Generating Income In Retirement

Hal Ratner
Head of Research
Morningstar Investment Management
November 11, 2017

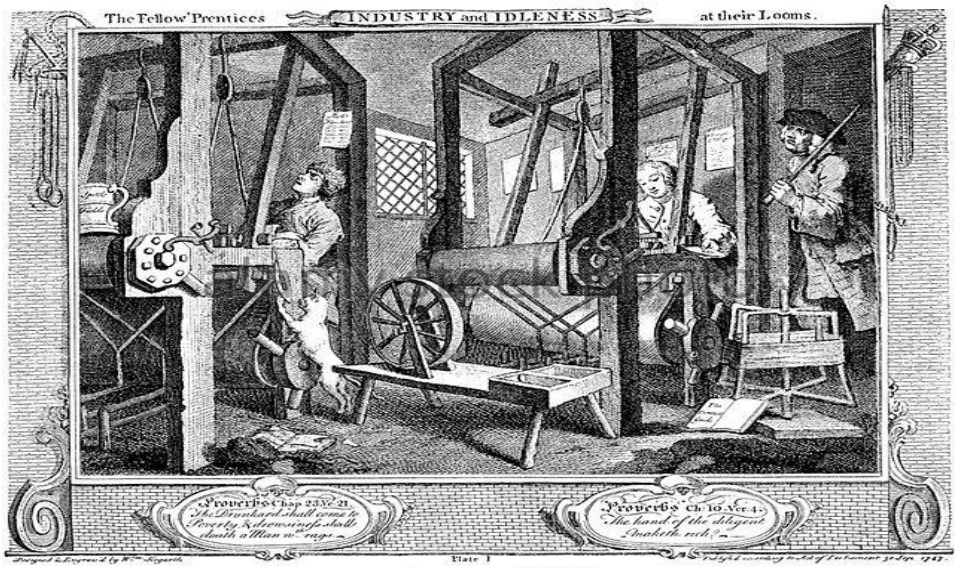
Agenda

- Backstory
- Retirement Risks
- Asset Allocation
- Investor Model
- Insurance
- Retirement Crisis?

Retirement Retrospective

Backstory

- Concept originated in mid 1700's
- Life expectancy between 26-40.
- Worked until you physically unable or died.



MORNINGSTAR®

Backstory

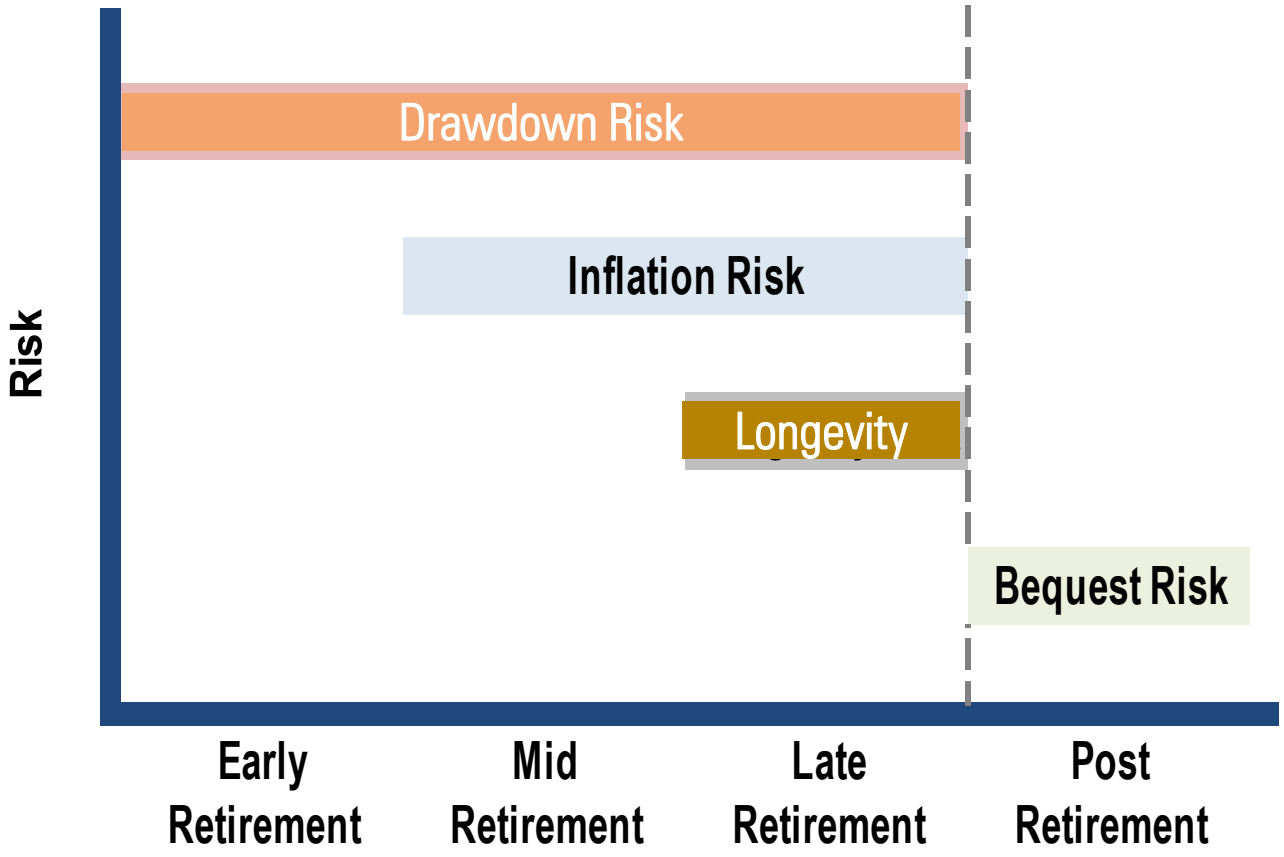
- Rise of modern state and increases in clerical and administrative occupations brought forth the public pension.
- Otto Von Bismarck, president of Prussia introduced a pension in 1881 for those 70 and above. Life expectancy was around 45.
- By 1920's many firms in US and Europe offered some form of private pension—typically beginning at age 65.
- 1935 Social Security Act guaranteed public pensions in US: Life expectancy for US male between 58 and 68.

Backstory

- Corporate pensions emerged in 1920s (Revenue Act(s) of 1921 and 1925)
- By 1940, 15% of private sector workers covered. By 1960 it was 41%
- 1960 – Life expectancy about 70 and general expectation that people would retire.
- Enter: Defined Contribution. Revenue Act of 1978 (section 401(k)). Shift risk from employer to individual.

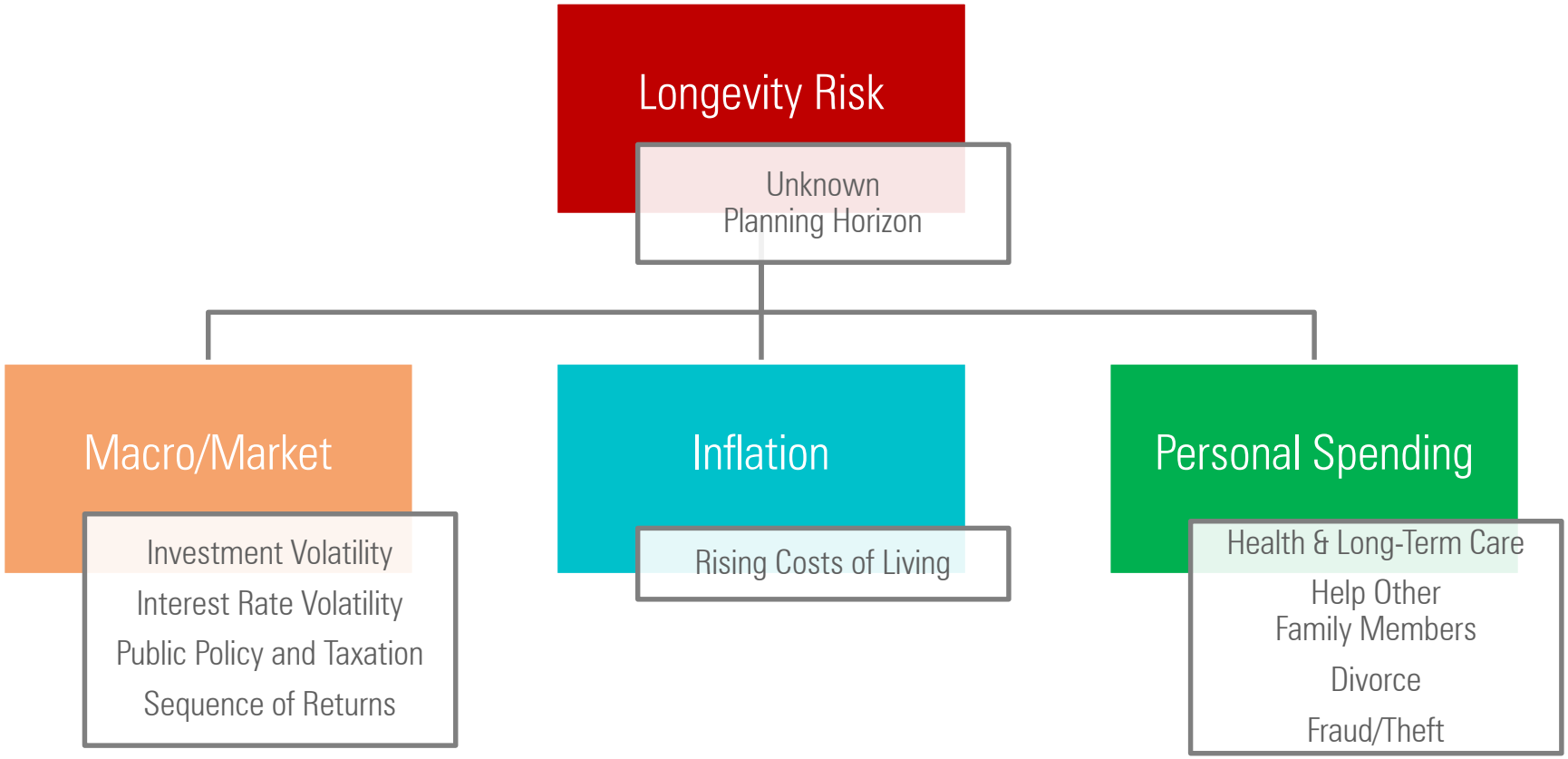
Retirement Risks

Retiree Risks

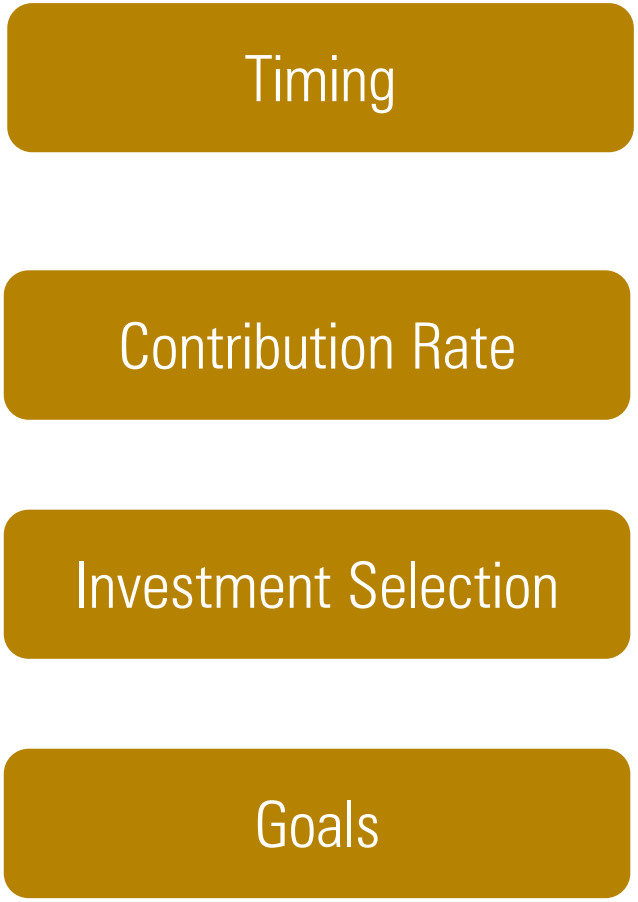


For illustration only.

