Alpha, Beta, and Now… Gamma

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Defining Value: Better Outcomes with "Gamma"

Alpha

the residual or skill component

- a zero sum game in the aggregate (after fees)

Beta

the market/asset allocation exposures of a portfolio

- equity allocation of the portfolio and underlying asset class exposures

Gamma

the additional value achieved from making more intelligent financial planning decisions.

- a non zero-sum game

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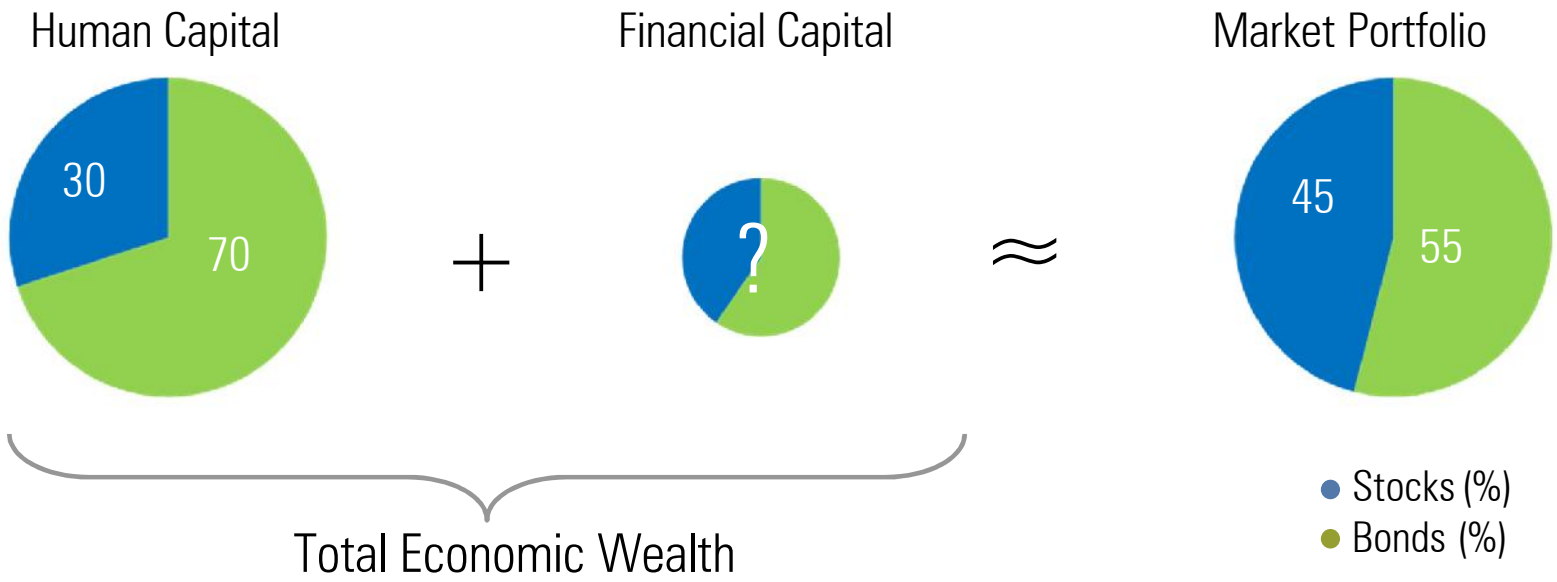
Different Types of Gamma

- **Total Wealth Asset Allocation**: Using human capital in conjunction with the market portfolio to determine the optimal equity allocation
- **Dynamic Withdrawal Strategy:** Updating the annual withdrawal amount annually based on the ongoing likelihood of portfolio survivability and mortality experience
- **Annuity Allocation:** Longevity risk is perhaps the greatest fear among the retirees. Annuities allow a retiree to hedge away this risk and can therefore improve the overall efficiency of a retiree's portfolio.
- **Asset Location and Withdrawal Sourcing**: where to place assets and where to withdrawal income in a tax efficient manner.
- **Liability Relative Optimization:** Asset allocation methodologies commonly ignore the funding risks associated with an investor's goals, by incorporating the liability into the portfolio optimization process it is possible to build portfolios that better hedge the risks faced by a retiree.

Total Wealth Allocation



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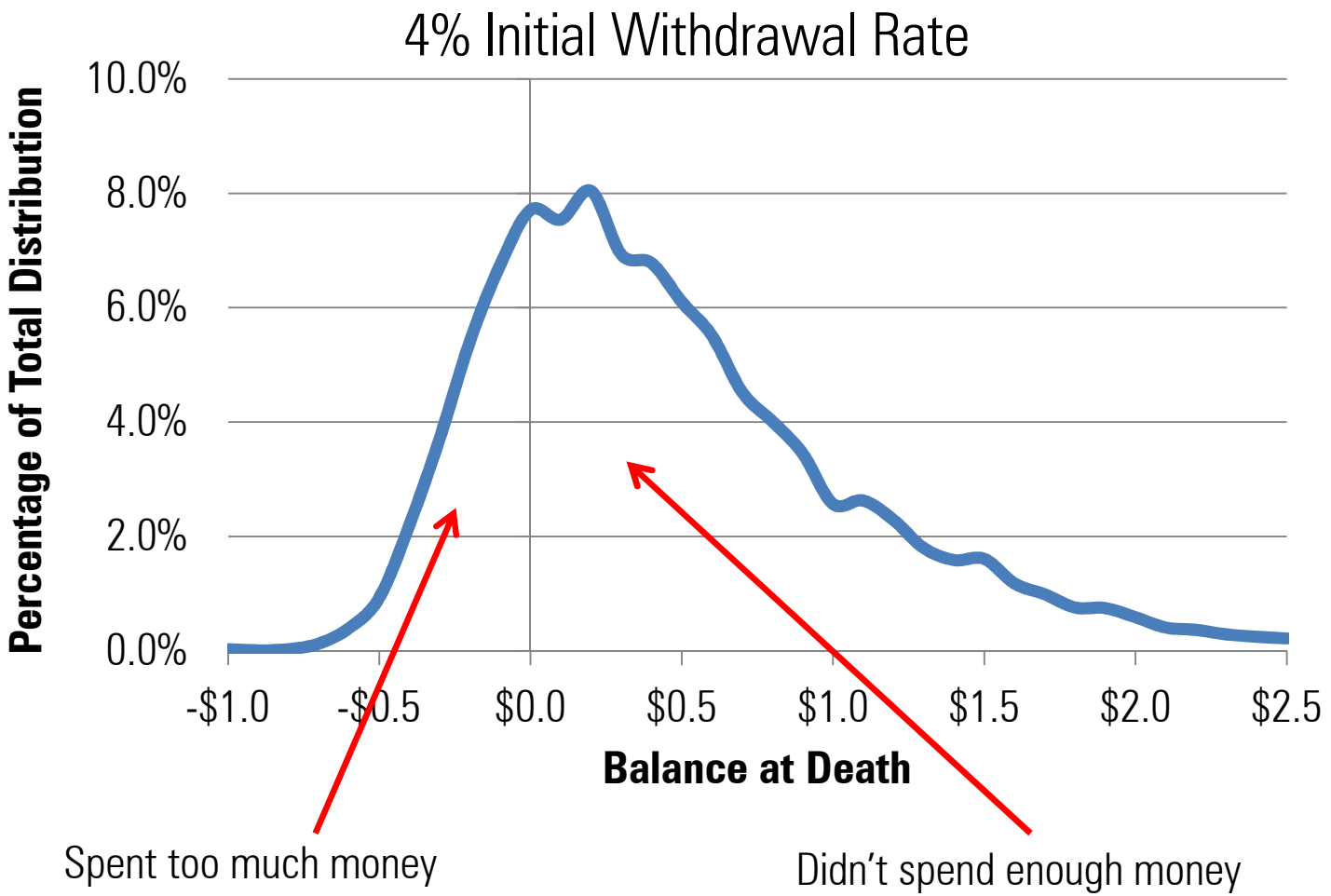
Dynamic Withdrawal Strategy



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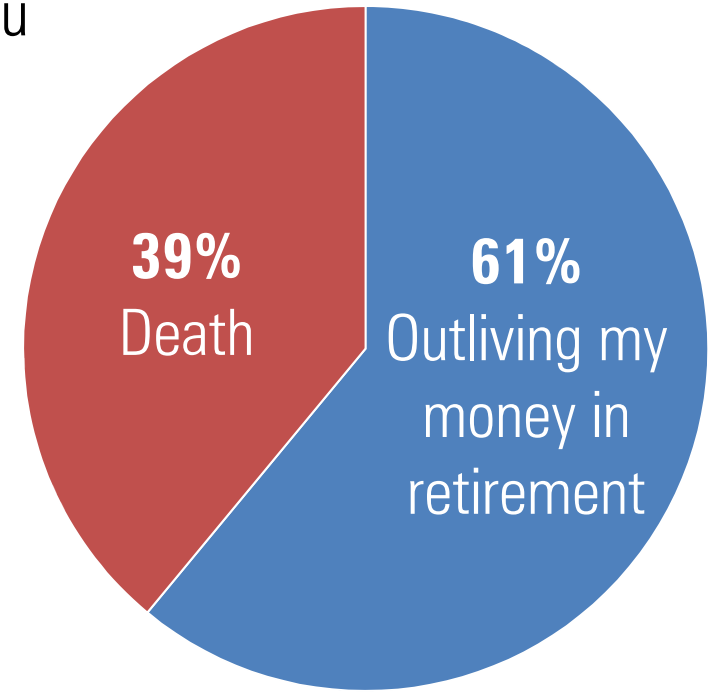
Annuity Allocation

What do you fear most?



