annuities demonstrates a clear advantage in consumption (i.e., ability so spend), leveraging the value of the increased guaranteed income from annuities.
  - This is emphasized in the Worst-Case scenario depicted in Exhibit 4, which reflects the possibility that traditional investments (an alternative to an annuity) are risky and may lose value.
- The DRIVE-with-Annuities results also emphasize the opportunity cost of fully annuitizing one's wealth at the start of retirement, which would have yielded an annual guaranteed income of $37,200.

EXHIBIT 4: SIMULATED ANNUAL CONSUMPTION

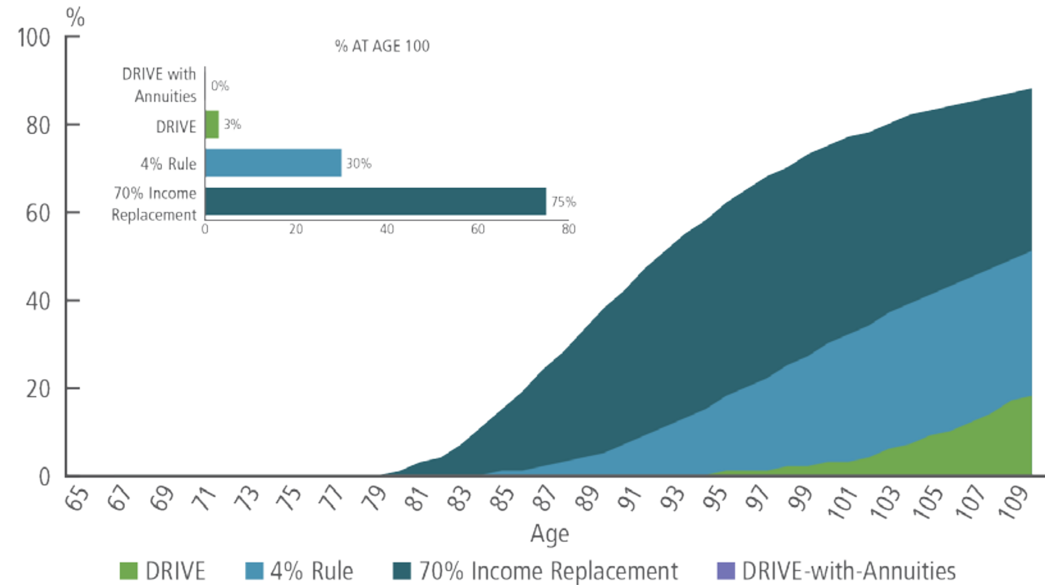


Source: QS Investors.

Perhaps the clearest takeaway underscored by the analysis is the value an annuity plays as a hedge against longevity risk. The simulation providing the forecasted income distribution in Exhibit 4 also yields the probability of wealth depletion statistics in Exhibit 5. Both the 4% Rule and the 70% Replacement Ratio have a far greater potential to fully deplete a retiree's savings, largely due to their inflexible nature and inability to course correct. A retiree utilizing DRIVE-with-Annuities will never see their wealth fully deplete due to the recurring, guaranteed payments from annuities.

EXHIBIT 5: SIMULATED PROBABILITY OF WEALTH DEPLETION

Source: QS Investors.



Analysis of Historical Backtested Results

We examined the DRIVE-with-Annuities output for a hypothetical woman named Alice. We began the backtest in 1974, allowing for a lengthy retirement to demonstrate the impact of annuities on her results.