Retiree Risks



Four Levers



Time Value Problem: Cash Flow Matching

$$PV = \sum_{t=1}^{T} \frac{CF_t}{(1+r_t)^t}$$

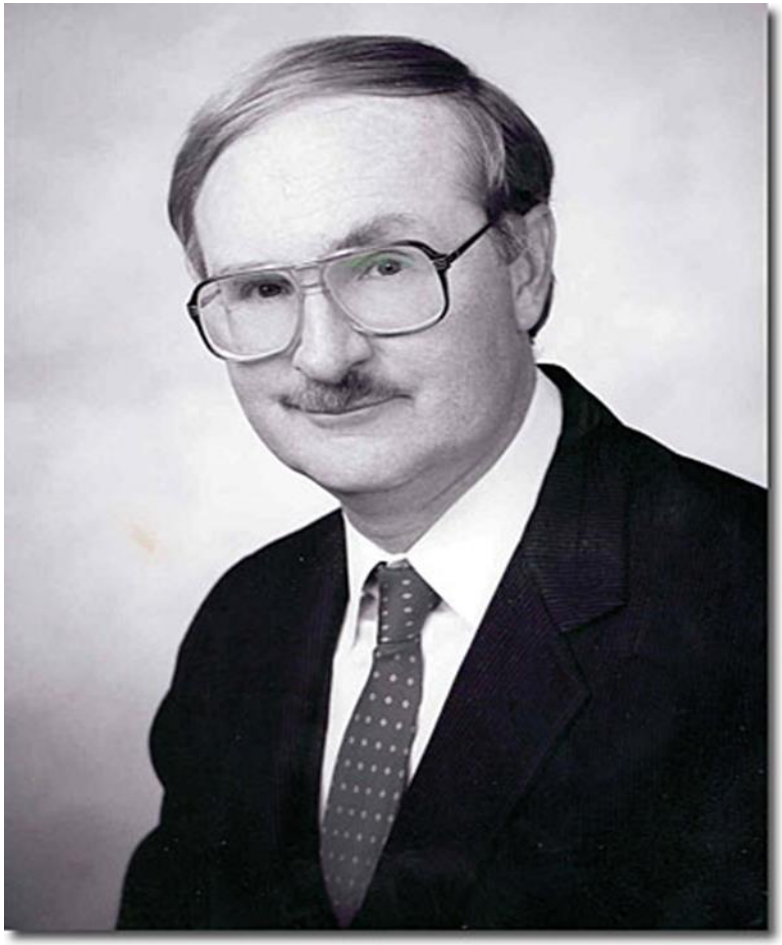
- CF = Net cash flow at time t
- r= rate of return at time t
- t= period

Planned Investment & Consumption

Asset & Product Allocation

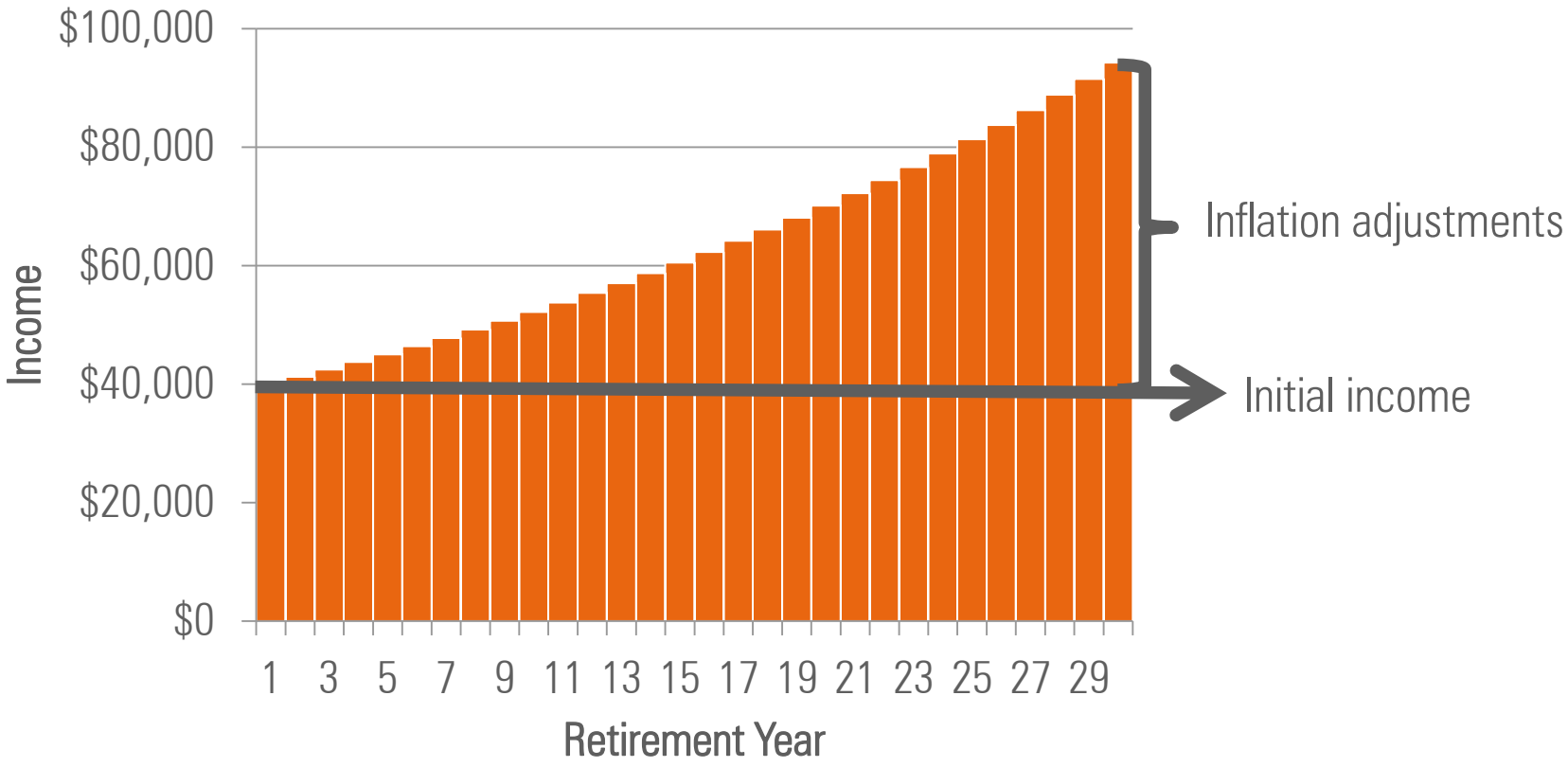
Timing & Horizon

Origin of the 4% Rule



William P Bengen, CFP

How Much Do I Have to Save for Retirement: The 4% Rule

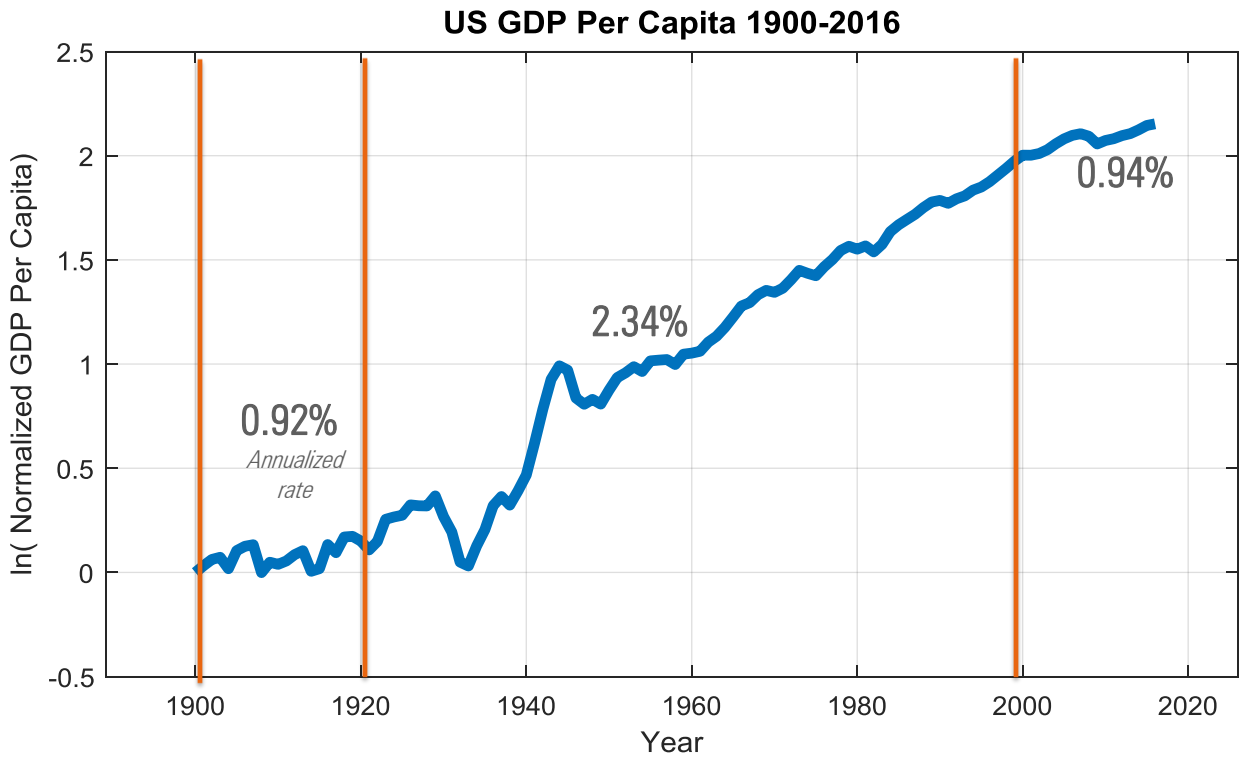


Source: Morningstar

Is the New Regime the old Regime?

The Arrow of Economic Time

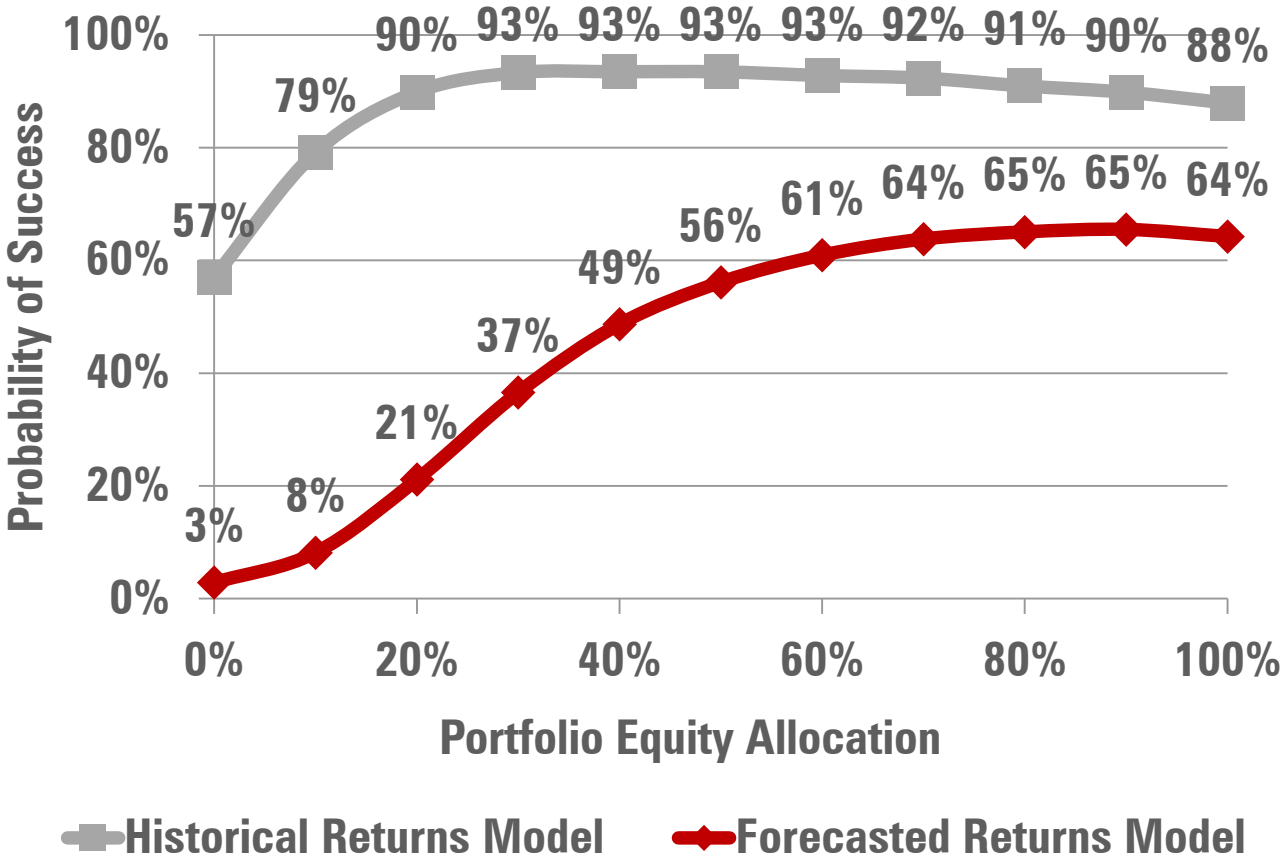
Period of acceleration followed by slowing growth



