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Retirement readiness is closely tied to the three critical aspects of retirement: funding, investment returns, and withdrawal of one's retirement assets.

Rethinking Longevity Risk: A Framework to Address the Tail End

SUMMARY

Longevity risk in retirement has always been a serious concern, in that it is part of the ensemble of risks in planning for retirement readiness. In turn, retirement readiness is closely linked to the three critical aspects of retirement: funding, investment returns, and withdrawal of one's retirement assets.

Before longevity became a household concern, the existing framework for thinking about retirement readiness assumed that all retirement needs would be taken care of via a wealth maximization approach. Once longevity risk rose to prominence due to the steady and significant improvement of human lifespan, it became obvious that this longer lifespan and the associated resource needs had to be addressed explicitly in one's retirement readiness thinking. Traditional retirement thinking does not adequately take into account the need for providing for the tail end of the lifespan in the form of a stable stream of retirement income.

Having an initial comfortable balance of retirement assets does not necessarily translate to securing a stable stream of retirement income, as there is a fundamental difference between maximizing the value of assets and converting assets into a stable stream of income.[1] A two-prong investing and funding framework is discussed in this paper, based on the recognition that the human lifespan in retirement can be best viewed as consisting of a definable normal period and an undefinable tail period. For the normal period, we can borrow from the available toolset in wealth management on accumulation and decumulation of wealth; for the tail period, we may consider deferred income annuity.

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[1] O'Reilly, G., DeSantis, M., Brzenk, P., Soe, A., and Tsui, P., "Introducing the S&P STRIDE Index Series," January 2016.

INTRODUCTION

Longevity risk may mean different things to different market participants. For pension plans, longevity risk refers to the escalation of pension obligations to retirees, due to longer lifespans. For individuals, longevity risk refers to the possibility that a person may outlive their retirement assets. This can be due to (a) living longer and thus needing more resources, (b) the results of investments not keeping up with withdrawals, and/or (c) the level of funding one has to begin with.

First and foremost, longevity risk owes its existence to the fact that individuals are now living longer, due to various factors such as advances in medicine and healthcare, as well as the absence of plagues and wholesale wars. This means that instead of living 10 to 20 years after retiring at the age of 65 (a somewhat arbitrary reference age for the purpose of exposition), one can reasonably expect to add a further 10 to 20 years to the tally. Indeed, the Social Security annuity tables show nonzero probabilities of being alive out to age 120.[2]

In this paper, we examine longevity risk from the point of view of individuals, principally when they turn into retirees. We will decompose the different aspects of longevity risk and discuss a framework in which longevity risk can be controlled.

HOW IS LONGEVITY RISK CHANGING RETIREMENT PLANNING?

Due to the fact that people are living longer, the existing framework for retirement readiness needs to be modified or expanded to take into account the demand that those additional years in retirement exerts on the retirement resources. These resources may be meager to begin with, and now they need to be stretched even more. In the meantime, the long-term capital market assumptions and return expectations are being revised downwards.[3]

Paradoxically, retirement assets and retirement income are two different concepts. In retirement assets, we look to maximize their values; in retirement income, we look for a stable stream of income. These two objectives are not one and the same. Based on this, we see that there may be a need to expand our retirement planning thinking from a simple investment framework to a two-dimensional resource allocation framework.

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[2] https://larrysiegeldotorg.files.wordpress.com/2014/09/siegel_waring_only-spending-rule-article-youll-ever-need.pdf

[3] https://am.jpmorgan.com/gi/getdoc/1383387336117

LONGEVITY RISK FOR AN AVERAGE RETIREE: THE NEXT 50 YEARS

How should one think of a period of 50 years, beginning with one's retirement at age 65? Many of us may pass away sometime before the 50 years are up. The current life expectancy was updated by the Society of Actuaries in their 2015 report to 86.2 years for a 65-year-old male and 88.2 years for a 65-year-old female. In a more recent update, these average life expectancies have declined slightly, by 0.4 years for males and females.[4]

For human beings, it may be hard to contemplate and plan for such a long time horizon, given the uncertainty about one's lifespan. Most people would simply use the average figure as a benchmark of sorts. Thus, if we look at the post-retirement years as comprising a normal period, say, up to the average life expectancy (and we round down to 85 years), with a tail period after age 85, increased longevity would mean that the tail period is getting longer and longer. This can be represented symbolically as follows:

$$[65, D) = [65, n-1] + [n, D) \qquad \text{Equation (1)}$$

where D stands for the event of death, n stands for the breakpoint of the normal period, and the open parenthesis ")" simply means that we do not have a deterministic end point.