Source: https://www.allianzlife.com/content/public/Literature/Documents/ent-1154.pdf

Asset Location and Withdrawal Sourcing

		Withdrawal Sequencing	
		Taxable Account First	Traditional IRA First
Asset Location	Stocks in Taxable Account	Tax Efficient	Moderately Efficient
	Stocks in Traditional IRA	Moderately Efficient	Tax Inefficient

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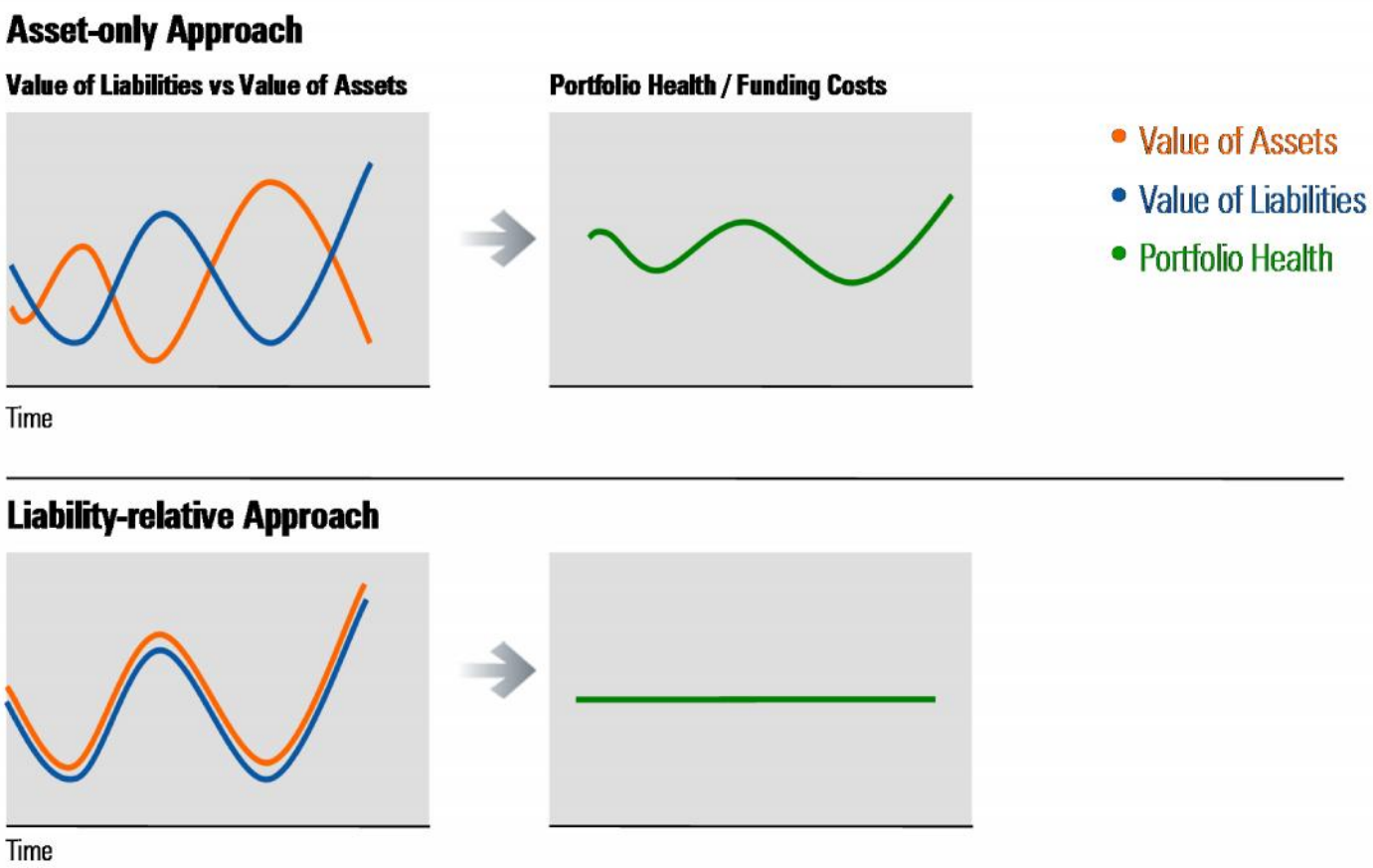
Liability Relative Optimization



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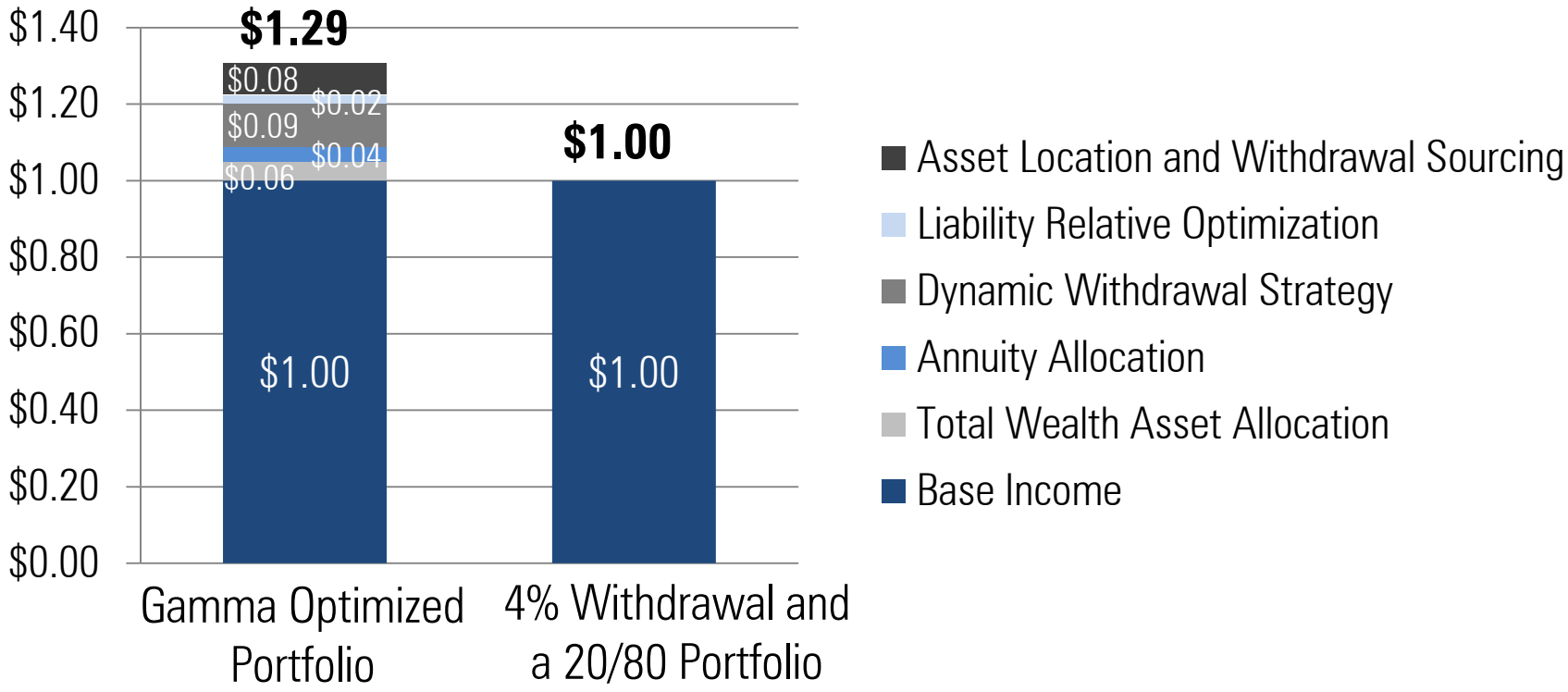
More Income with Gamma Optimization



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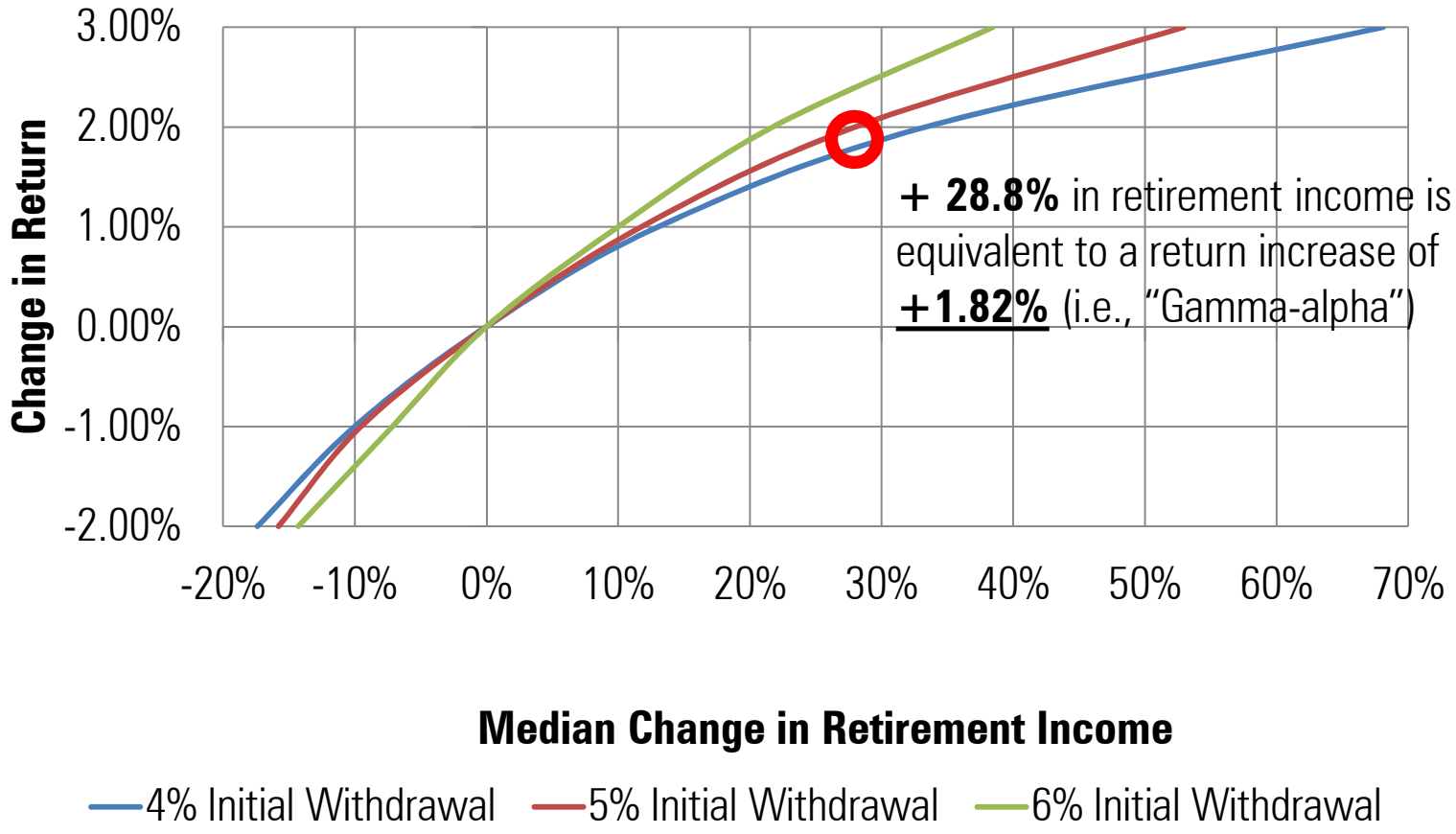
Relationship Between Additional Income and Return Changes