Data source: Federal Reserve Bank of St. Louis (FRED). Calculation: Author

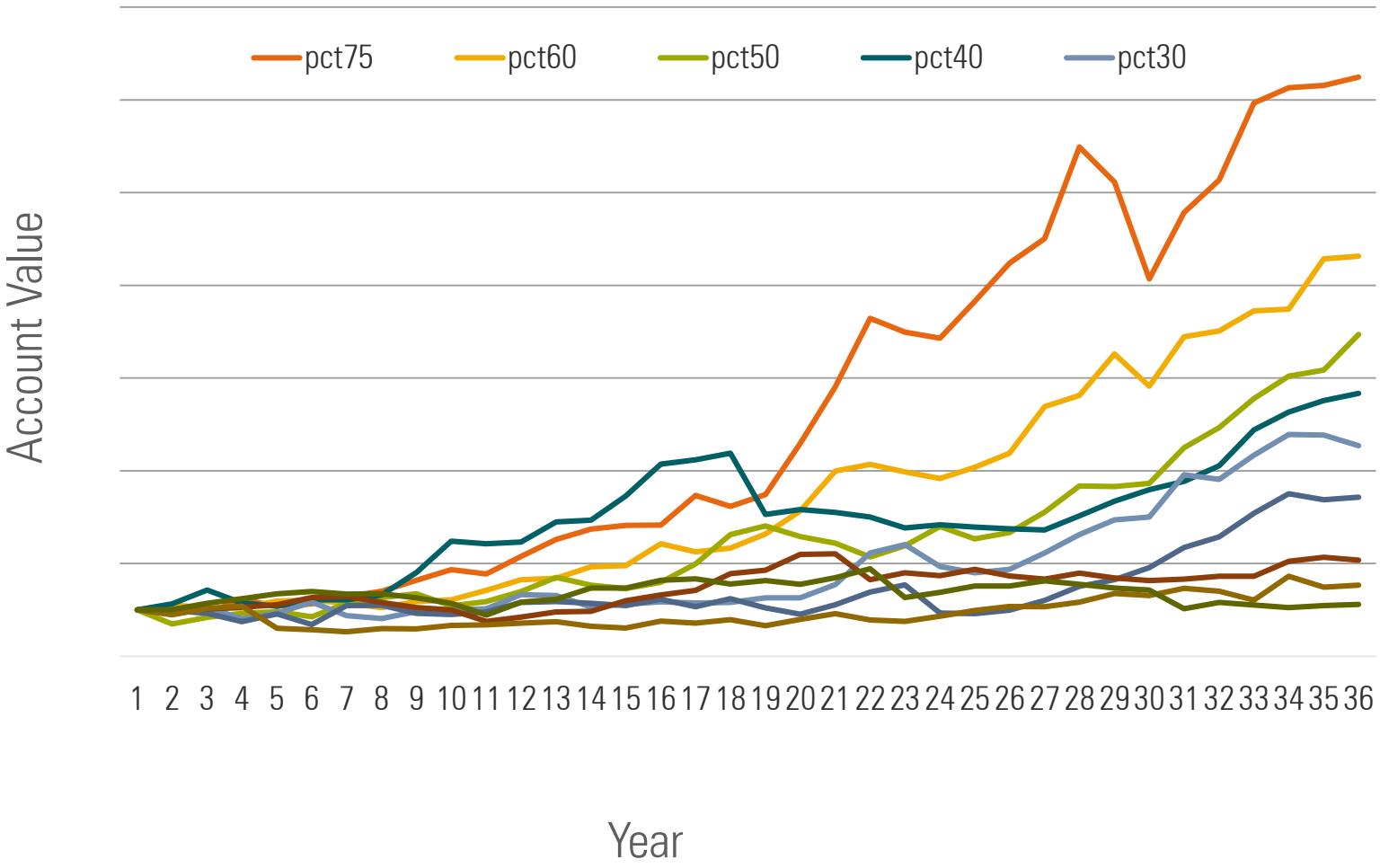
MORNINGSTAR®

The Safety of The 4% Rule, Past versus Future



Source: "Low Bond Yields and Efficient Retirement Income Portfolios" by David Blanchett, Journal of Retirement

Simulated Market Paths



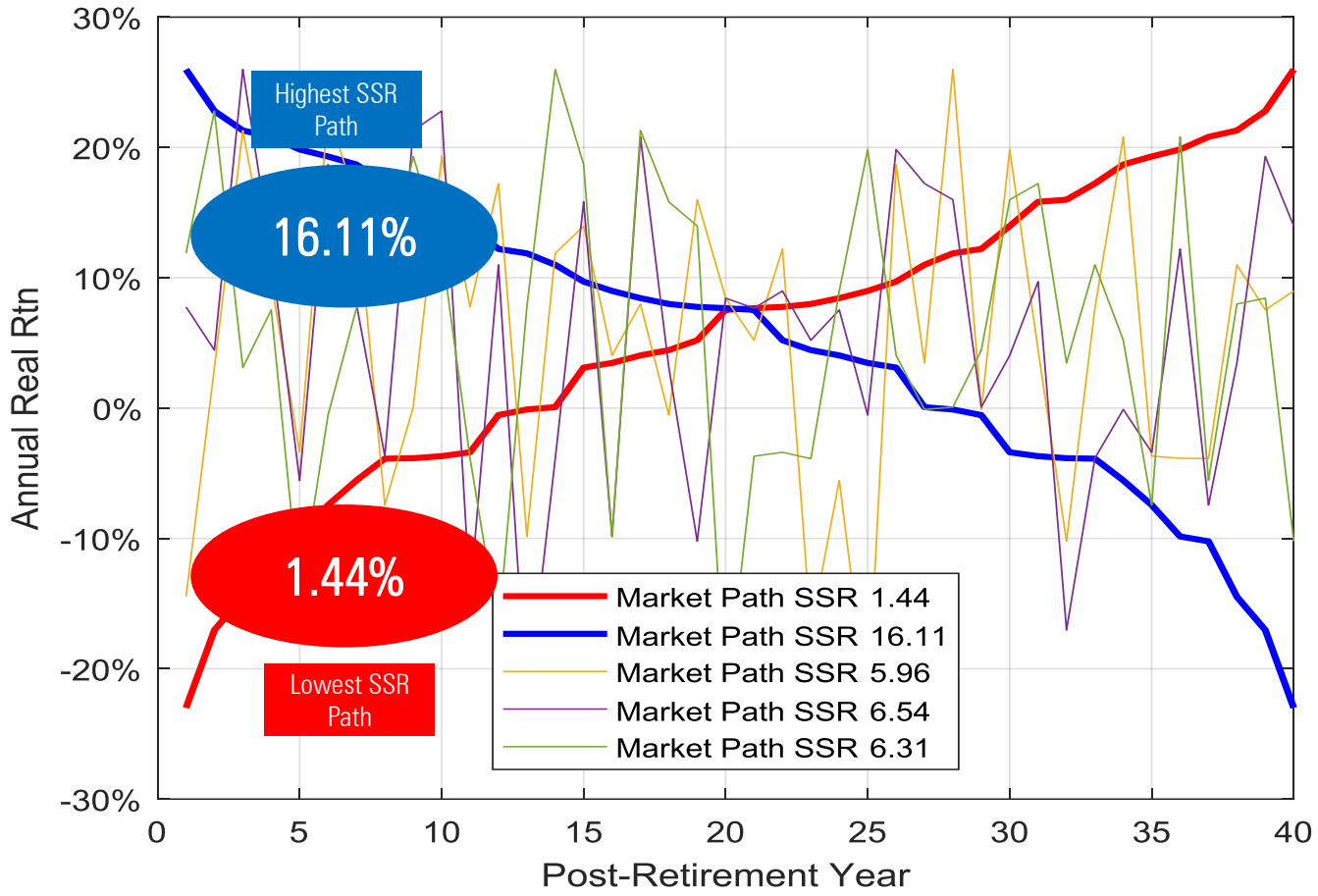
Sustainable Spending Rate

Equity Allocation

Percentile	0%	25%	75%	99%
75	7.8%	8.5%	9.8%	10.6%
50	6.2%	6.9%	8.1%	8.4%
10	4.6%	5.3%	5.7%	5.6%
5	4.2%	5.0%	5.3%	5.0%
2.5	4.0%	4.6%	4.6%	3.9%
1.5	3.9%	4.4%	4.2%	3.6%

Source: Morningstar. Exhibit calculated using a 30/70 S&P/IA IT Govt Bond portfolio and assuming Male mortality from the annuity 2000 table. Annual data from the 1970 through 2015 period was resampled for all but the red and blue paths in which resampled data was sorted by best return to worst return and worst to best for the lowest SSR path.

Sequence Risk: Sustainable Spending Rates (SSRs): 4.9% Horizon Return



Source: Morningstar. Exhibit calculated using a 30/70 S&P/IA IT Govt Bond portfolio and assuming Male mortality from the annuity 2000 table. Annual data from the 1970 through 2010 period was resampled for all but the red and blue paths in which resampled data was sorted by best return to worst return and worst to best for the lowest SSR path.

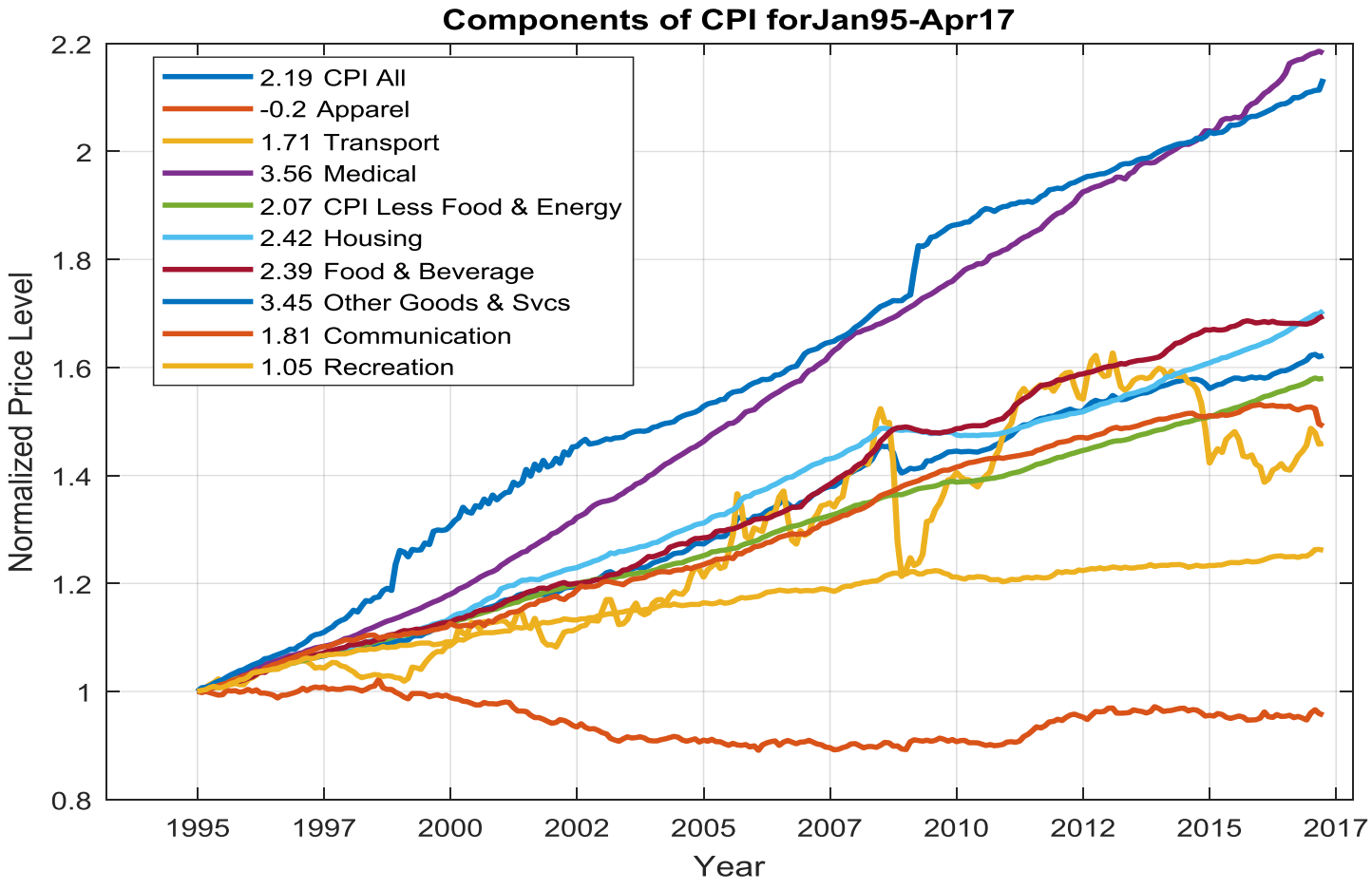
Consumption is King: What Affects Retiree Spending?

What They Buy
(Consumption Basket)

Actual Spending

For illustration only.