In the past, we looked at the post-retirement years as a single time period, represented by [65, D). However, this is not that helpful. One of the vexing challenges in retirement thinking is the unknown: one simply does not know when death will occur. This uncertainty hampers our planning to a great extent. For instance, if we knew upon retirement at 65 that we only had 10 years to live, we would then know exactly how to create an adequate and sustainable cash flow for that duration (assuming we were not underfunded) and not to have to worry about the years beyond. It is precisely because we do not have such information that we have to prepare for the years beyond, be it one more year, or 40 more years.

Currently, one simple way to provide a steady income stream in retirement for an indefinite time period is to buy a single premium income annuity.

Currently, one simple way to provide a steady income stream in retirement for an indefinite time period such as [65, D) is to buy a single premium income annuity (SPIA). Essentially, this means exchanging a lump sum at retirement for a lifetime income stream. One admirable characteristic of this financial arrangement is that the indefinite length of the lifetime income stream matches the indefinite length of our remaining lifespan [65, D). Thus, what remains for us to talk about would be (a) whether or not we have that lump sum to begin with (a funding issue), and (b) whether or not the monthly income thus acquired would be adequate, but not (c) whether

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[4] https://www.americanbazaaronline.com/2016/10/28/life-expectancy-of-americans-decline-society-of-actuaries-report418827/

or not it is sustainable, other than the issue of counterparty risk with the annuity carrier.

SPIAs, though prevalent among retirees, are not a universal choice. There are three main criticisms of SPIAs or annuities in general.

1. Annuitants lose control over their lump sum irrevocably upon purchase of the annuity contract.
2. The pricing of the annuity can be expensive (due to administrative charges, capital charges, and markups).[5]
3. If annuitants die early into the payout, it does not seem like a good deal to the annuitants, especially to their heirs and beneficiaries. This point is somewhat contradictory, as an annuity is a risk-pooling vehicle, which means that the annuitants living for shorter periods would be subsidizing those who live longer, per the nature of the risk-sharing concept.

We maintain that a better way to deploy the funding vehicle of an annuity is open to us, not as an SPIA, but as a deferred income annuity (DIA). First, however, we need to go through a critical examination of what else is involved in the run up to the longevity risk.

In Equation (1), we transform an indefinite time period [65, D) into (a) a definite time period—[65, n-1]—and (b) another indefinite time period—[n, D). Thus, if we make n equal 85 (the approximate current measure of average life expectancy), then what we are saying is we can decompose our remaining lifetime into a period of 20 years [65, 84] and an indefinite tail period of [85, D). For the rest of the paper, we will stick with this choice of the value of n, but bear in mind that n can easily be equal to 75, 80, 90 or any other reasonable age.

This simple reorientation of one's remaining lifespan in retirement has profound implications.

This simple reorientation of one's remaining lifespan in retirement has profound implications. By separating one's lifespan into a definite period and an indefinite period, we have succeeded in pushing the event of D into the tail portion of one's lifespan by fiat. During the definite period, or the first 20 years of one's post-retirement period, the retiree can plan out investment and withdrawal strategies without fear of the uncertain timing of death. However, this does not mean we can postpone the planning for the tail period until a later date. Indeed, what we want to emphasize is that the first 20-year period and the tail period are equally significant, and thus we have to think of investment and withdrawal strategies for both periods, not in sequence of each other, but concurrently, at or before the time of retirement. However, the respective investment and withdrawal strategies may vary significantly from one period to the next.

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[5] The Calculus of Retirement Income: Financial Models for Pension Annuities and Life Insurance, by Moshe A. Milevsky (2006)

By separating one's lifespan into the two stages we have shown, we now have a resource allocation problem at hand: namely, how much of our retirement assets should be allocated for the first 20-year period and for the tail period. This decision needs to be made at the time of retirement, not when we reach 85, as many of us may have done. In a similar vein, Sexauer, Peskin, and Cassidy (2012) made the case that a decumulation benchmark comprising a laddered portfolio of TIPS for the first 20 years (which would consume 88% of available capital) and a deferred life annuity purchased with the remaining 12% would enable retirees to make retirement income last a lifetime.[6]

THE CURRENT STATE OF RETIREMENT PLANNING

Before we present our discussion, let us first talk about how today's retirement community thinks about retirement. The traditional way of thinking about retirement can be represented by the following simple accounting equation.