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Methodology

Calculating Gamma

- Gamma is the utility-adjusted income generated by the Gamma-optimized portfolio, which we denote as ff.
- We define ff as the constant payment amount that a retiree would accept such that his or her utility would equal the utility of the actual income path realized on a given simulation path
- This is given by

$$II = \left(\frac{\sum_{t=0}^{T} q_t (1+\rho)^{-t} I_t^{\frac{\eta-1}{\eta}}}{\sum_{t=0}^{T} q_t (1+\rho)^{-t}} \right)^{\frac{\eta}{\eta-1}}$$

I_t = the level of income in year t
q_t = the probability of surviving to at least year t
T = the last year for which $q_t > 0$
ρ = the investor's subjective discount rate (5%)
η = the investor's elasticity of substation (EOS) preference parameter (.5)

Calculating Gamma

- There are two preference parameters (ρ and η) that describe how the investor feels about having income to consume at different points in time, with no reference to risk.
- Following the approach in Epstein and Zin (1989), we treat the elasticity of substation as a parameter distinct from the risk tolerance parameter. We introduce the risk tolerance parameter (θ) next by treating the path as unknown and evaluating expected utility.

$$EU = \sum_{i=1}^{M} p_i \frac{\theta}{\theta - 1} (II_i)^{\frac{\theta - 1}{\theta}}$$

Θ = risk tolerance parameter (.333)
M = number of paths
i = which of M paths is being referred to
p_i = the probability of path i occurring which we set to $1/M$.

Calculating Gamma

- We define Y as the constant value for II that we yield this level of expected utility. This is given by

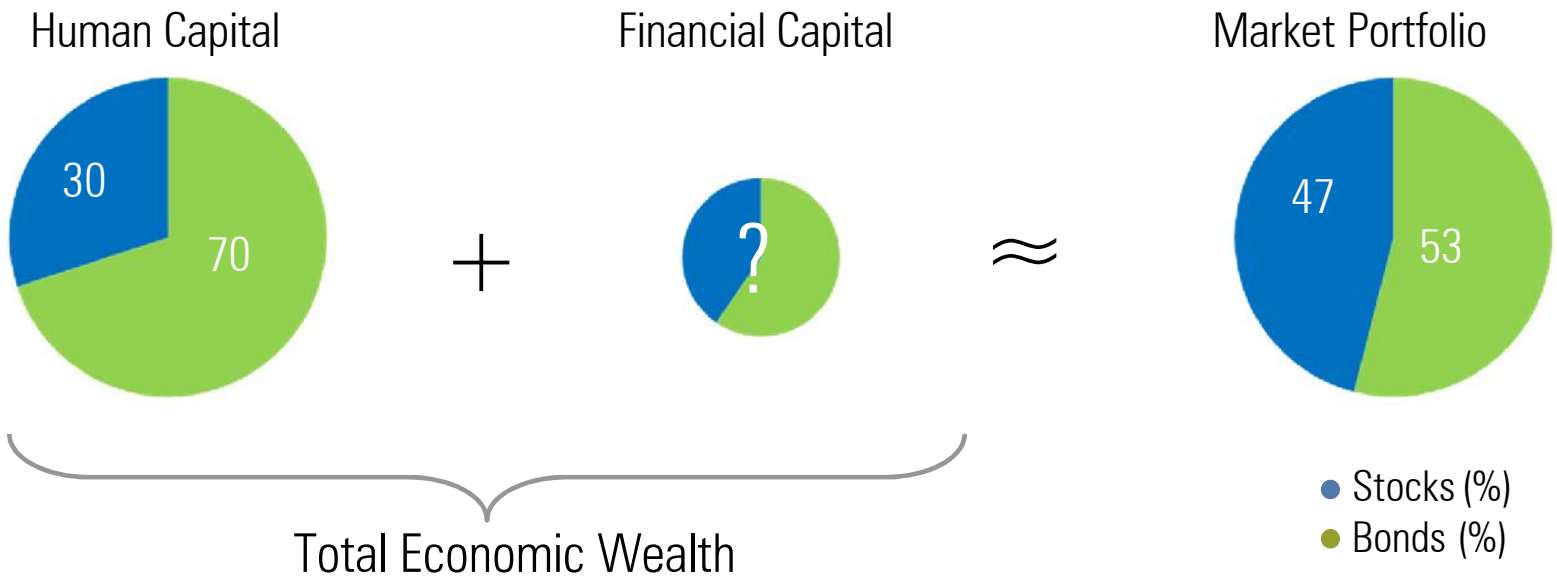
$$Y = \left[\sum_{i=1}^{M} p_i \, (II_i)^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}}$$

- We can now formally define the Gamma of a given strategy or set of decisions as

$$Gamma(Strategy) = \frac{Y(Stategy) - Y(Benchmark)}{Y(Benchmark)}$$

Total Wealth Asset Allocation

Targeting the Market Portfolio



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Individual Portfolio Assignment

+

Financial Capital

- Tradable assets such as stocks and bonds have traditionally been used when constructing an asset allocation
- Incomplete without considering Human Capital

Human Capital

- An individuals ability to earn and save
- Present value of all your expected future wages including pension and social security

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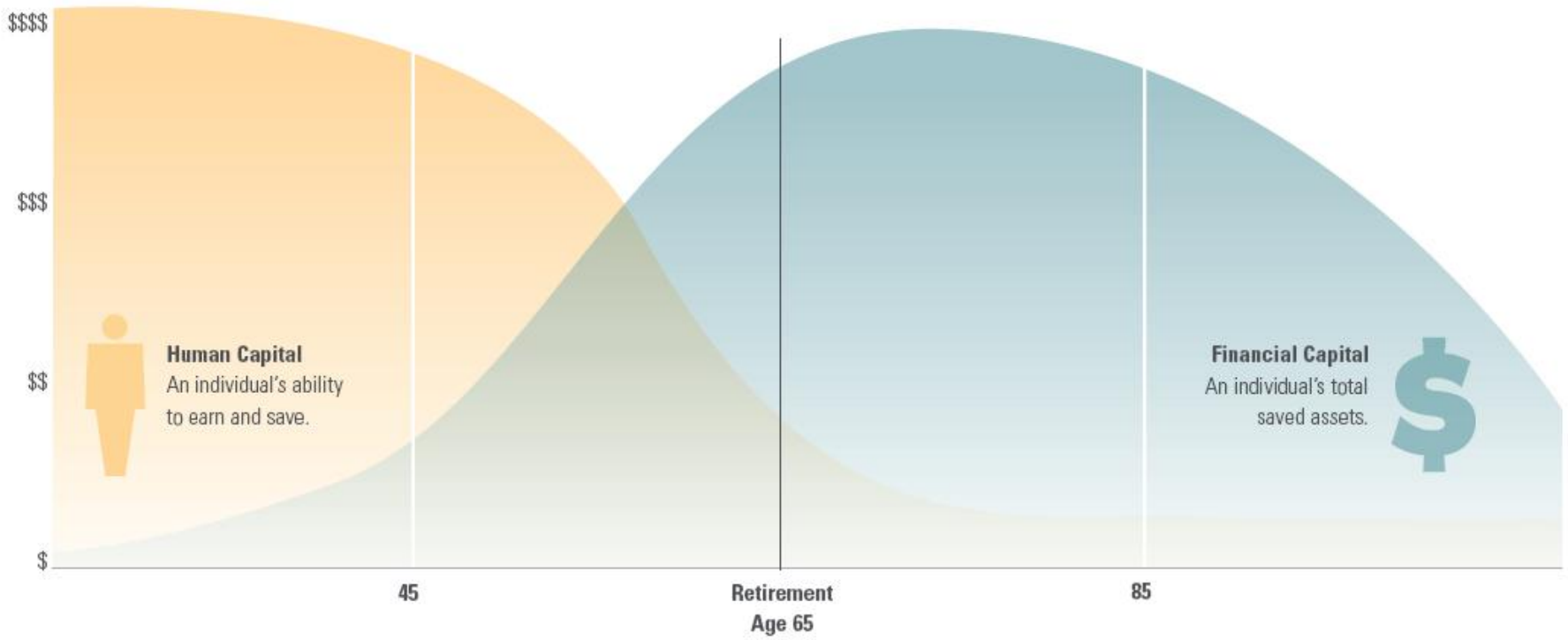
Life Cycle of Human Capital and Financial Capital