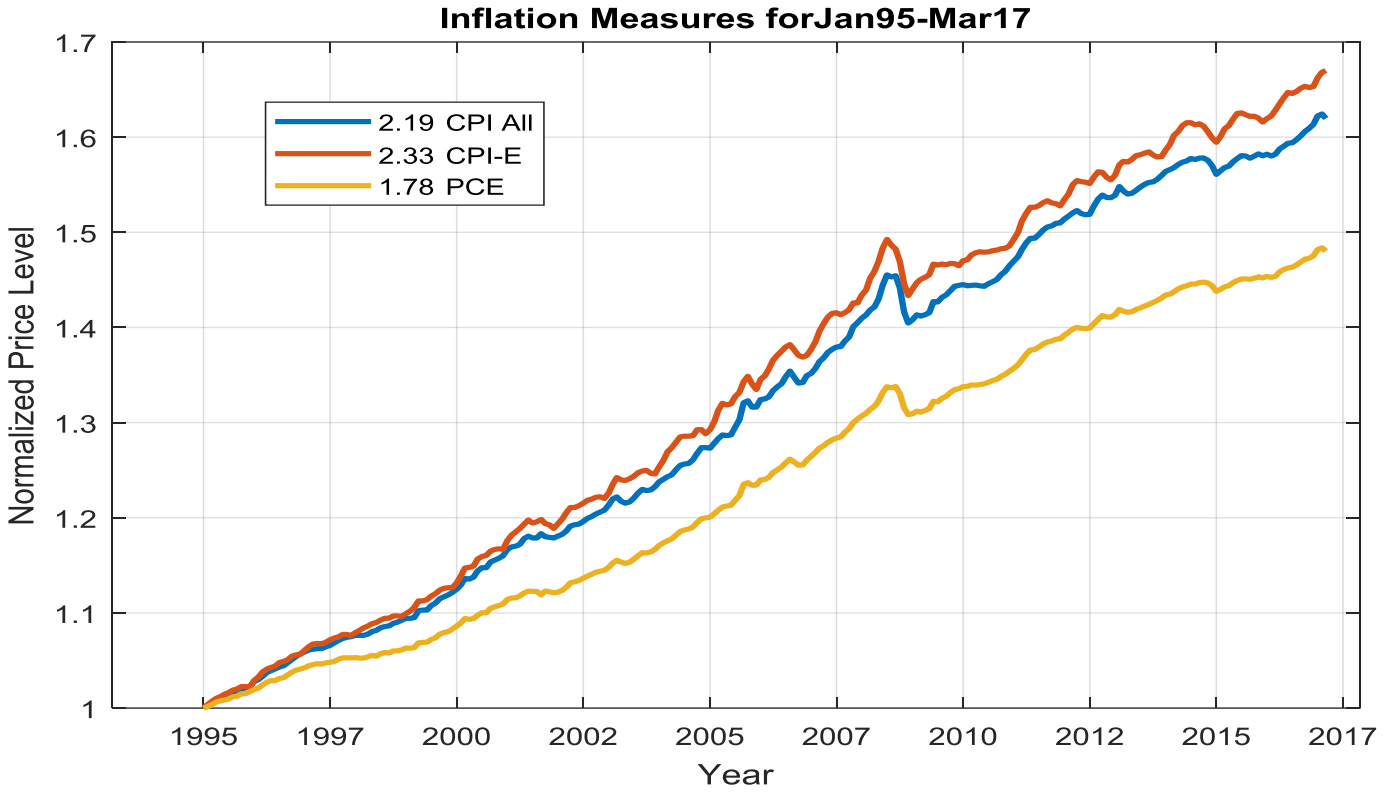
Different Rates of Inflation



Source: Bureau of Labor Statistics.

Alternate Measures of Inflation: CPI-U, CPI-E, PCE

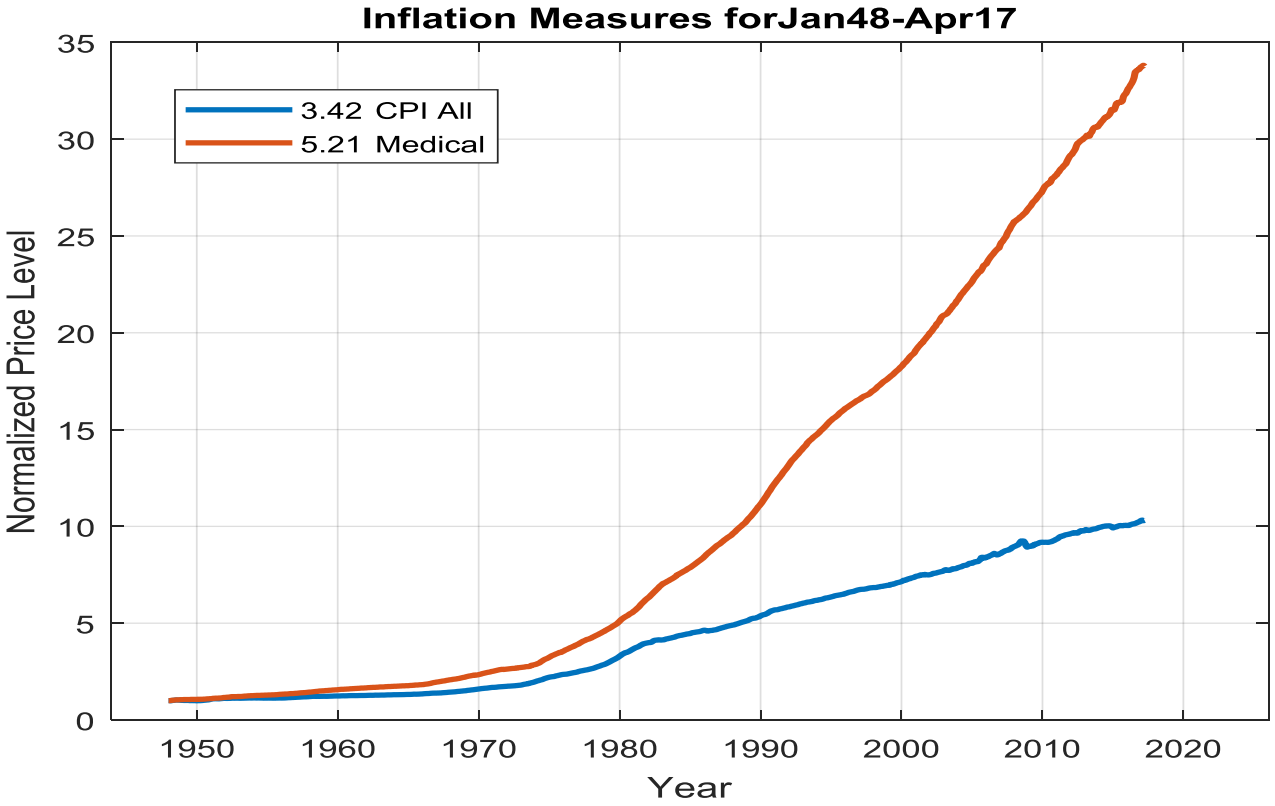
CPI- U, is the standard measure. But Personal Consumption Expenditure (PCE) may be more accurate as it incorporates "substitution" effect. The Experimental CPI (CPI-E) is designed to measure inflation faced by retirees.



Source: Bureau of Labor Statistics.

General Inflation (CPI-U) vs. Medical Inflation

Medical inflation has averaged +5.21% per year from 1948 through April 2017, versus +3.42% for the CPI-U, therefore, medical inflation has been growing about 50% faster than general inflation on an annual basis.



Source: Bureau of Labor Statistics.

The Three "Stages" of Retirement

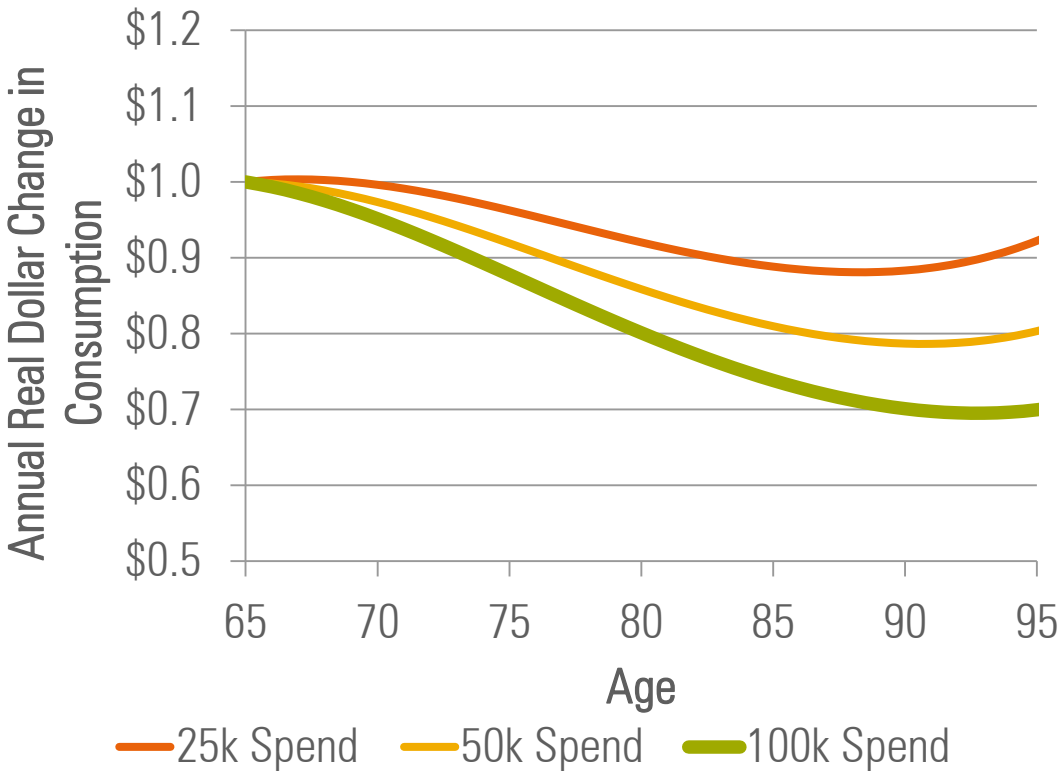
- **Go-Go:** Retirees maintain lifestyle, travel, the group that does not consider themselves "old".

- **Slow-Go:** Between the ages of 70 and 84, brought on by the body saying "Slow Down," 20%-30% budget decline.

- **No-Go:** 85+, significant changes in retirement lifestyle is generally brought on by health issues.

Source: "The Prosperous Retirement, Guide to the New Reality", Michael Stein

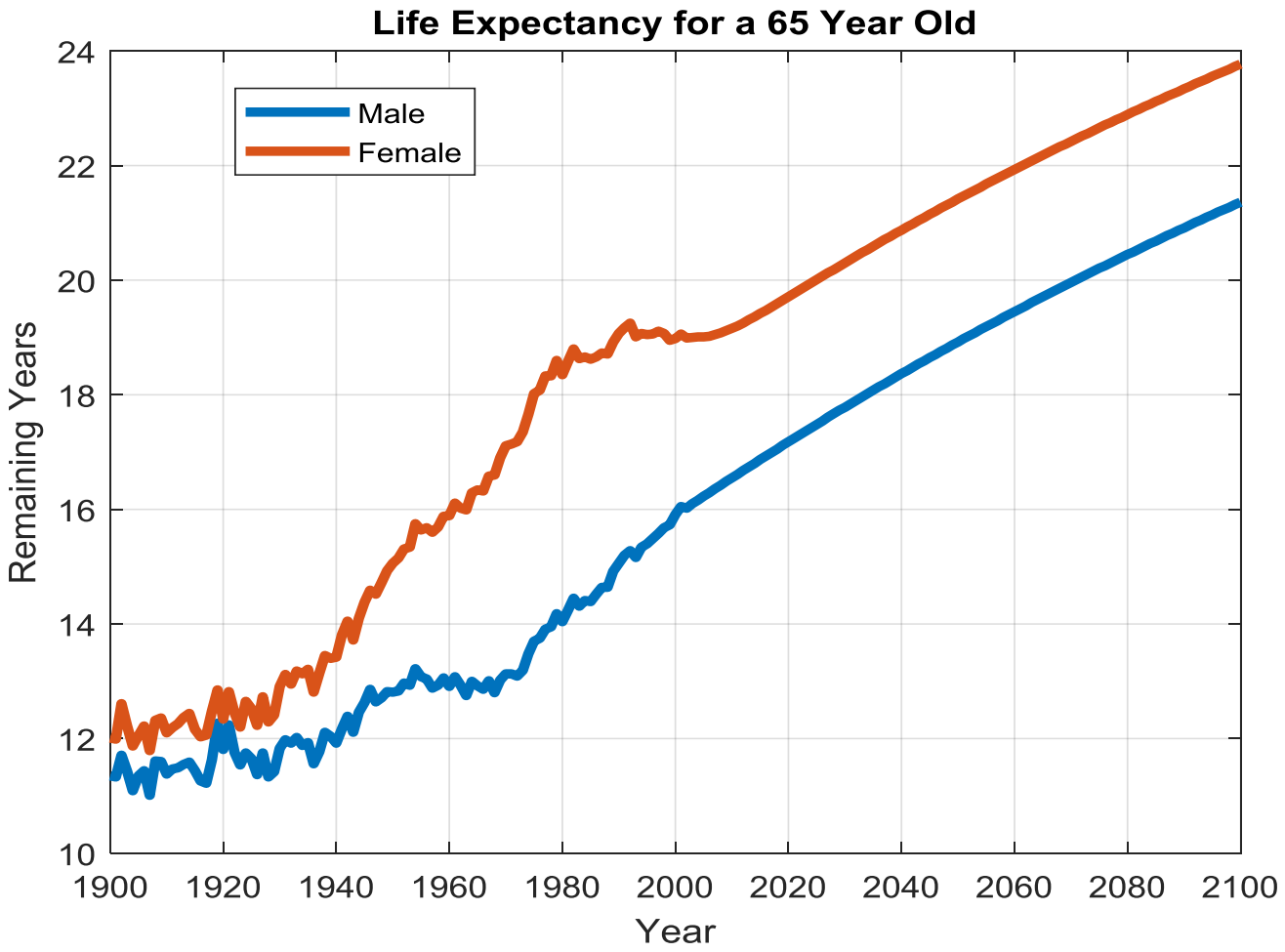
Lifetime Real Income Need, Age 65 Retiree



Source: "Estimating the True Cost of Retirement" by David Blanchett, Morningstar White Paper