For each period i, with i greater than 65,

$$EB_i = BB_i + C_i + R_i - W_i \quad \text{Equation (2)}$$

where EB_i is the ending balance of period i, BB_i is the beginning balance of period i, C_i is the contribution in period i, R_i is the investment returns in period i, and W_i is the withdrawal amounts in period i.

Equation (2) is the underpinning of many studies and simulations, where the three key variables—C, R, and W—have been studied extensively. Many discussions about the current retirement crisis come down to the interplay of (a) the underfunding of one's retirement balance (the contribution variable C), (b) the random nature of investment returns (the investment return R), and (c) the level of sustainable withdrawals (the withdrawal variable W). When these elements do not resolve well, a retirement crisis may ensue. Robert Merton gave an impassioned plea for better retirement planning in his famous HBR article "The Crisis in Retirement Planning."[7]

Many other commentators have opined on these drivers as well. Bill Sharpe, together with Jason Scott and John Watson, wrote about the inadequate advice given to retirees for managing spending and investing.[8] Phil Murphy, in an S&P Dow Jones Indices blog, highlighted the concerns of retirement income planning[9] and cited a paper by Waring and Siegel,[10] in

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[6] http://www.cfapubs.org/doi/sum/10.2469/faj.v71.n1.11

[7] https://hbr.org/2014/07/the-crisis-in-retirement-planning

[8] https://web.stanford.edu/~wfsharpe/retecon/4percent.pdf

[9] https://www.indexologyblog.com/2016/11/11/benchmarking-retirement-withdrawal-strategies/

[10] https://www.cfainstitute.org/learning/products/publications/faj/Pages/faj.v71.n1.2.aspx

which the annuitization approach was used to determine a realistic spending rate for retirees.

Much research has been devoted to the general theme of retirement readiness. In this paper, we focus on the overarching framework itself, rather than on the individual factors of funding, investment, and withdrawal. What may not be so obvious in this framework is the implication of the sequential nature of the periods. Thus, starting at age 65, the ending balance reflects the random changes in the market returns, as well as the subjective decisions made by the retiree on savings and spending. For each period i after 65, whether or not EB_i is higher than BB_i depends on whether or not ($C_i + R_i$) is greater than or less than W_i. In all likelihood, in the post-retirement periods, C_i probably would be insignificant, leaving R_i as the only meaningful quantity.

If EB_i is less than BB_i, then the prospect of having a sustainable income stream for the rest of one's lifespan is negatively affected. However it gets played out, by the time one reaches age 85, there is no guarantee that the lump-sum amount of the investment portfolio, BB_{85}, would be sufficient for all the expenses that would be needed for the tail period that comes next.

It is worth noting that the tail period is indefinite by nature and could potentially last for 30 or more years. At age 85, a retiree may not have much left in a retirement account if capital market returns have been subpar in the previous decades. In their recent book entitled "Adaptive Asset Allocation: Dynamic Global Portfolios to Profit in Good Times – and Bad," Butler, Philbrick, and Gordillo vividly illustrate the consequences of the market sequence of returns for retirees.[11]

A TWO-PRONG FRAMEWORK

Against this backdrop, our discussion about improving retirement outcomes consists of two steps.

1. At age 65, one should secure income for the tail period by taking out a deferred income annuity.

2. Investment and withdrawal strategies need to ensure that a sustainable and adequate stream of income can be had for the first 20 years of retirement.

While it may seem strange that we posit the first prong to be making a provision for the tail period, it's important to prepare for the tail period before the first 20 years of retirement pass us by. However, as we mentioned earlier, both periods are equally significant and should be treated in a concurrent fashion.

By focusing on the tail period, we are saying that if we do not put it in place when we retire, it will be too late for us to do anything at a later stage.

[11] http://www.wiley.com/WileyCDA/WileyTitle/productCd-1119220351.html

A Case Study

Let us now illustrate what we have been discussing with the hypothetical case of John and Mary Smith. John and Mary were both born on Jan. 1, 1952. They are turning 65 on Jan. 1, 2017. Additionally, through systematic contributions and investing prudently, John and Mary have accumulated a retirement account of USD 1.25 million. They estimate that their annual expenses will be about USD 90,000 per year, including property taxes, insurance, operating costs, etc. Their effective tax rate is 25%. Thus, their target income level in retirement is USD 120,000 a year, or USD 10,000 per month, on a pre-tax basis. John's social security income comes to USD 2,925 per month, and Mary gets a spousal benefit of USD 1,475 per month.

John and Mary are looking to supplement their social security benefits with another stable source of income, using their retirement assets. They are looking to obtain a monthly income of USD 5,600 (= USD 10,000 - USD 2,925 - USD 1,475) by purchasing an immediate annuity.