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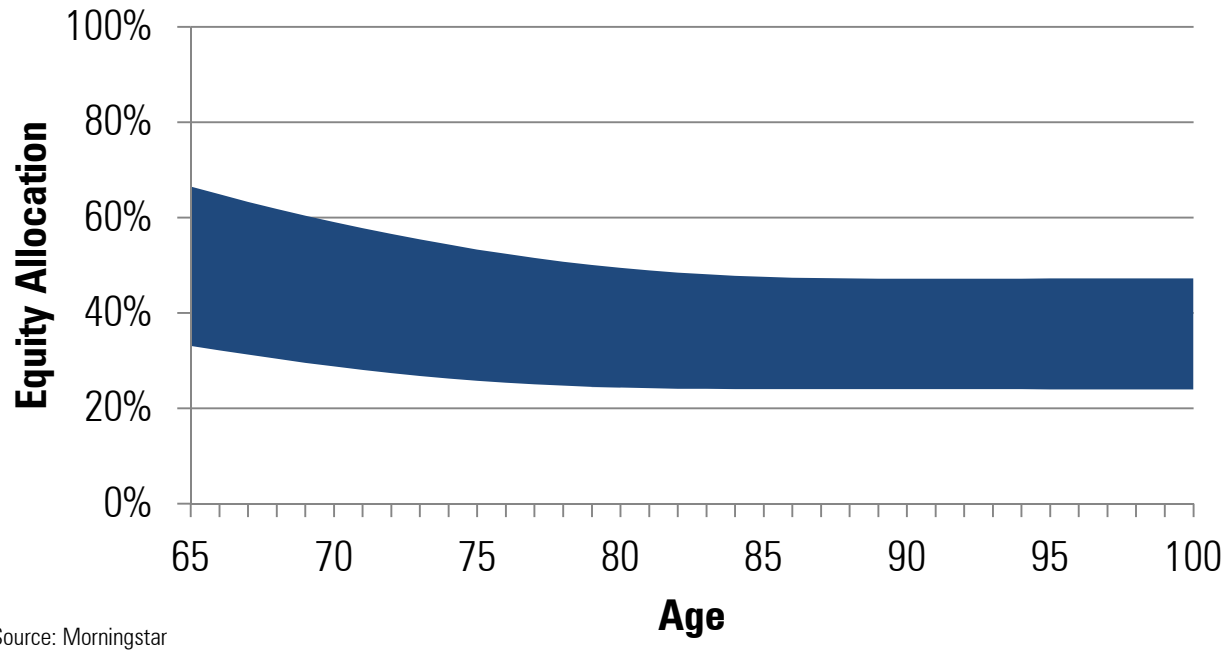
Bounded Portfolio Equity Allocation

- Allocations are bounded by Morningstar Aggressive and Conservative glidepaths



Source: Morningstar

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Dynamic Withdrawal Strategy

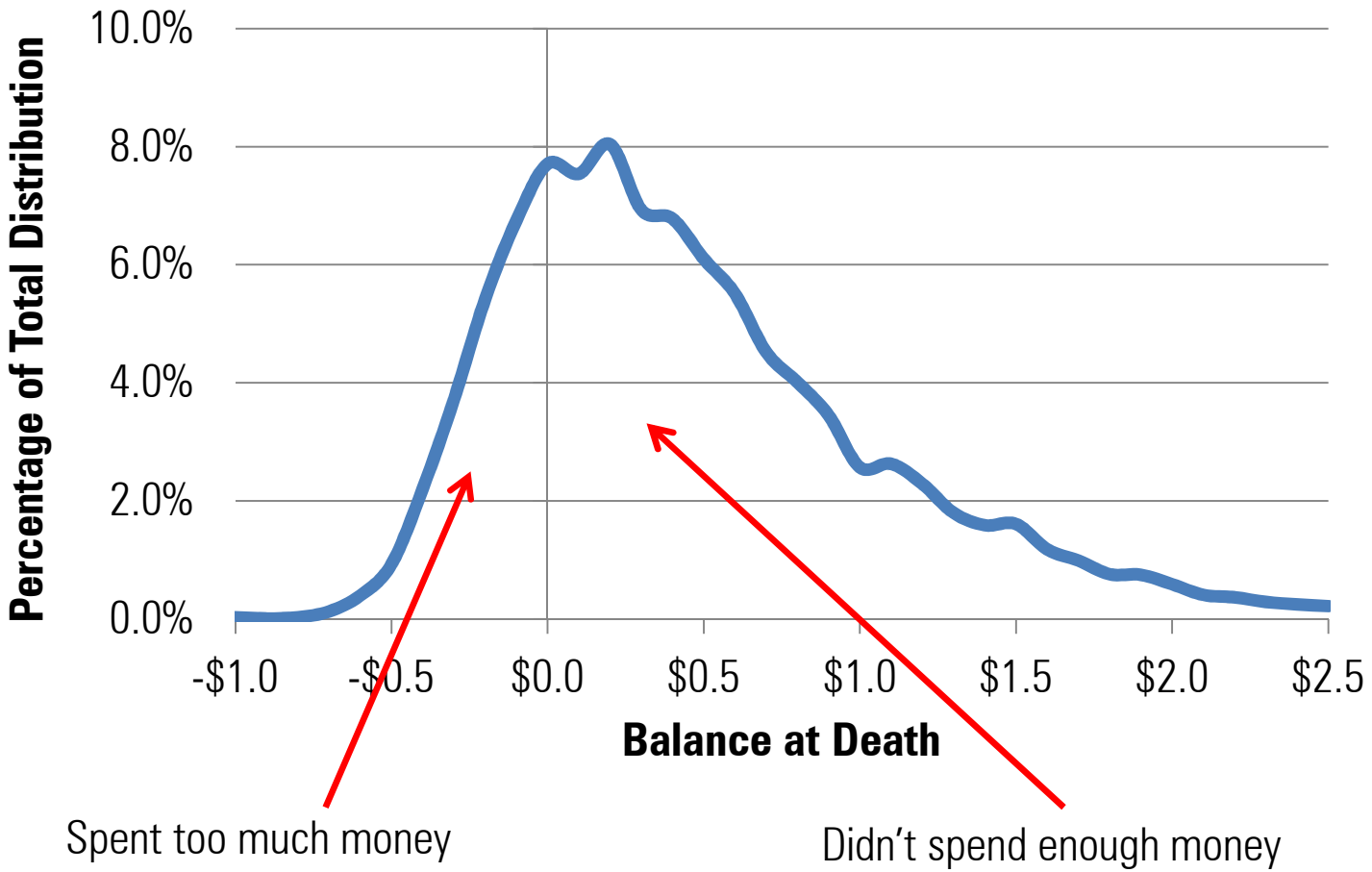
Different Ways to Generate Income from a Portfolio

The strategy tested in most withdrawal research

- **Constant Dollar:** fixed amount, increased annually by inflation, based on the initial balance
- **Endowment Approach:** fixed percentage of portfolio value
- **RMD Method:** 1 divided by the remaining retirement duration (life expectancy)
- **Dynamically Updated Based on Survivorship Experience:** based on maintaining a constant probability of failure over the estimated remaining retirement duration, based on actual survivorship experience

What financial planners help retirees with and what retirees are actually likely to do

Distribution of Balance at Death with "4% in 30 years"



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Better Outcomes

- Dynamically updating the available income can both increase total lifetime income and improve portfolio survivability
- The more frequently a withdrawal strategy is updated/reviewed the easier it is to make adjustments to help ensure on-going survivability and sustainability of the retiree's portfolio
- Potential "failure", to some extent, can be inevitable for some scenarios if a retiree wants to maximize lifetime income (i.e., maximize lifetime happiness)

"4%" for All Ages

- 4% can be a great ***starting*** place for a ~65 year old couple
- It is not necessarily valid for older/single retirees

Number of Years Remaining	Equity Allocation				
	20%	30%	40%	50%	60%
5	20.0%	19.9%	19.9%	19.8%	19.9%
10	10.4%	10.4%	10.5%	10.4%	10.5%
15	7.2%	7.3%	7.4%	7.4%	7.5%
20	5.7%	5.8%	5.9%	6.0%	6.0%
25	4.8%	4.9%	5.0%	5.1%	5.2%
30	4.2%	4.4%	4.5%	4.6%	4.7%
35	3.8%	3.9%	4.1%	4.2%	4.3%
40	3.5%	3.6%	3.8%	3.9%	4.0%