MORNINGSTAR®

Life Expectancy Keeps Increasing



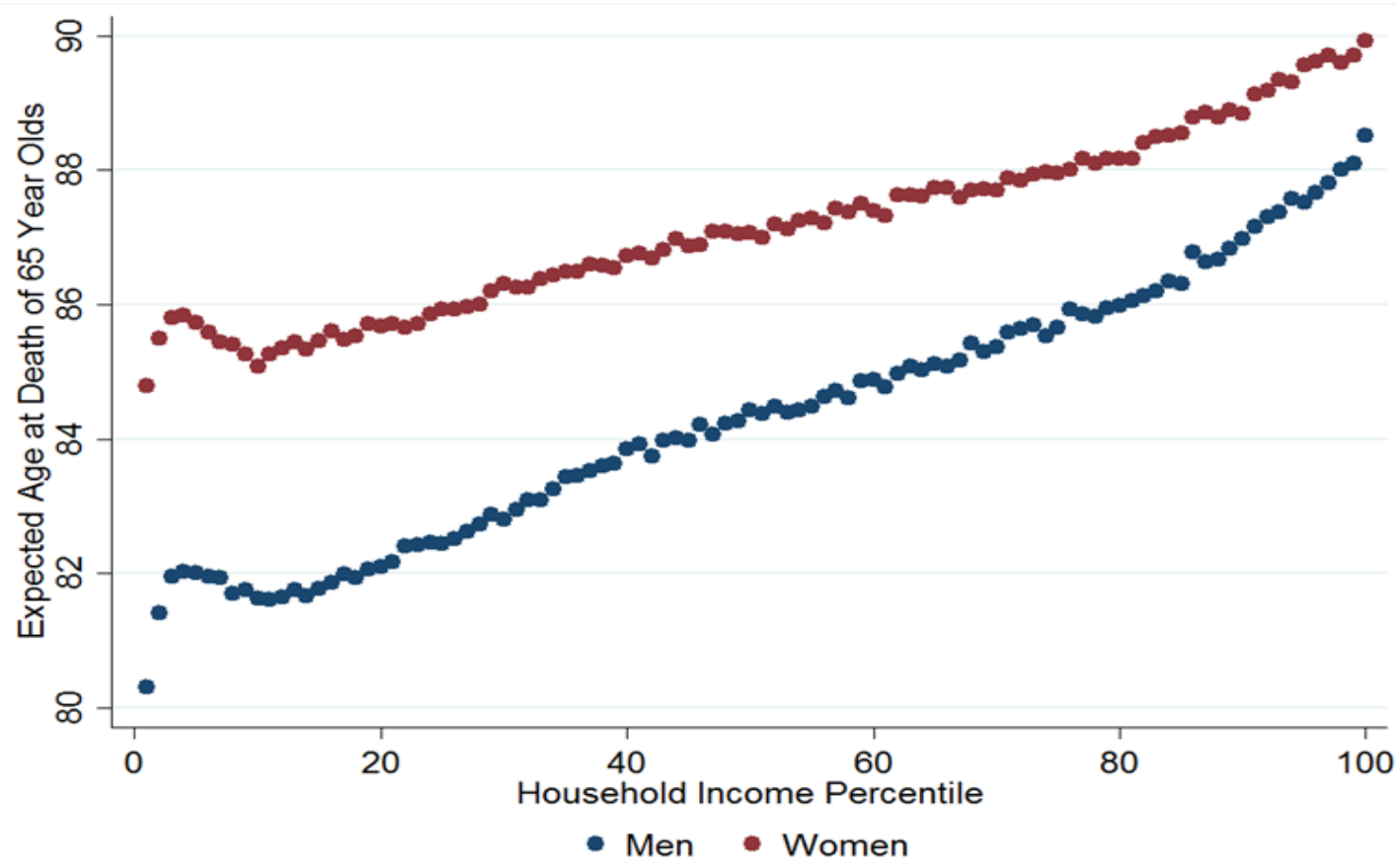
Source: Social Security Administration.

Probability of 65 Year Old Living to Age 95

	Male	Female	Both	≥1
Average American	7%	13%	1%	19%
Healthy American	20%	29%	6%	43%
Healthy American in 15 Years	25%	33%	8%	50%

Source: Social Administration 2010 Periodic Life Table, Society of Actuaries 2012 Annuity Mortality Table

Life Expectancy is Correlated with Income

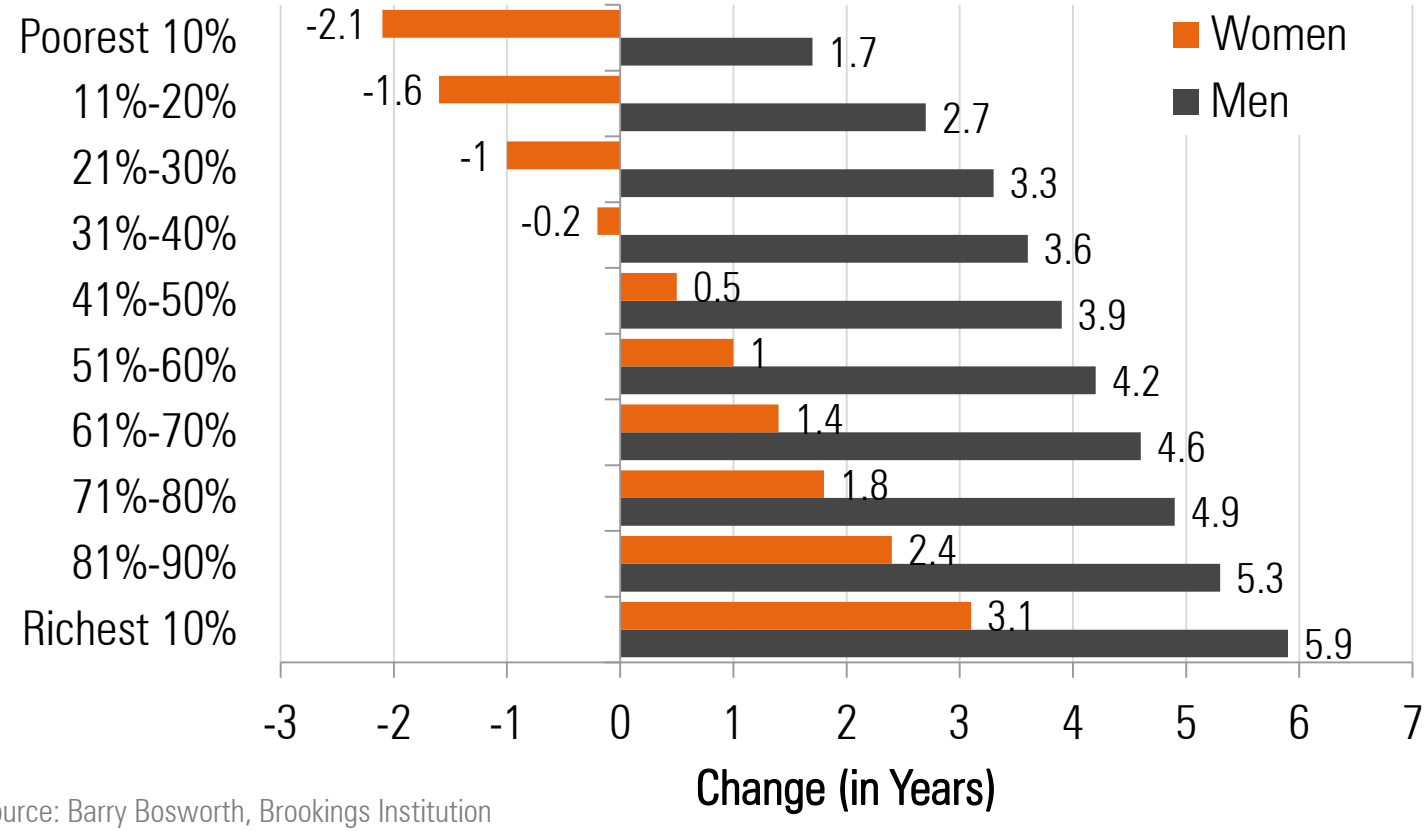


Source: Health Inequality Project

MORNINGSTAR®

Wealthier People Tend to Live Longer

Change in average additional life expectancy (in years) at age 55, by wealth, between cohorts born in 1920 and 1940



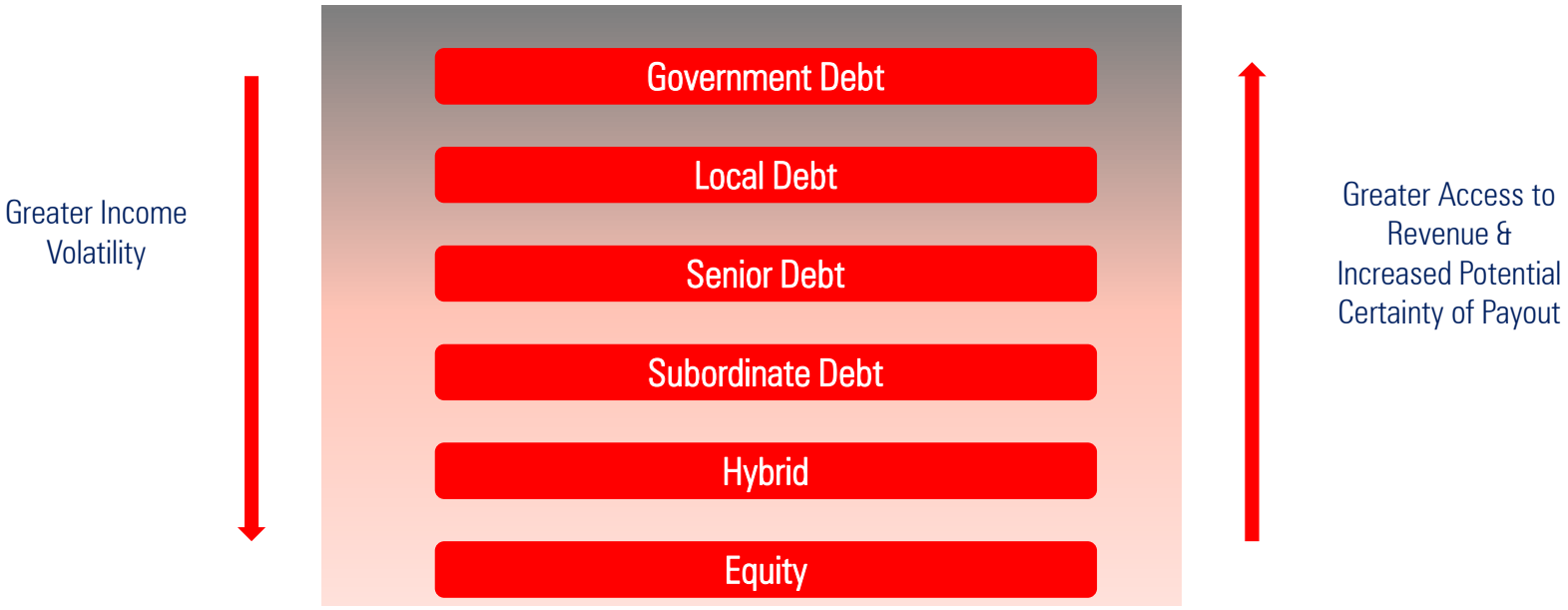
Source: Barry Bosworth, Brookings Institution

Asset Allocation

Investments: Income Investor Cares about Sources of Total Return

Capital Structure: Sources of Return

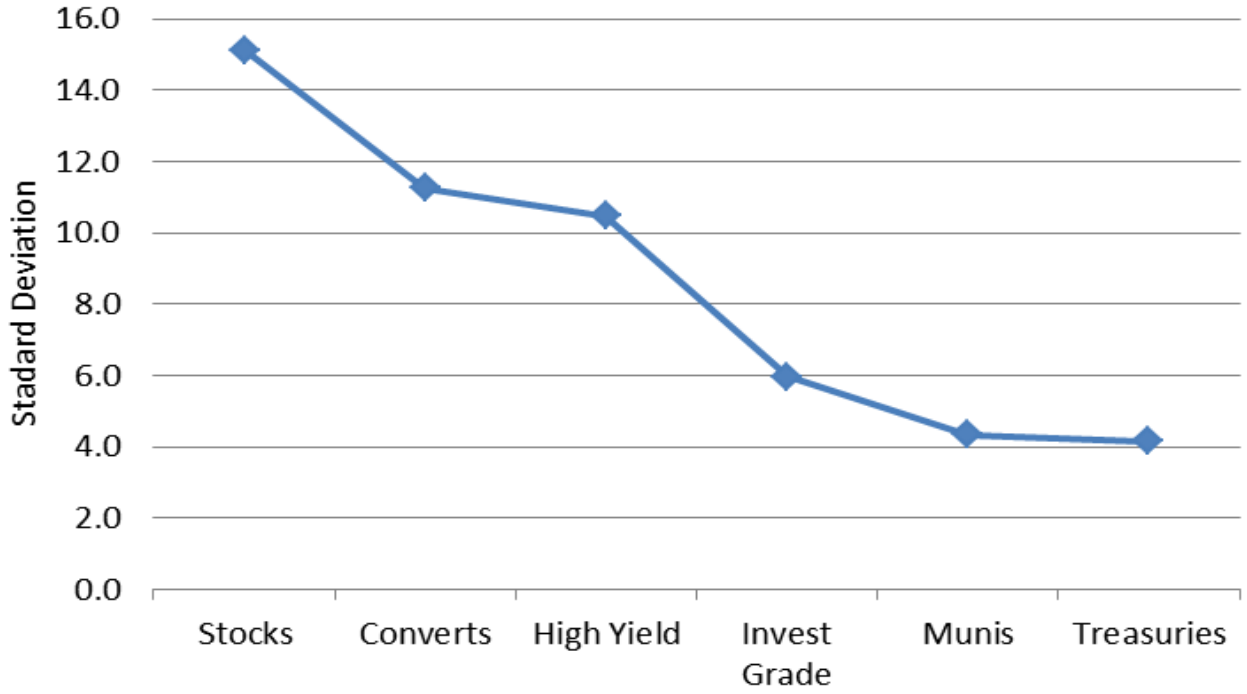
Position on capital structure determines "surety" of payment



- Strategic Asset Allocation is ultimately a cash flow matching exercise in which the cash flow structure of the portfolio is aligned with the investor's liabilities.