> It is expected that the pricing results obtained via a theoretical pricing model and pricing quotes offered by various annuity providers would be somewhat different.

It is expected that the pricing results obtained via a theoretical pricing model and pricing quotes offered by various annuity providers would be somewhat different, due to the fact that the annuity providers would factor in costs related to the usage of an insurance company's balance sheet, administrative charges associated with operating a risk pool, and profit margin expectations. For the purpose of illustration we take advantage of what is available in the public domain. Many firms have made income calculators available to the public. For our illustrations, we choose Fidelity's online Guaranteed Income Estimator (GIE)[12] (results are only for discussion purposes). We created three scenarios for John and Mary.

Case 1 is a joint life income annuity with no annual increase, with an income start date of Jan. 1, 2017.

Case 2 consists of two stages, 2A and 2B.

- Case 2A: A 10-Year period certain income annuity, followed by
- Case 2B: A joint life income annuity with no annual increase, with an income start date of Jan. 1, 2027.

Case 3 is a joint life deferred income annuity with no increase, with an income start date of Jan. 1, 2037.

The three cases are presented in Exhibit 1.

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[12] https://gie.fidelity.com/estimator/gie/gielanding

Exhibit 1: Different Funding Alternatives

SCENARIO	PERIOD (AGES)		
	[65,74]	[75,84]	[85,D]
Case 1	Joint life income annuity, income start date Jan. 1, 2017		
Case 2	SPIA	Joint life deferred income annuity, income start date Jan. 1, 2027	
Case 3	Wealth management		Joint life deferred income annuity, income start date Jan. 1, 2037

Source: S&P Dow Jones Indices LLC. Table is for illustrative purposes.

In all scenarios, we look at the type of annuity that is for joint life only, with 50% income payment for life to the survivor, and no residual death benefits, except for the 10-year period certain annuity. To obtain an estimate for monthly income, we choose the premium amount to be USD 125,000.

Highlights of the Results

For a USD 125,000 premium for each separate annuity contract, in Case 1, the monthly income is USD 625 starting on Jan. 1, 2017. In Case 2A and 2B, the monthly income is USD 1,128 starting on Jan. 1, 2017, and lasts 10 years, followed by a joint life deferred income annuity of USD 1,357 starting on Jan. 1, 2027. In Case 3, it is USD 3,880 starting on Jan. 1, 2037. We then scale up the purchases to reach a monthly income level of USD 5,600.

The monthly income estimates for each annuity contract in each of the three cases are summarized in Exhibit 2.

Exhibit 2: Amount of Retirement Income per USD 125,000 Premium

SCENARIO	PERIOD (AGES)		
	[65,74]	[75,84]	[85,D]
Case 1	Joint life income annuity, income start date Jan. 1, 2017==>USD 625/month		
Case 2	2A: SPIA=>USD 1,128	2B: Joint life deferred income annuity, income start date Jan. 1, 2027==>USD 1,357	
Case 3	Wealth management		Joint life deferred income annuity, income start date Jan. 1, 2037==>USD 3,880

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

Since the monthly income in Case 1 is only USD 625, John and Mary would have to pay a significantly higher premium to get to the USD 5,600 per month level.

Since the monthly income in Case 1 is only USD 625, John and Mary would have to pay a significantly higher premium to get to the USD 5,600 per month level. They would have to spend:

USD 1,120,000 = 125,000 X (5,600 / 625).

As a result, they would have USD 130,000 left in their retirement account.

In Case 2A, John and Mary would have to pay USD 620,567 for the 10-year period certain policy, and in Case 2B, they would have to pay USD 515,843 for the joint life deferred income annuity, for a total out-of-pocket cost of USD 1,136,411, and they would have USD 113,589 left in their retirement account.

- Case 2A: USD 620,567 = 125,000 X (5,600 / 1,128)
- Case 2B: USD 515,843 = 125,000 X (5,600 / 1,357)

In Case 3, John and Mary would also need to buy more joint life deferred income annuity to get to USD 5,600 per month, as follows.

- USD 200,000 = 125,000 X (5,600 / 3,880)

Notice that in this third case, this only covers the income when they would turn 85. John and Mary would have USD 1,050,000 (= 1,250,000 – 200,000) available to fund their first 20 years of retirement.

Exhibit 3 shows the amount of premium needed in each case to obtain a monthly income stream of USD 5,600.