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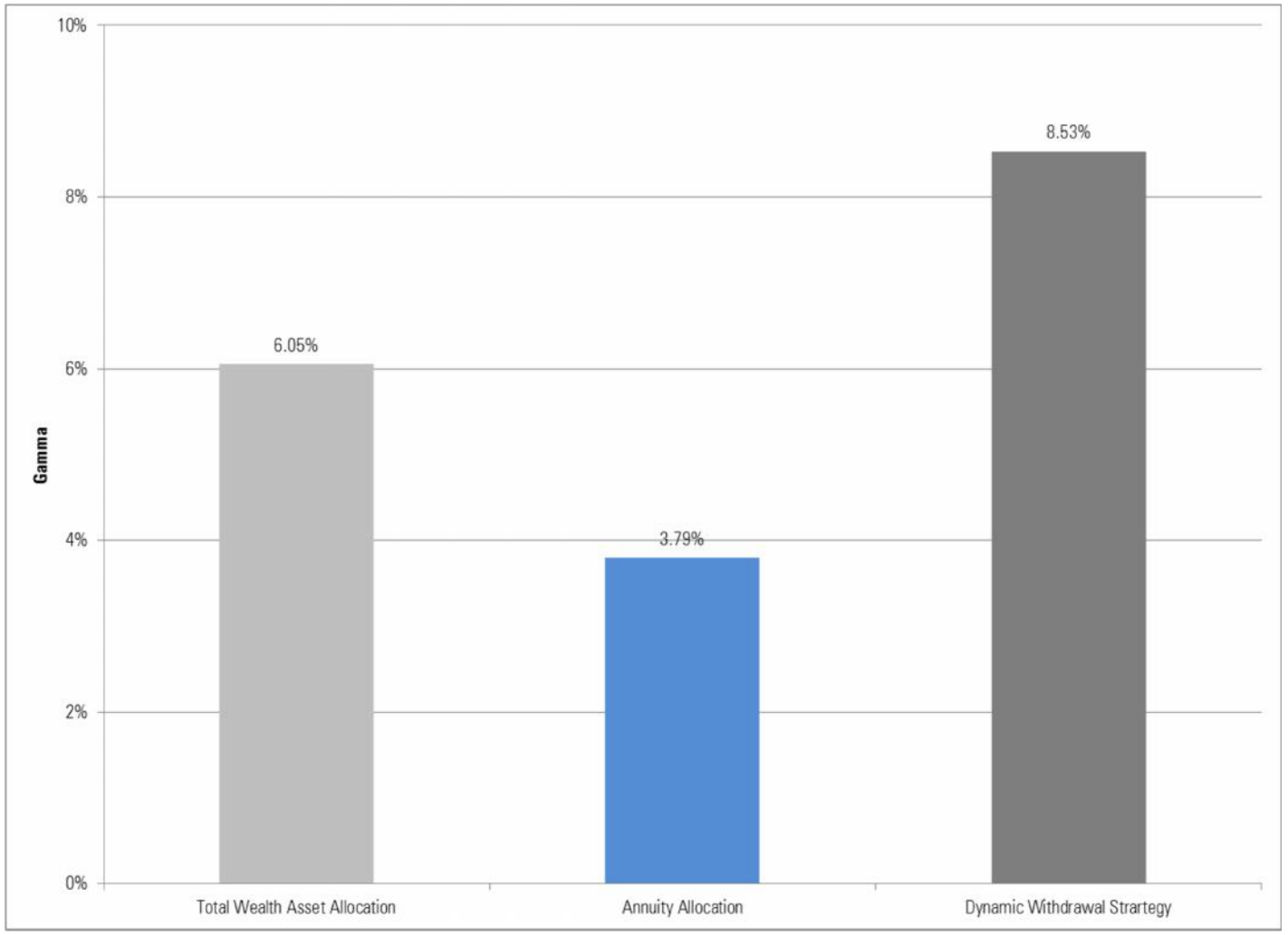
Gamma of Dynamic Withdrawal Strategy



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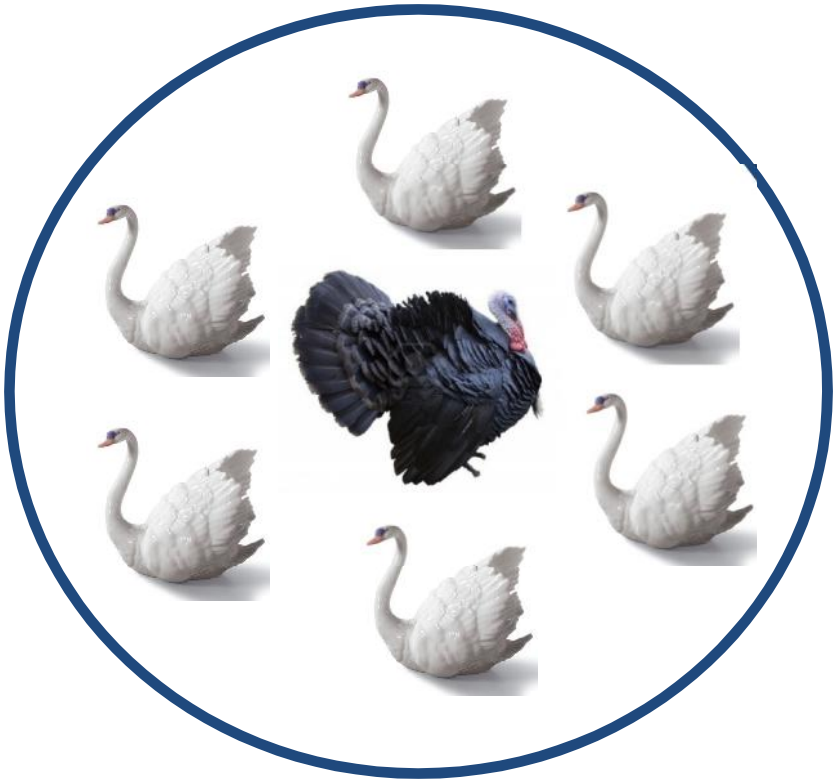
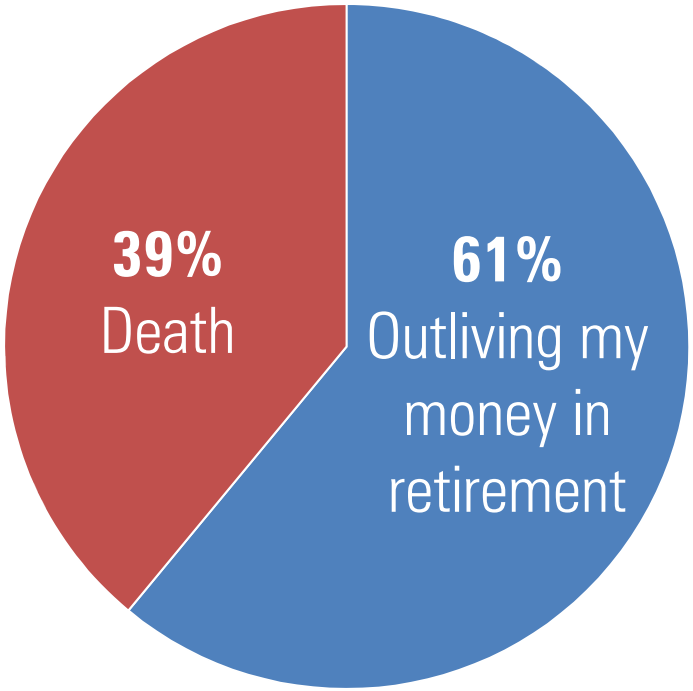
Annuities

Inefficient Retirement Planning

- Defined benefit plans allow for longevity risk pooling
- DC participants have to deal with longevity risk on an individual basis, which is inefficient from a lifetime income maximization perspective
- Annuities represent one possible solution



Defining the Goal: Which Do You Fear the Most?



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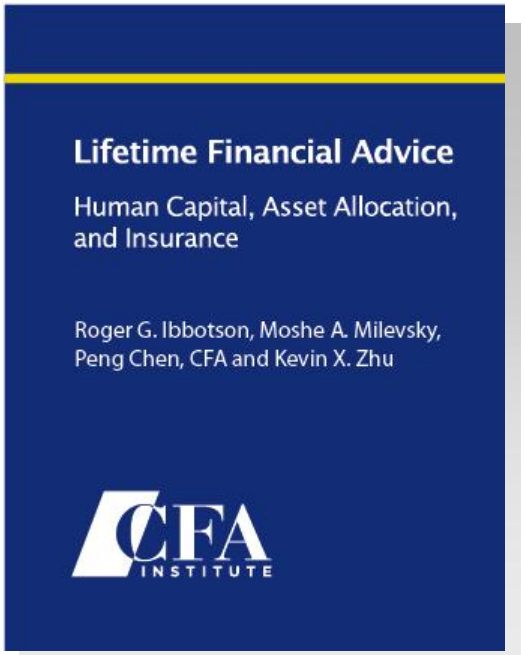
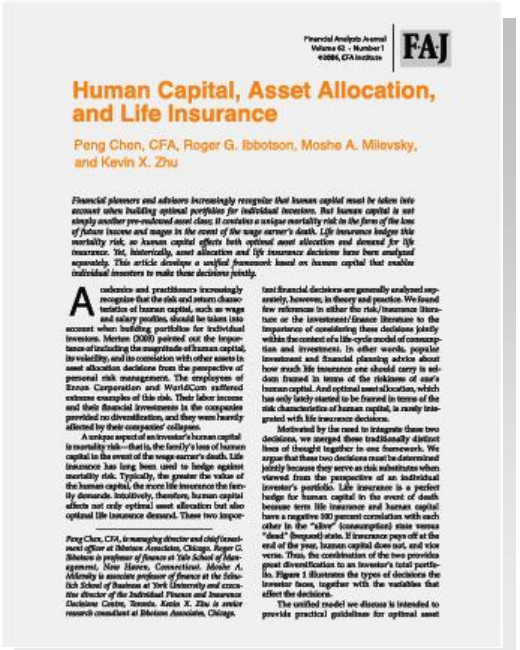
Do You Feel Lucky?