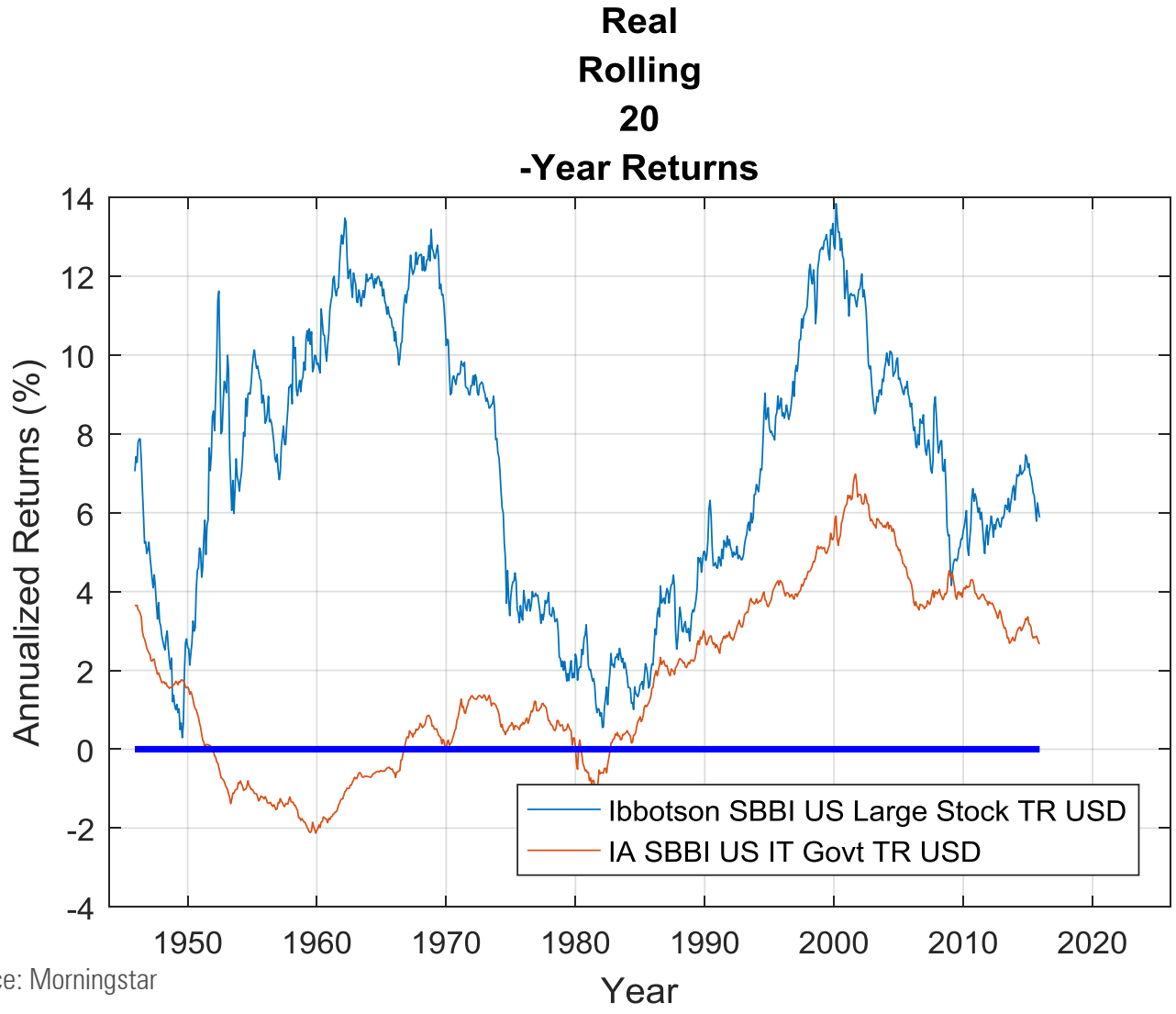
Risk Estimation
Cash flow and Valuation

- Risks for Various Asset Classes (10 year period through Dec 2014)

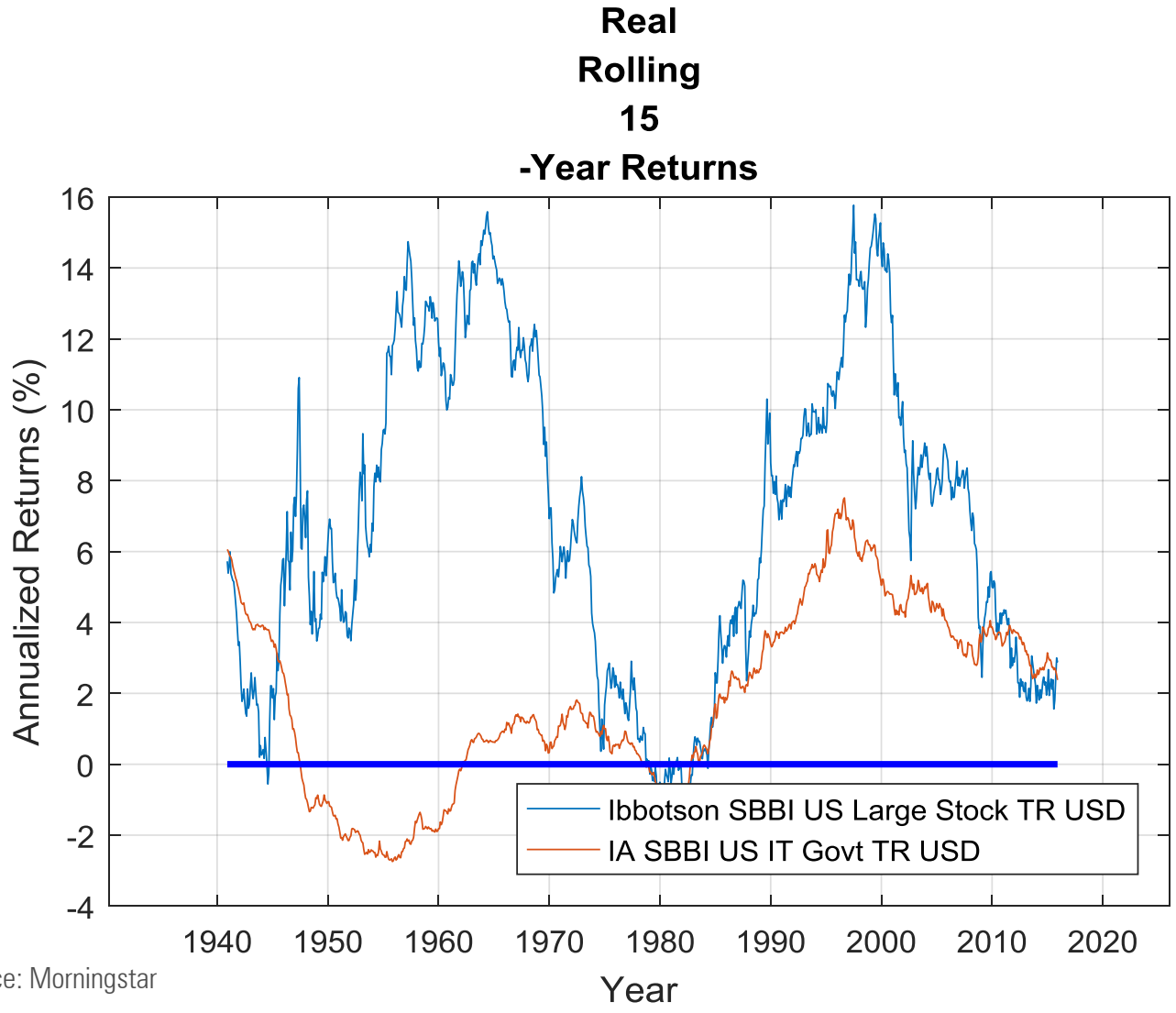


Source: Morningstar Direct. For illustrative purposes only.