Exhibit 3: Premium Required for USD 5,600 Per Month

SCENARIO	PERIOD (AGES)		
	[65,74]	[75,84]	[85,D]
Case 1	Joint life income annuity, income start date Jan. 1, 2017==> USD 1,120,000		
Case 2	2A: SPIA=>USD 620,567	2B: Joint life deferred income annuity, income start date Jan. 1, 2027==>USD 515,843	
Case 3	Wealth management		Joint life deferred income annuity, income start date Jan. 1/, 037==>USD 200,000

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

Clearly, these three scenarios do not exhaust all possibilities, but already we can see some interesting features. In the first two cases, we constructed an income stream of USD 5,600 per month, using annuities only. In Case 3, we leave open the possibility of some income fluctuations in the first 20 years in retirement for John and Mary, but it looks like with a nest egg of slightly over USD 1 million dollars for funding purposes, they would also be able to achieve their income goal over the first 20 years of their retirement. Case 3 is also an example of what we mean by a two-prong framework; one has to take care of the tail period at the time of retirement, rather than at age 85, by setting aside the appropriate resources at age 65.

To maintain the purchasing power of the income, one would have to aim for a higher level of nominal income in the future.

This case study provides concrete examples of how monthly incomes flow from retirement assets, engineered in such a way that they can potentially circumvent the sequence risk. We may also start to think about the consequences of having different starting retirement balances: what if John and Mary did not have USD 1.25 million in their retirement account, but much less? In the extreme case, if John and Mary had a balance of zero in their retirement account, then they would have to live on their monthly social security checks alone. For retirees, such deliberations may be too late, but the same thought process may provide useful feedbacks to people who may be 10-20 years away from their retirement, and thus may still have time to manage their financial affairs accordingly.

A monthly income of USD 10,000 20 years from now would be significantly eroded by inflation. To maintain the purchasing power of the income, one would have to aim for a higher level of nominal income in the future. Thus, this would add to the premium cost of the deferred income annuity purchased at age 65 in all three cases. Because part of this monthly income is derived from social security benefits, not all of it is subject to inflation risk, as social security benefits are adjusted for inflation. Near-retirees can start thinking in more concrete terms, rather than in abstract terms.

RECENT DEVELOPMENTS – QUALIFIED LONGEVITY ANNUITY CONTRACT

With the emphasis on defined contribution (DC) plans for one's retirement assets, and given the required minimum distribution of the DC assets starting at age 70 ½, as well as the need for lifetime income in old age, additional funding vehicles are needed to address these concerns.

> A qualified longevity annuity contract is a generic deferred income annuity, normally purchased at age 65, with the first monthly income payable at age 85.

A qualified longevity annuity contract is a generic deferred income annuity, normally purchased at age 65, with the first monthly income payable at age 85. On July 1, 2014, the U.S. Department of the Treasury and the Internal Revenue Service issued final rules regarding longevity annuities, making them accessible to the 401(k) and IRA markets.[13] The required minimum distribution regulations were amended so that longevity annuity payments would not need to begin prematurely in order to comply with those regulations. There are two important aspects to this, among others.

(a) Increasing the maximum permitted investment: Under the final rules, a 401(k) or similar plan, or an IRA, may permit plan participants to use up to 25% of their account balance or (if less) USD 125,000 to purchase a qualifying longevity annuity without concern about noncompliance, with the age of 70 ½ minimum distribution requirements. The dollar amount will be adjusted for cost-of-living increases more frequently in USD 10,000 increments.

(b) Allowing "return of premium" death benefit: Under the final rules, a longevity annuity in a plan or IRA can provide that, if the purchasing retirees die before (or after) the age when the annuity begins, the premiums they paid but have not yet received as annuity payments will be returned to their accounts.

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[13] https://www.treasury.gov/press-center/press-releases/Pages/jl2448.aspxhttps://www.treasury.gov/press-releases/Pages/jl2448.aspx; https://www.irs.gov/irb/2014-30_IRB/ar07.html

CONCLUSION

The traditional framework for planning retirement readiness may have been overtaken by improvement in the human lifespan, and with it the demand for a framework that can handle the income risks associated with a long tail period in retirement years. Besides funding, investment, and withdrawal considerations, an explicit resource allocation framework should be included in one's retirement readiness thinking. Recent regulations governing the required minimum distribution of retirement balances are also expanding the availability of retirement income options as an increasing number of Americans reach retirement age, essentially alleviating the impact of longevity risk.

Besides funding, investment, and withdrawal considerations, an explicit resource allocation should be included in one's retirement readiness thinking.

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