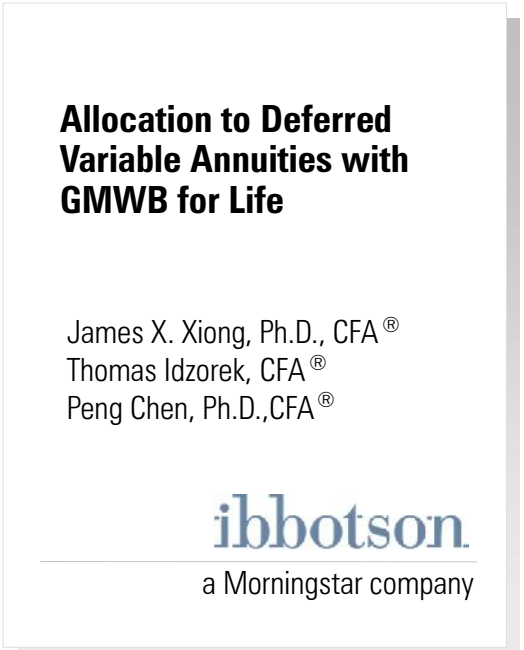
Incorporating Guaranteed Income



CFA Institute Research Foundation monograph presenting research on lifetime finance



Award-winning paper on the integration of human capital and asset allocation



Research paper focused on a methodology reflecting the features of variable annuities with GMWB for life

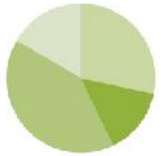
Determining Asset Allocations with Annuities

Collect Inputs → Determine Product Allocations → Determine Asset Allocations

Human Capital

Financial Capital and Current Savings

Life Insurance



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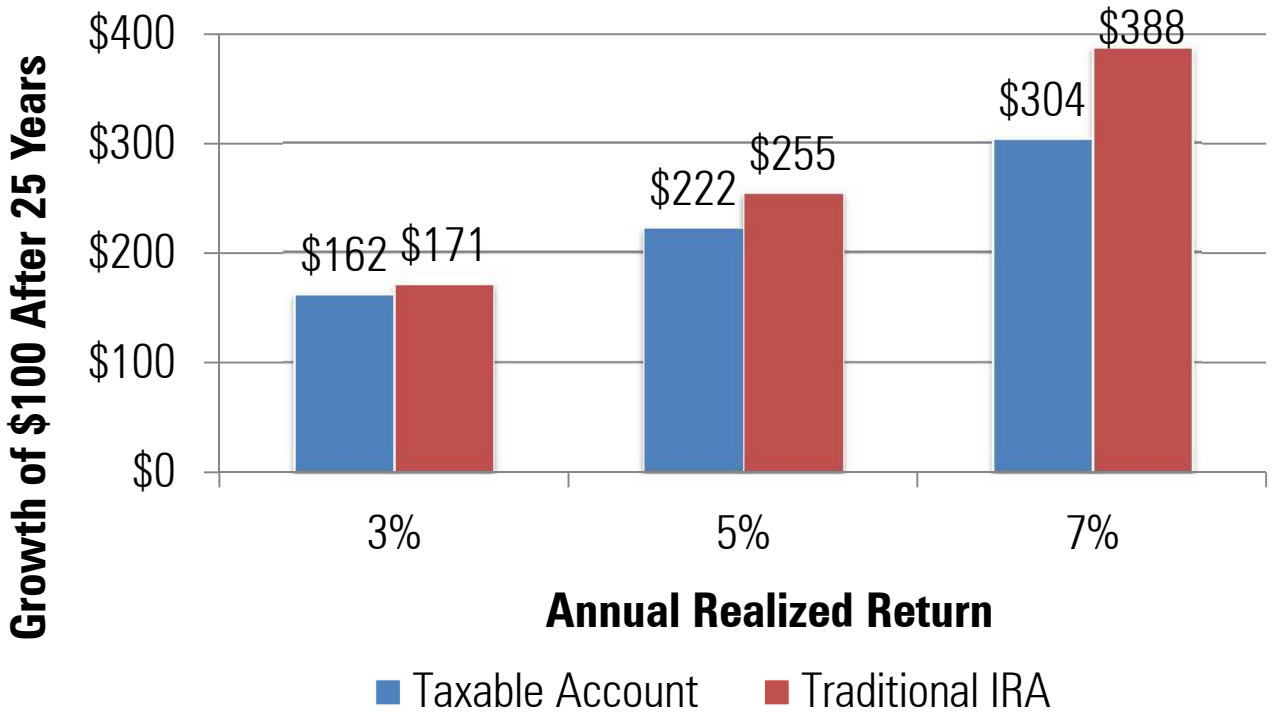
Asset Location and Withdrawal Sourcing

The Importance of Taxes



Analysis assumes a 35% tax rate, where taxes are paid annually in the Taxable Account, but not until the end of the period in the Traditional IRA

Asset Location and Withdrawal Sourcing

		Withdrawal Sequencing	
		Taxable Account First	Traditional IRA First
Asset Location	Stocks in Taxable Account	Tax Efficient	Moderately Efficient
	Stocks in Traditional IRA	Moderately Efficient	Tax Inefficient

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Impact of Asset Location and Withdrawal Sequencing

Additional Income Generated				
		Asset Location Portfolio Efficiency		
		Efficient	1/n	Inefficient
Income Order	401k First	0.71%	-4.06%	-10.86%
	Split	3.83%	0.00%	-3.75%
	Taxable First	8.23%	6.82%	4.95%

Equivalent Return Impact				
		Asset Location Portfolio Efficiency		
		Efficient	1/n	Inefficient
Income Order	401k First	0.07%	-0.24%	-0.78%
	Split	0.21%	0.00%	-0.25%
	Taxable First	0.43%	0.36%	0.25%

For illustration only. Source: "Alpha, Beta, … and Now Gamma" by David Blanchett and Paul D. Kaplan, Morningstar White Paper

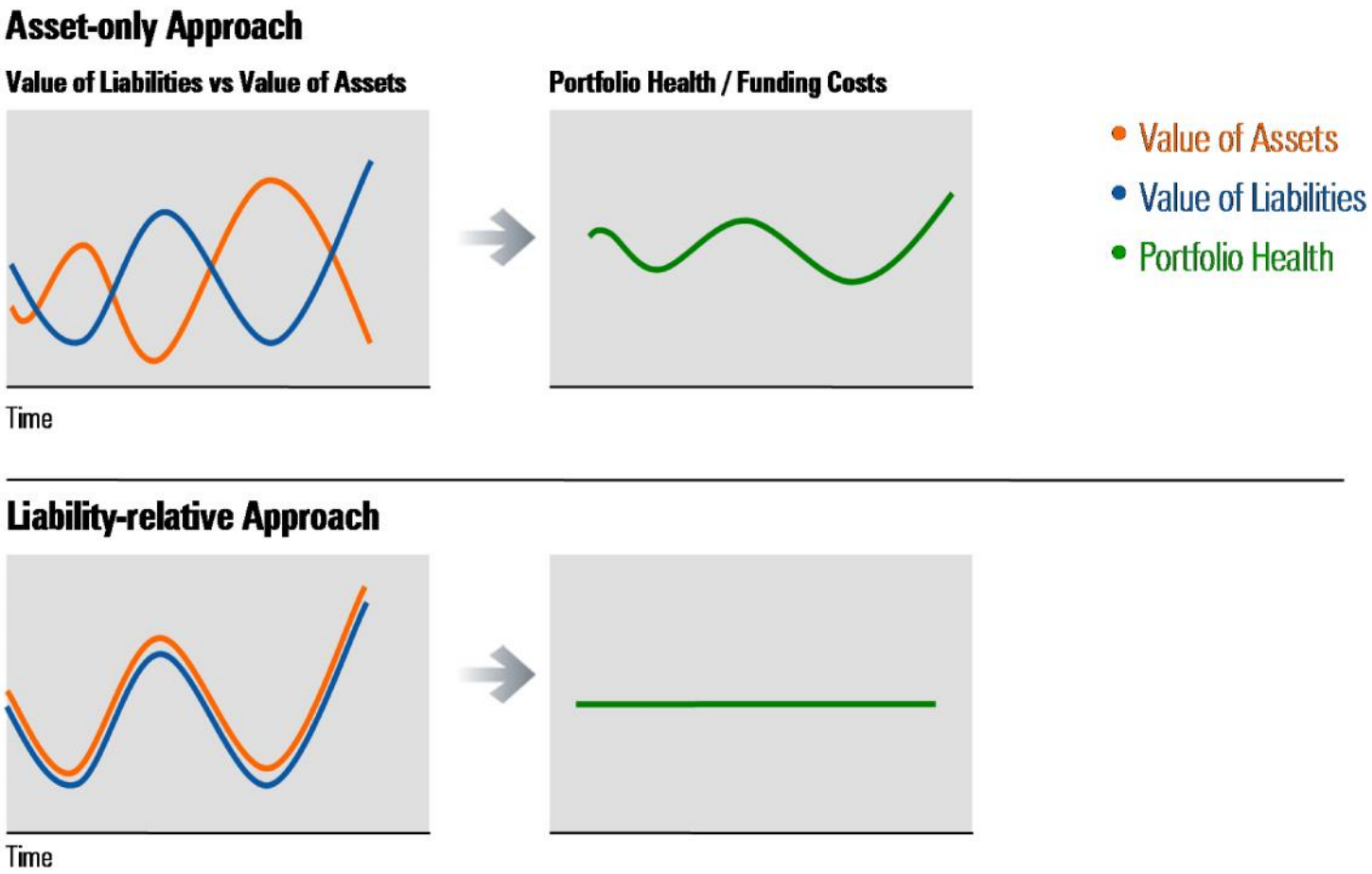
Liability Relative Optimization

What is Portfolio Risk?

What is the TRUE risk for a portfolio that exists to fund (pay for) a liability?

- It is NOT the standard deviation of the asset portfolio
- It is NOT the performance of your asset portfolio relative to the asset portfolios of your peers
- The TRUE risk is that it won't be able to pay for the liability!