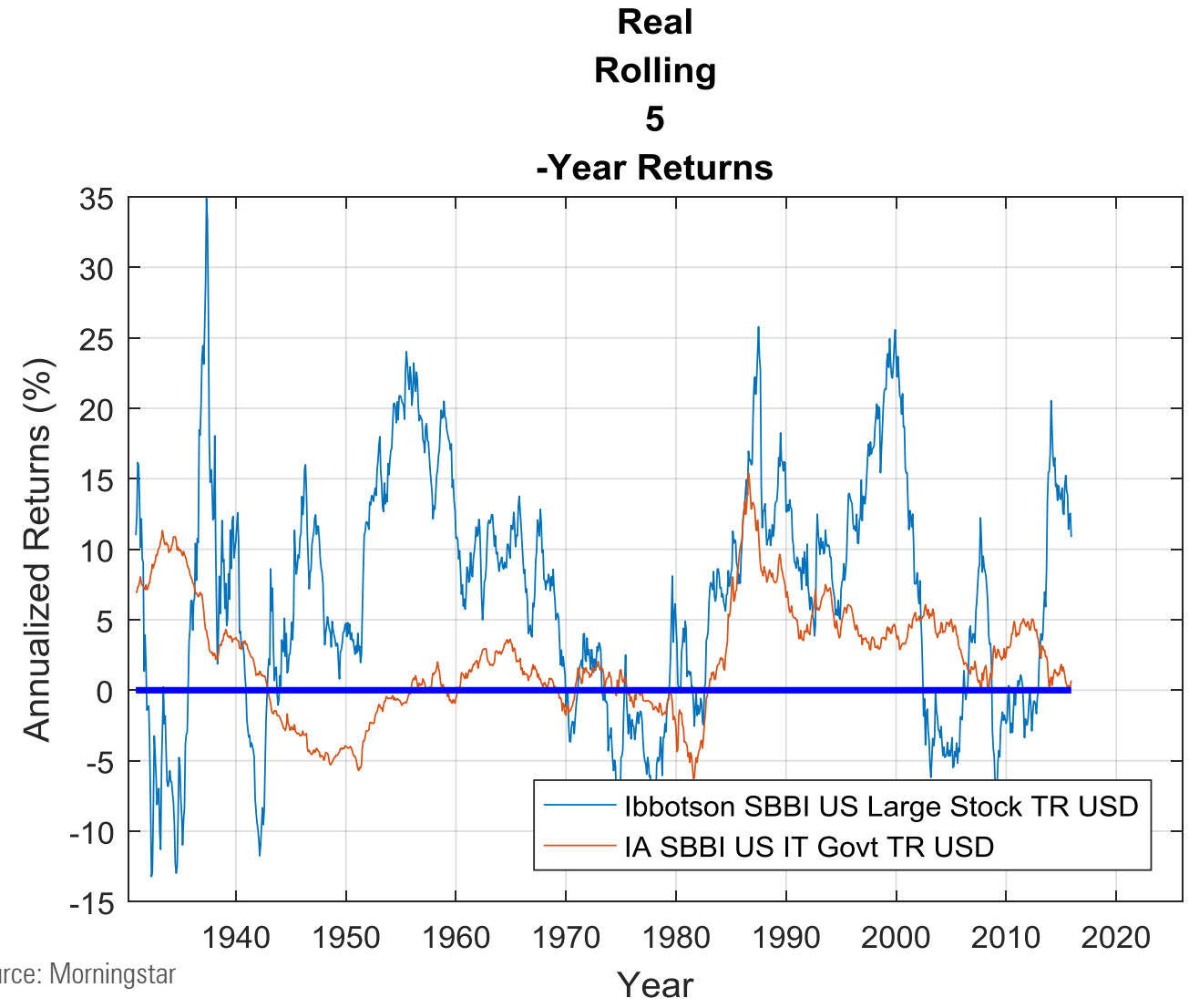
MORNINGSTAR®



Source: Morningstar

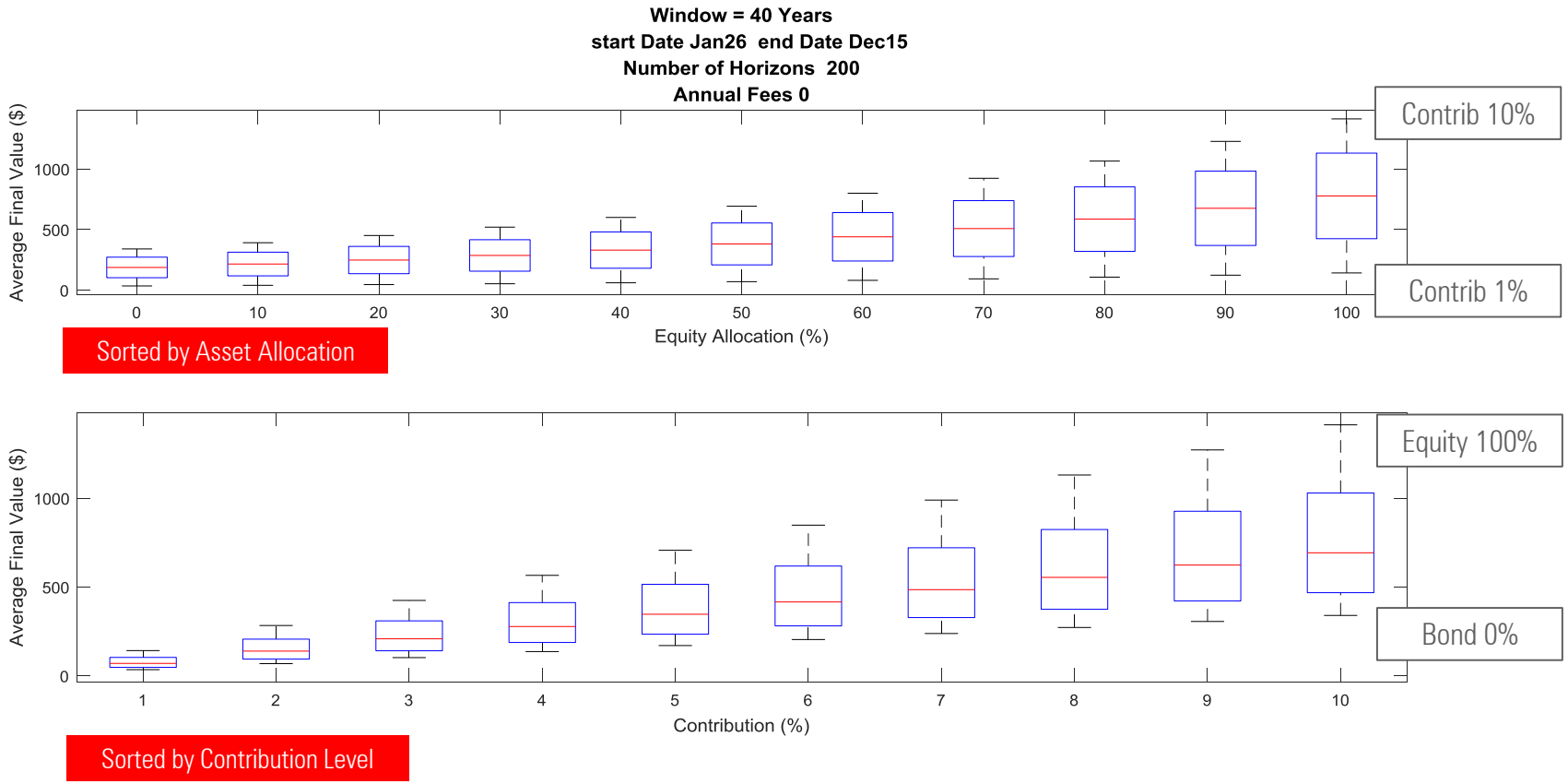


Source: Morningstar



Source: Morningstar

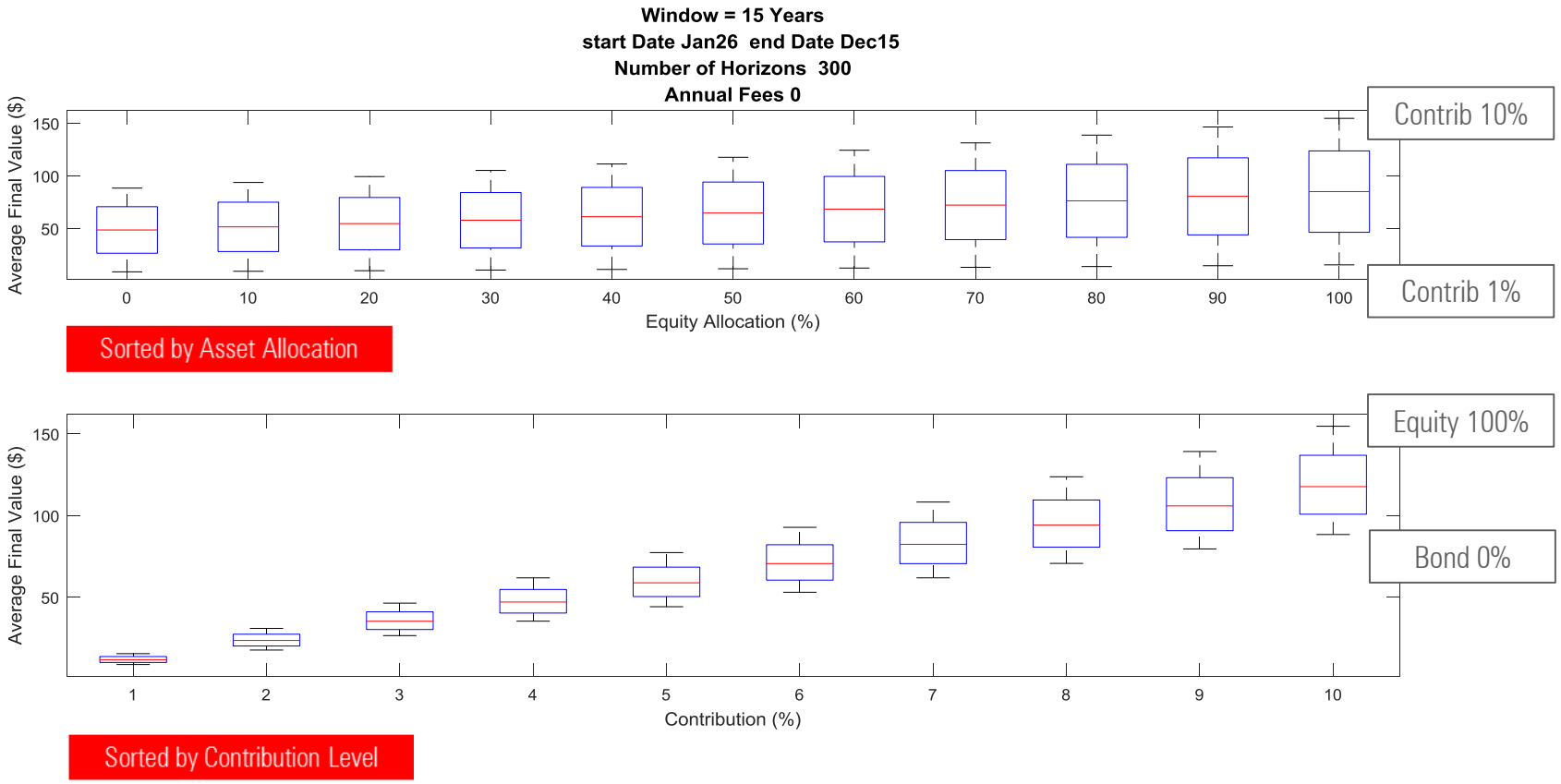
Contributions are King: Relative Impact of asset allocation and contribution level of dispersion of terminal account values. Contributions have greater impact on terminal wealth than does asset allocation.



Source: Morningstar. Portfolios calculated using 75/25 S&P 500/IA Small Cap Indexes and 75/25 IT and LT IA SBBI Govt Bond Indexes. Portfolios are rebalanced at end of each quarter and contributions are made at the beginning.

MORNINGSTAR®

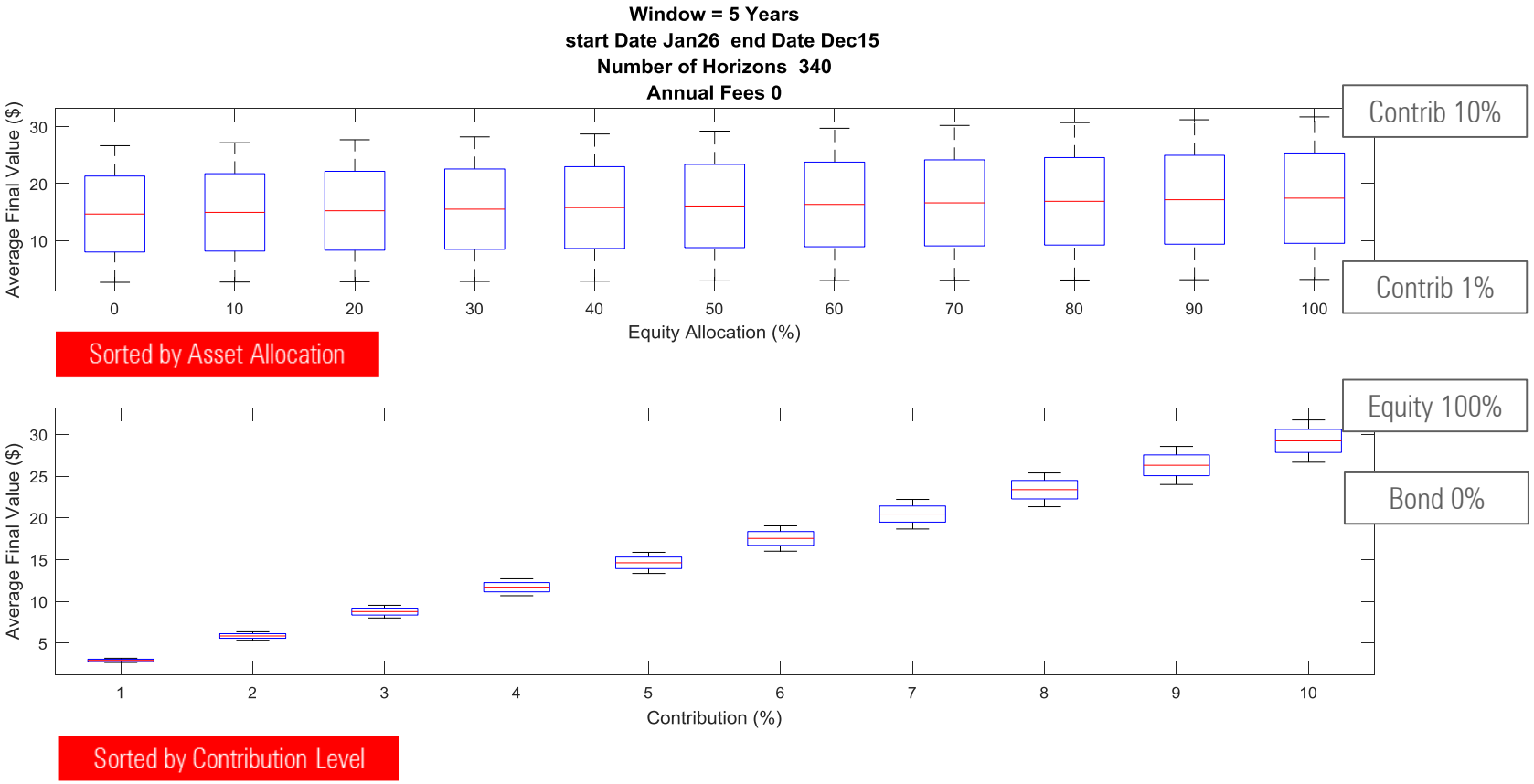
Contributions are King



Source: Morningstar. Portfolios calculated using 75/25 S&P 500/IA Small Cap Indexes and 75/25 IT and LT IA SBBI Govt Bond Indexes. Portfolios are rebalanced at end of each quarter and contributions are made at the beginning.

MORNINGSTAR®

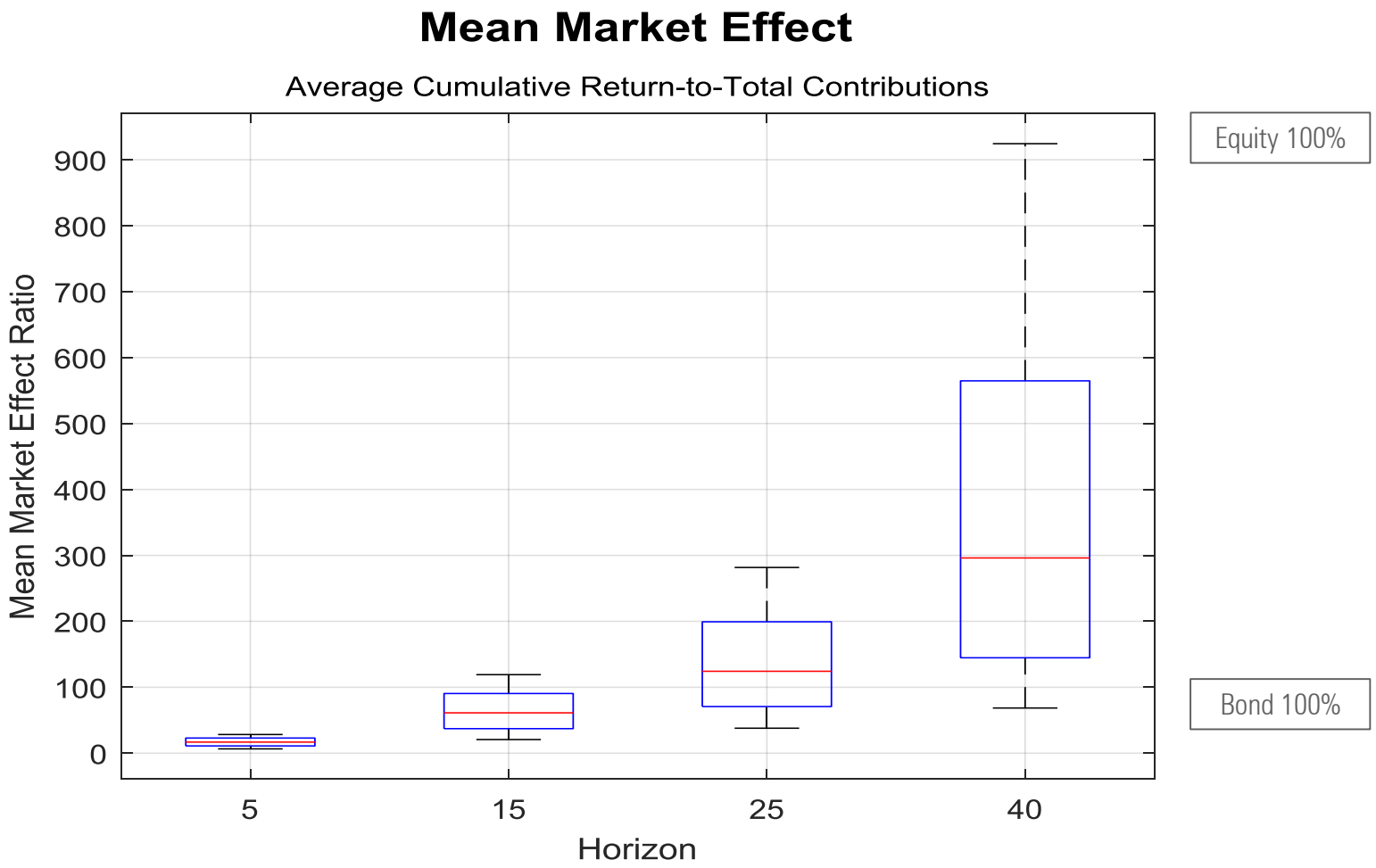
Contributions are King



Source: Morningstar. Portfolios calculated using 75/25 S&P 500/IA Small Cap Indexes and 75/25 IT and LT IA SBBI Govt Bond Indexes. Portfolios are rebalanced at end of each quarter and contributions are made at the beginning.