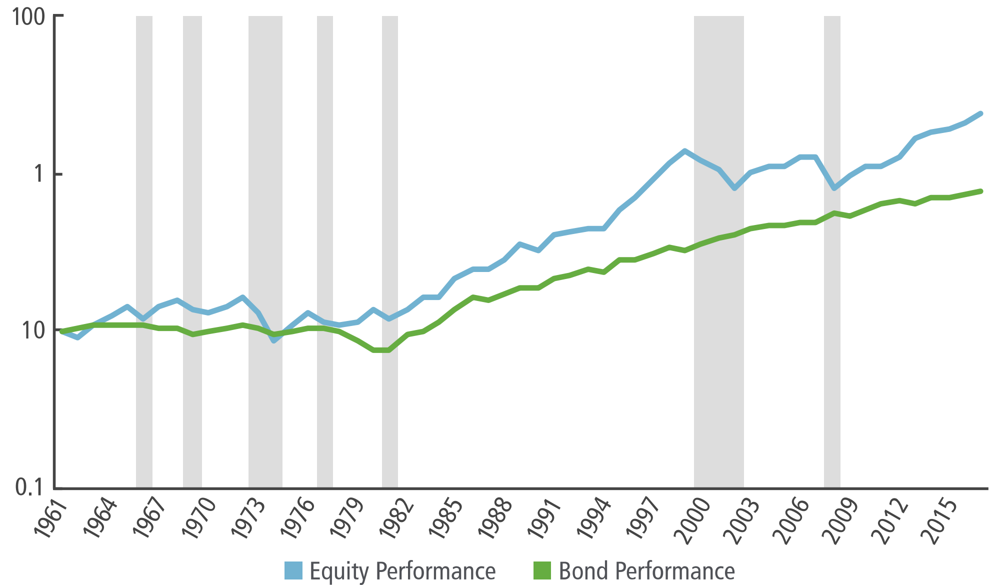
- In the DRIVE-with-Annuities framework, Alice had a similar asset allocation (mix of stocks and bonds) as she would have had in DRIVE, but the optimal solution in DRIVE-with-Annuities identified several optimal points to convert some of her wealth into annuities.

EXHIBIT 6: BACKTESTED RESULTS FROM 1974 - 2019

ALICE

AGE IN RETIREMENT	INITIAL WEALTH
65-110	$400,000
GENDER	**GUARANTEED ANNUAL INCOME**
Female	$20,000
ANNUITY TYPE	**ANNUITY COST OF LIVING ADJUSTMENT**
Immediate	2% Annually

EXHIBIT 6A: HISTORICAL EQUITY AND BOND PERFORMANCE[13]

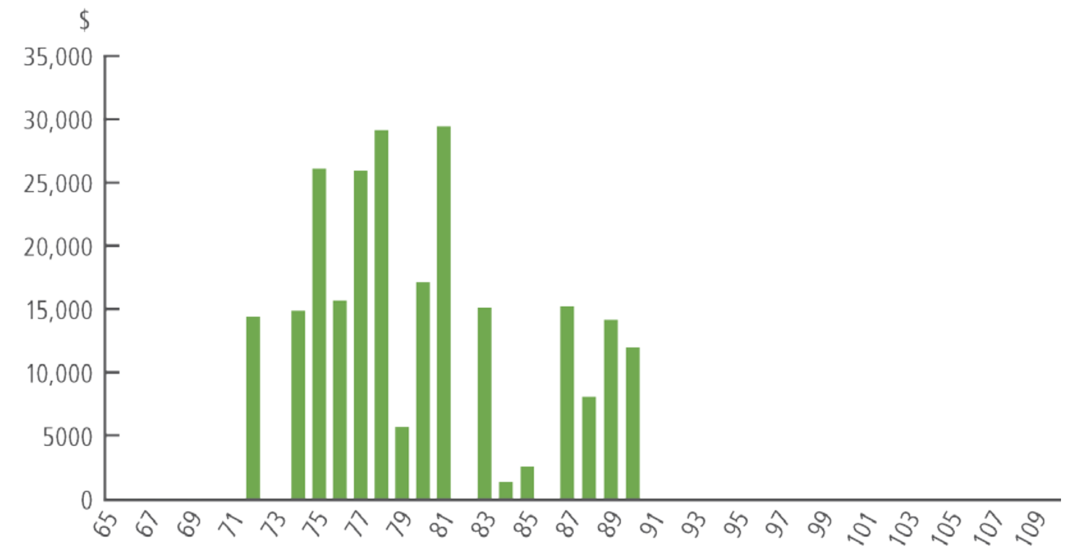


Source: QS Investors, Bloomberg.

The first of these annuity purchases (as exhibited in Exhibit 6B) occurred at the age of 71 and the final one at the age of 90.