Improving Portfolio Health



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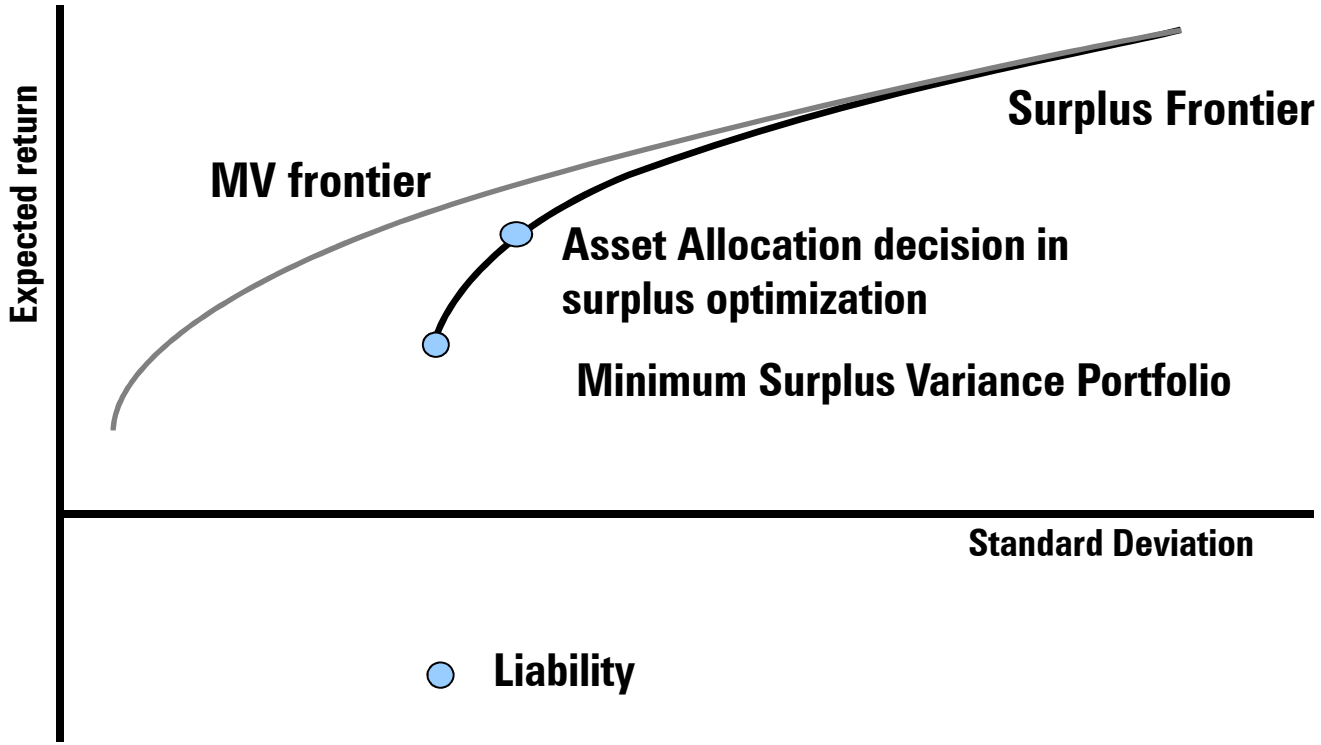
What is Surplus Optimization?

- Surplus optimization is a special case (or extension) of traditional mean-variance optimization in which the optimizer is *constrained* to hold a combination of assets representing the liability short
- Surplus optimization is one element of a broader approach called liability-relative investing or asset-liability management (ALM), which can include 1) duration matching (a.k.a. immunization), 2) convexity matching, and 3) cash flow matching
- Surplus optimization focuses on the entire portfolio – assets and liabilities – not just the assets of a portfolio

Surplus Optimization



Surplus optimization considers both the amount and the investment characteristics of the liability (funding ratio).

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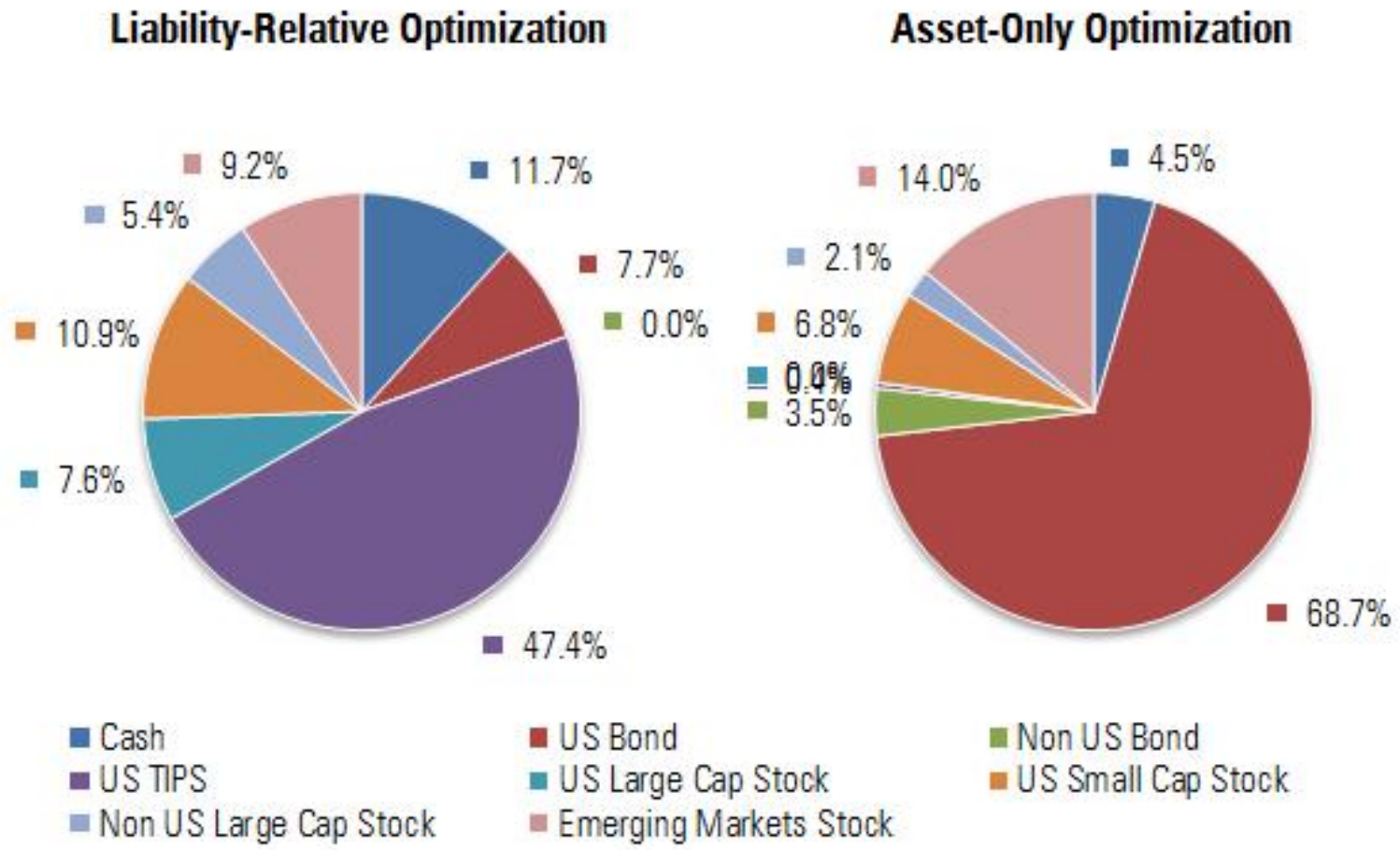
Different Portfolios



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Return and Risk Impact

	Liability-Relative Optimization	Asset-Only Optimization
Geometric Return	6.00%	6.00%
Standard Deviation	7.45%	6.71%
Surplus Geometric Return	3.74%	3.66%
Surplus Standard Deviation	6.79%	7.38%

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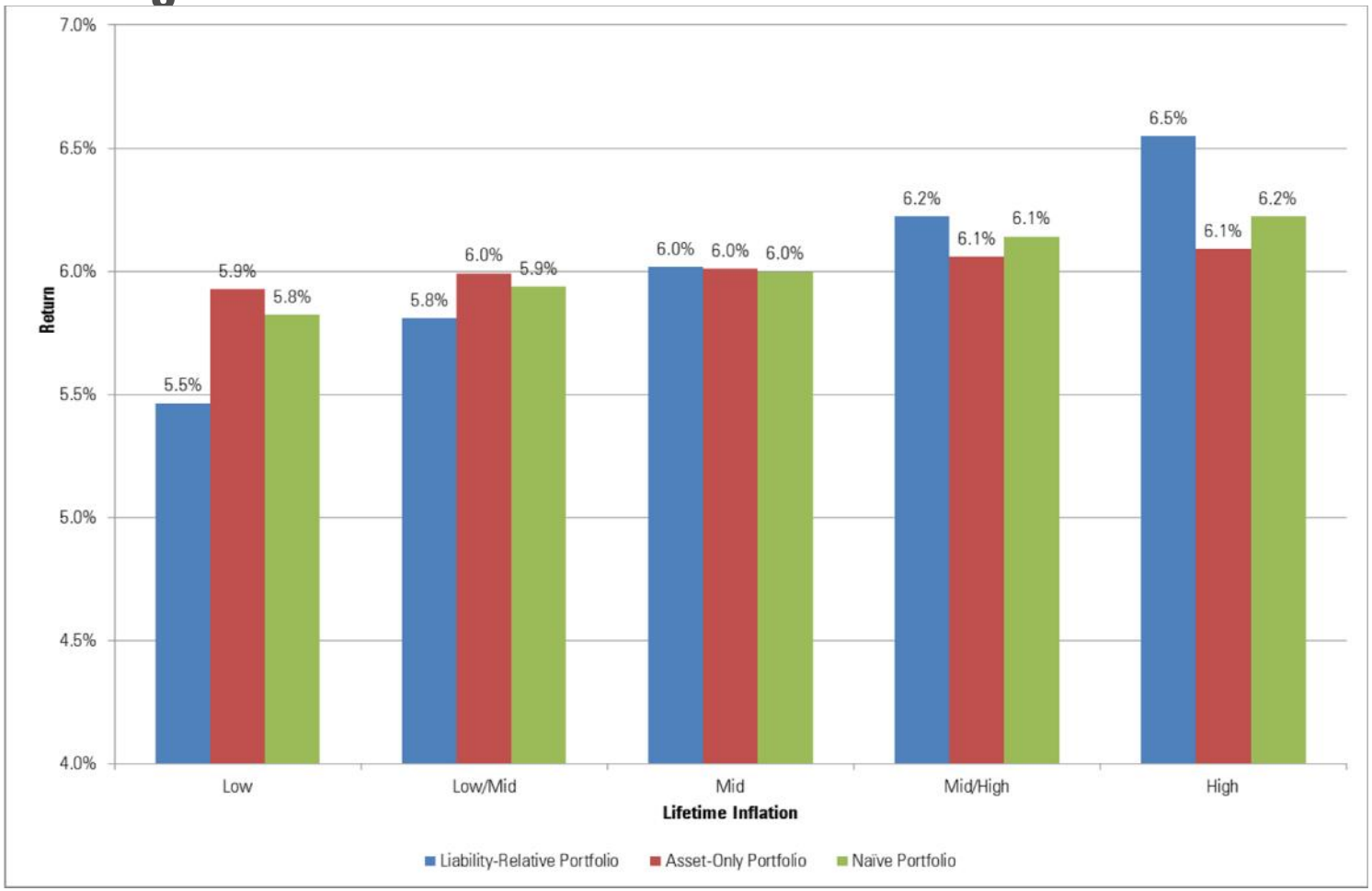
Average Annual Returns for the Inflation Quintiles



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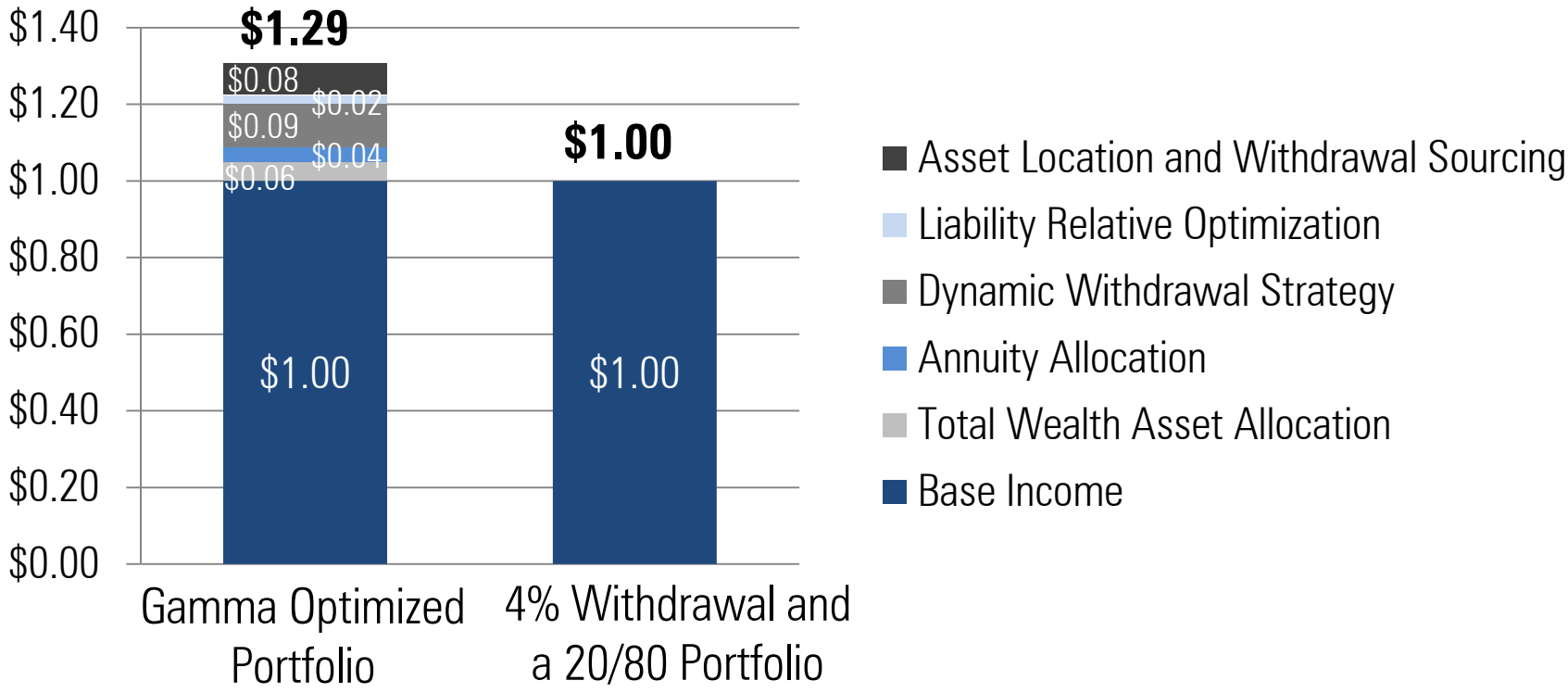
Conclusions

More Income with Gamma Optimization



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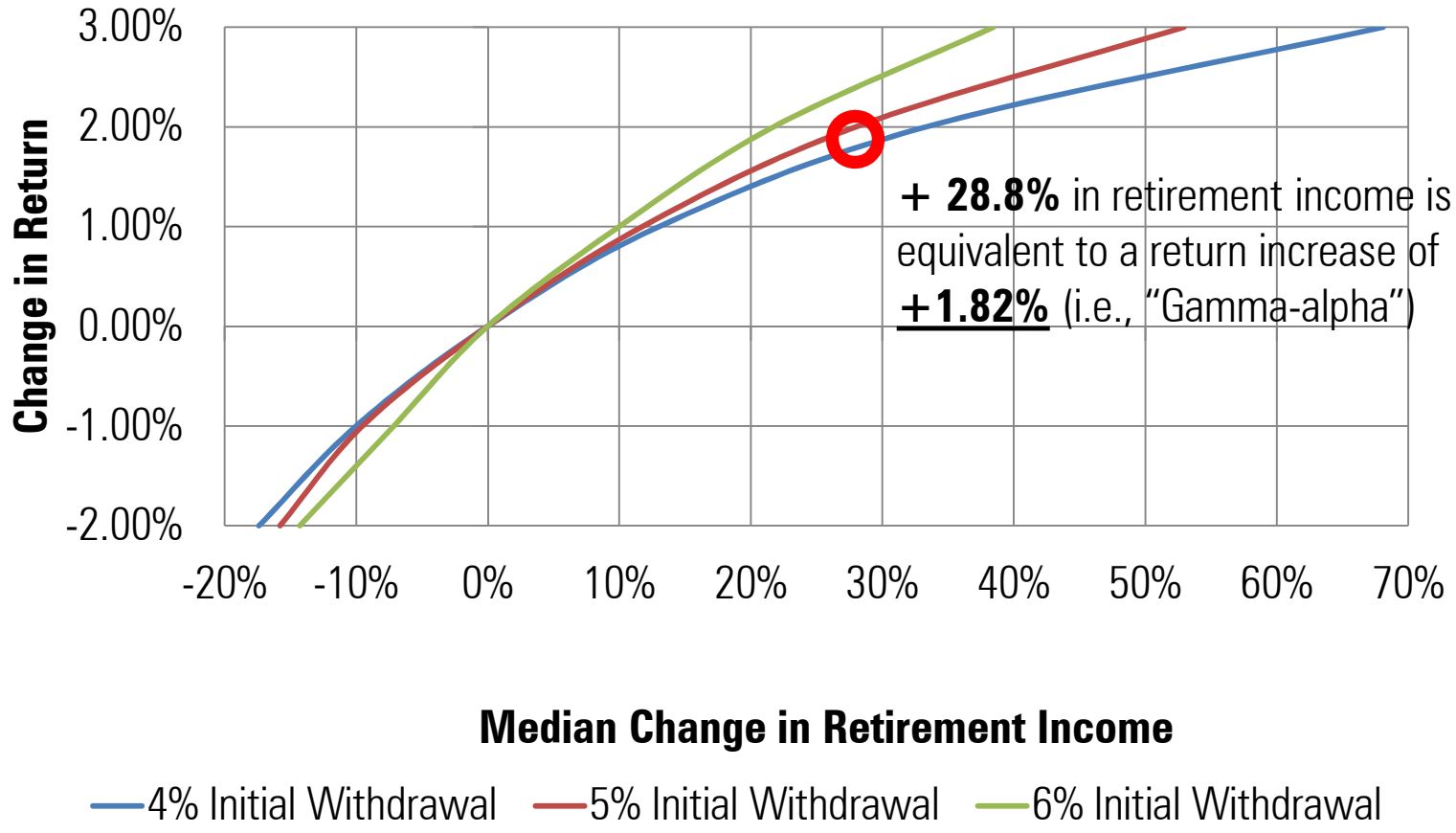
Relationship Between Additional Income and Return Changes



For illustration only. Source: "Generating More Retirement Income with "Gamma" Portfolio Optimization" by David Blanchett, Morningstar White Paper

Conclusions

- Creating retirement income from a portfolio is complicated
- There are a number different risks that need to be considered when building an "optimal" retirement income portfolio
- An optimized retirement income plan (i.e., Gamma optimized) can generate 29% more retirement income than a naïve approach

Important Disclosures

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- Some of the author's calculations are based upon Monte Carlo simulations. Monte Carlo is an analytical method used to simulate random returns of uncertain variables to obtain a range of possible outcomes. Such probabilistic simulation does not analyze specific security holdings, but instead analyzes the identified asset classes. The simulation generated is not a guarantee or projection of future results, but rather, a tool to identify a range of potential outcomes that could potentially be realized. The Monte Carlo simulation is hypothetical in nature and for illustrative purposes only. Results noted may vary with each use and over time.
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