- The DRIVE-with-Annuities framework made the annuity purchase recommendations following years when the stock market performed strongly.
  - These equity market returns had the effect of increasing Alice's wealth to a level where diversifying into an annuity was beneficial – another way to view this action is trimming her portfolio gains in favor of increasing her future guaranteed income.

EXHIBIT 6B: BACKTESTED ANNUITY PURCHASES

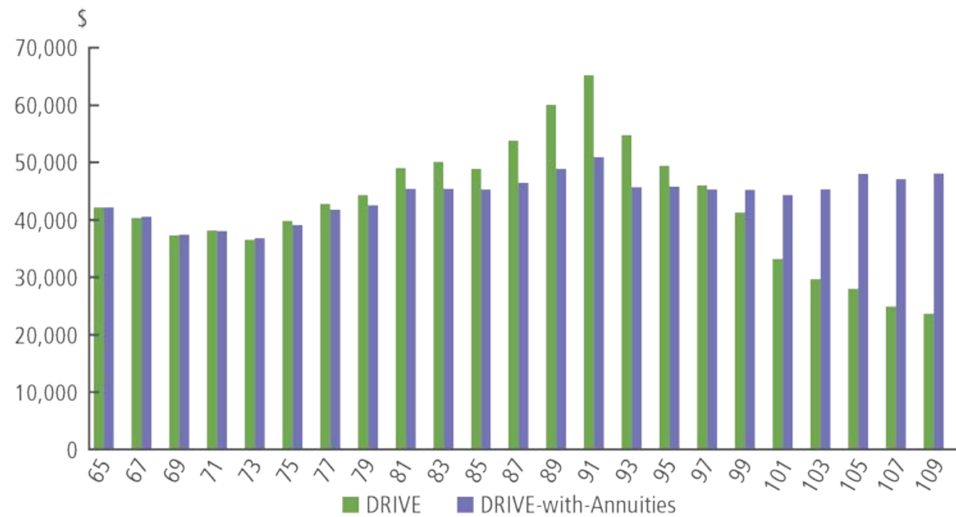


Source: QS Investors

[13] Equities represented by the S&P 500 Index, Bonds represented by the U.S. Barclays Aggregate Index. Areas shaded in grey denote periods of historically significant equity market loss.

- As demonstrated in Exhibit 6C, the benefit of the annuity purchases is most clearly observed in Alice's later years, where her annual spending potential exceeds her consumption without the annuity exposure. Consumption in the DRIVE-with-Annuities framework has a higher floor and exhibits less annual volatility due to the annuity payments. The analysis is done in "real" terms, therefore adjusting for the expected detrimental impact of inflation over time.
  - The annual consumption output will dynamically adjust regularly, and the back-tested results would have provided a helpful guide for Alice's future estate planning and long-term consumption.

EXHIBIT 6C: BACKTESTED ANNUAL CONSUMPTION (SPENDING RECOMMENDATION)

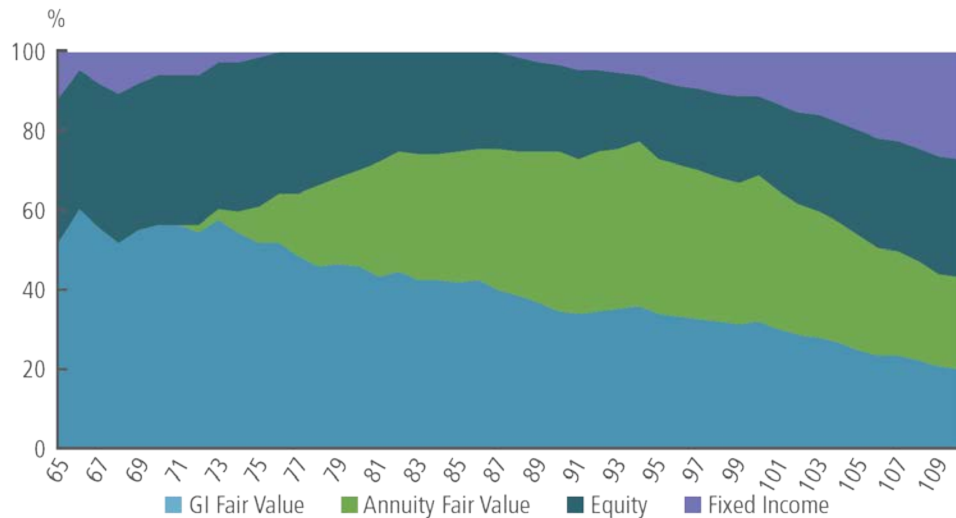


Source: QS Investors

Exhibits 6D and 6E demonstrate Alice's back-tested portfolio allocations (% of portfolio and dollar value) between guaranteed income, annuities, equities and fixed income over the remainder of her retirement.

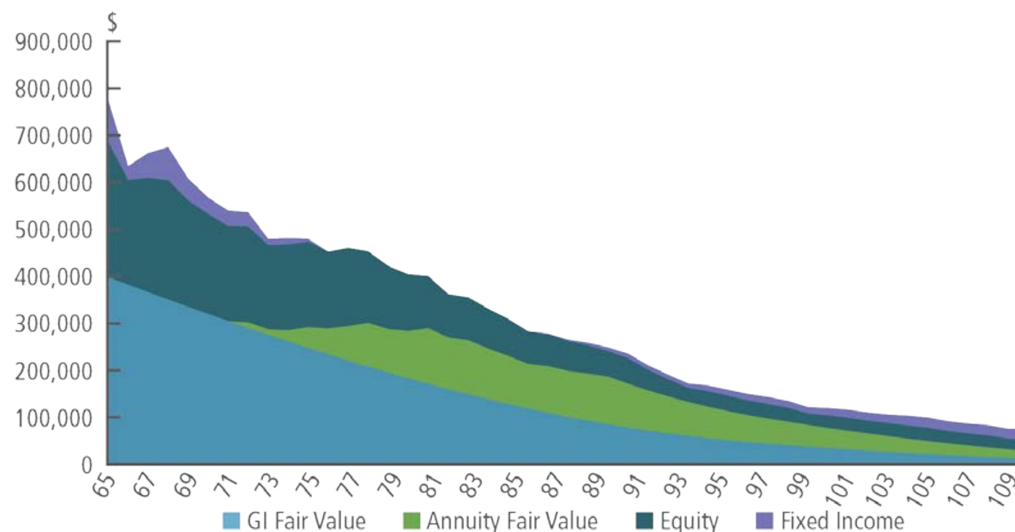
- The framework effectively draws down Alice's portfolio over her retirement, while still leaving a buffer at an advanced age to avoid complete portfolio exhaustion.

EXHIBIT 6D: BACKTESTED PORTFOLIO ALLOCATION (AS % OF WEALTH)



Source: QS Investors

EXHIBIT 6E: BACKTESTED PORTFOLIO ALLOCATION (PORTFOLIO VALUE $)



Source: QS Investors

Conclusion

Perhaps the clearest takeaway from our approach to decumulation is that retirement experiences are unique to each individual, and this requires dynamic and thoughtful decision making. The unique circumstances of each investor call for a solution that can produce highly customized recommendations. We believe that for most individuals, annuities play a valuable role in their retirement portfolio, alongside traditional investments such as stocks and bonds. In particular, individuals with greater wealth and who are in the middle years of their retirement (roughly, 70-85 years old), are likely to benefit from annuities the most. However, real-world constraints and aversions may curb an advisor's or a retiree's desire to utilize annuities. Those individuals would still benefit greatly from utilizing our systematic decumulation framework (DRIVE) without utilizing annuities in the analysis.

Annuities are not a panacea for the financial challenges that retirees face, and they have limitations when there is a competing need for higher capital growth. The QS DRIVE-with-Annuities framework showcases the power of dynamic capital allocation with annuities: deploying annuities in a customizable framework such as DRIVE-with-Annuities allows investors greater control over longevity risks, while minimizing the sacrifice to portfolio growth over the long run.

IMPORTANT INFORMATION

The strategy outlined is not currently offered and as such, no clients are invested in this strategy. It is purely hypothetical, and the performance returns and other statistics were calculated by QS Investors using published data sources, which have been noted throughout this paper.

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QSCR19100 (June 2020)