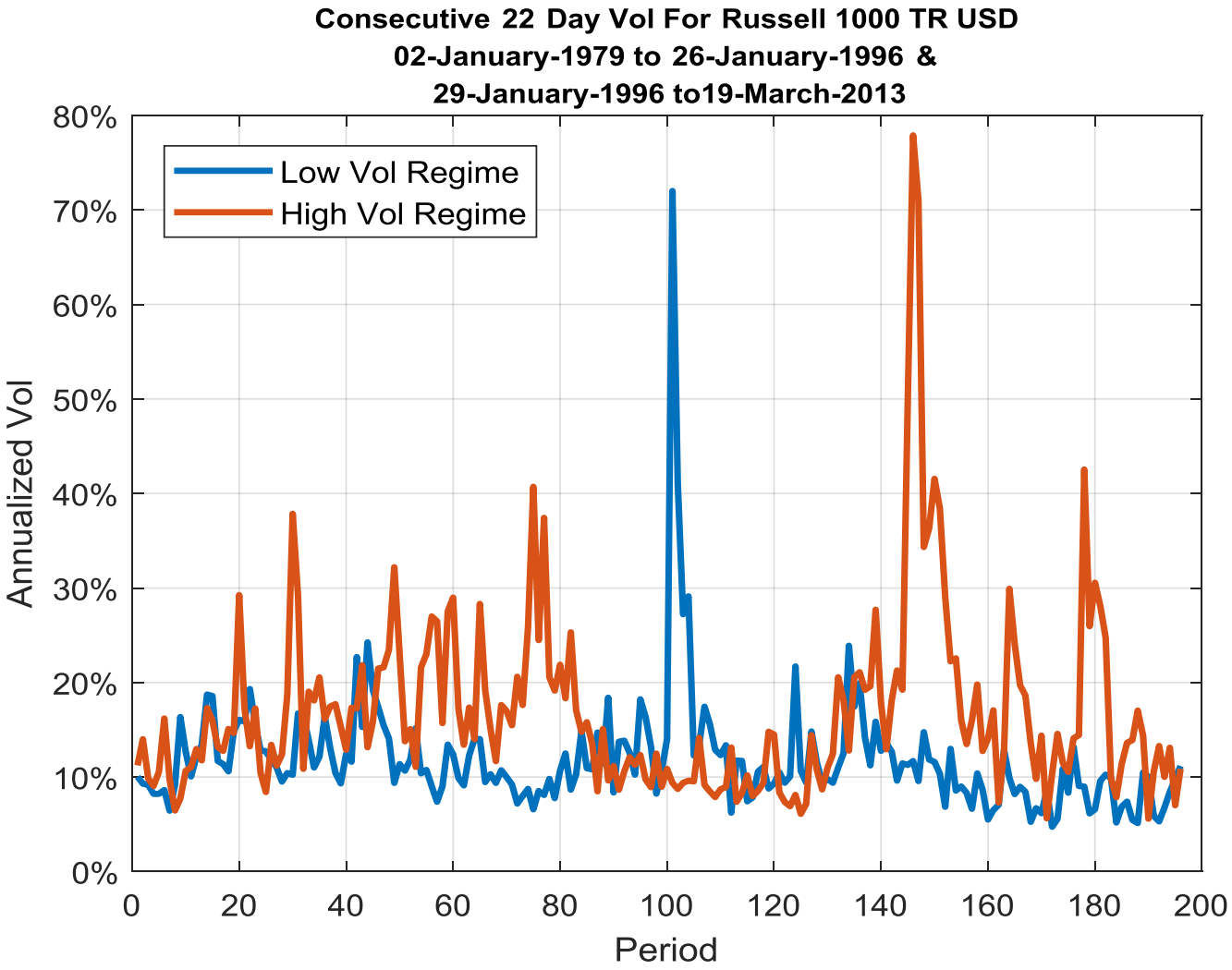
MORNINGSTAR®

Contributions are King



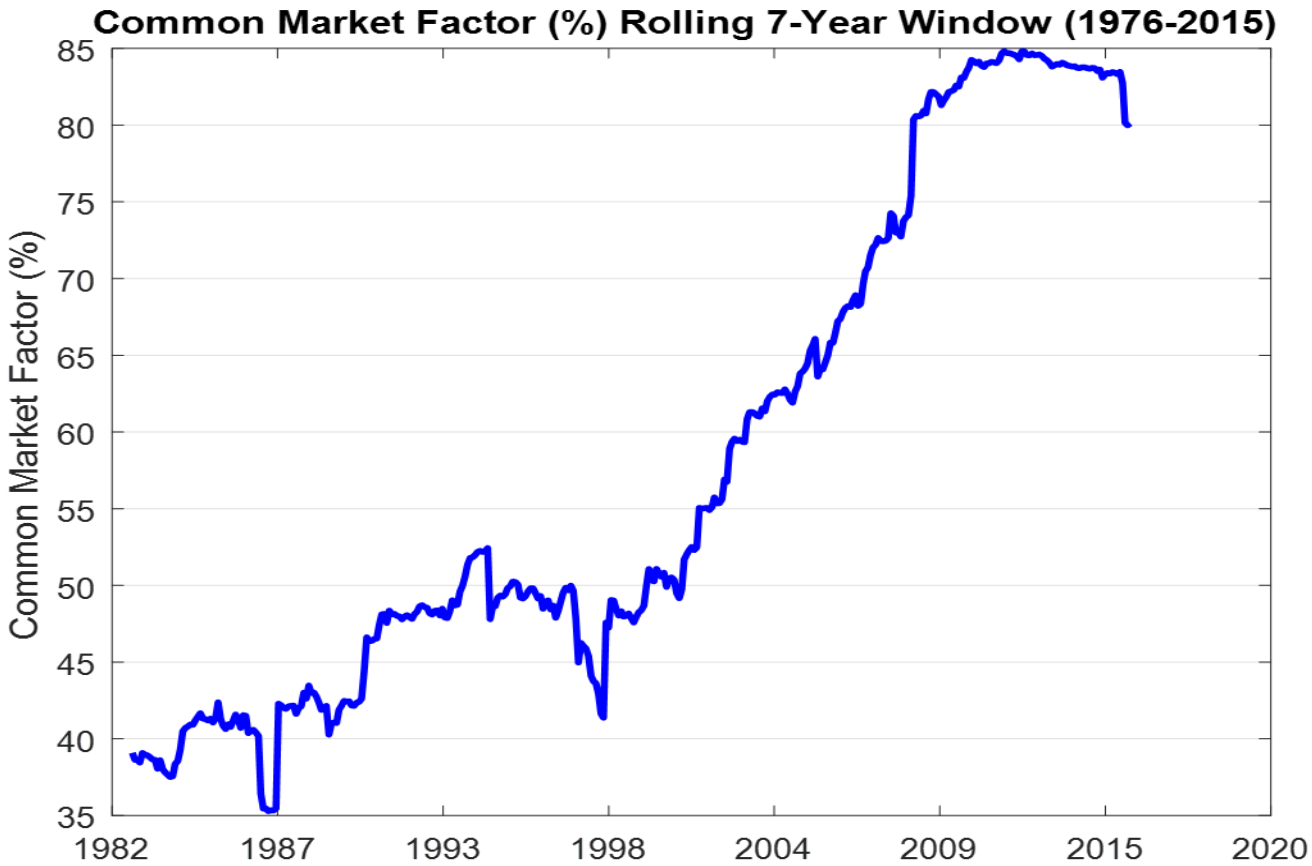
Source:: "Contributions Are King" Ratner (2017) Morningstar Magazine.. Portfolios calculated using 75/25 S&P 500/IA Small Cap Indexes and 75/25 IT and LT IA SBBI Govt Bond Indexes. Portfolios are rebalanced at end of each quarter and contributions are made at the beginning.

New Challenges: Structural Increase in Volatility



MORNINGSTAR®

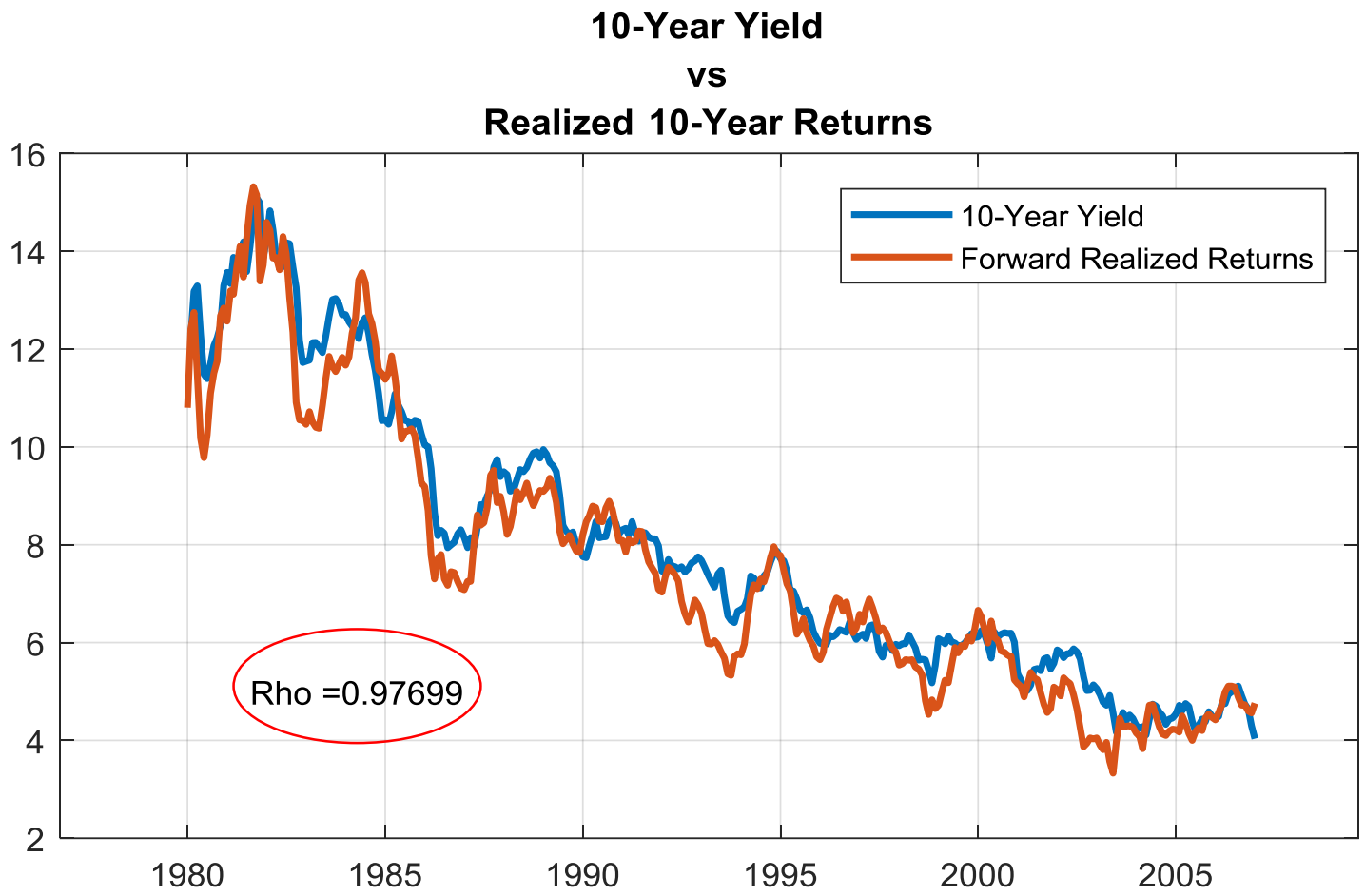
New Challenges: Structural Increase in Correlations: More Limited Diversification Opportunities



Source: "Efficiency, Risk & Diversification" Ratner (2017) Investment & Wealth Monitor, IMCA.; Data: MSCI Country Index for 17 Countries: US,Australia, Austria,,Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Singapore, Spain,Sweeden, Switzerland, UK. Graph plots the scaled first principle component of the covariance matrices for the indexes mentioned.

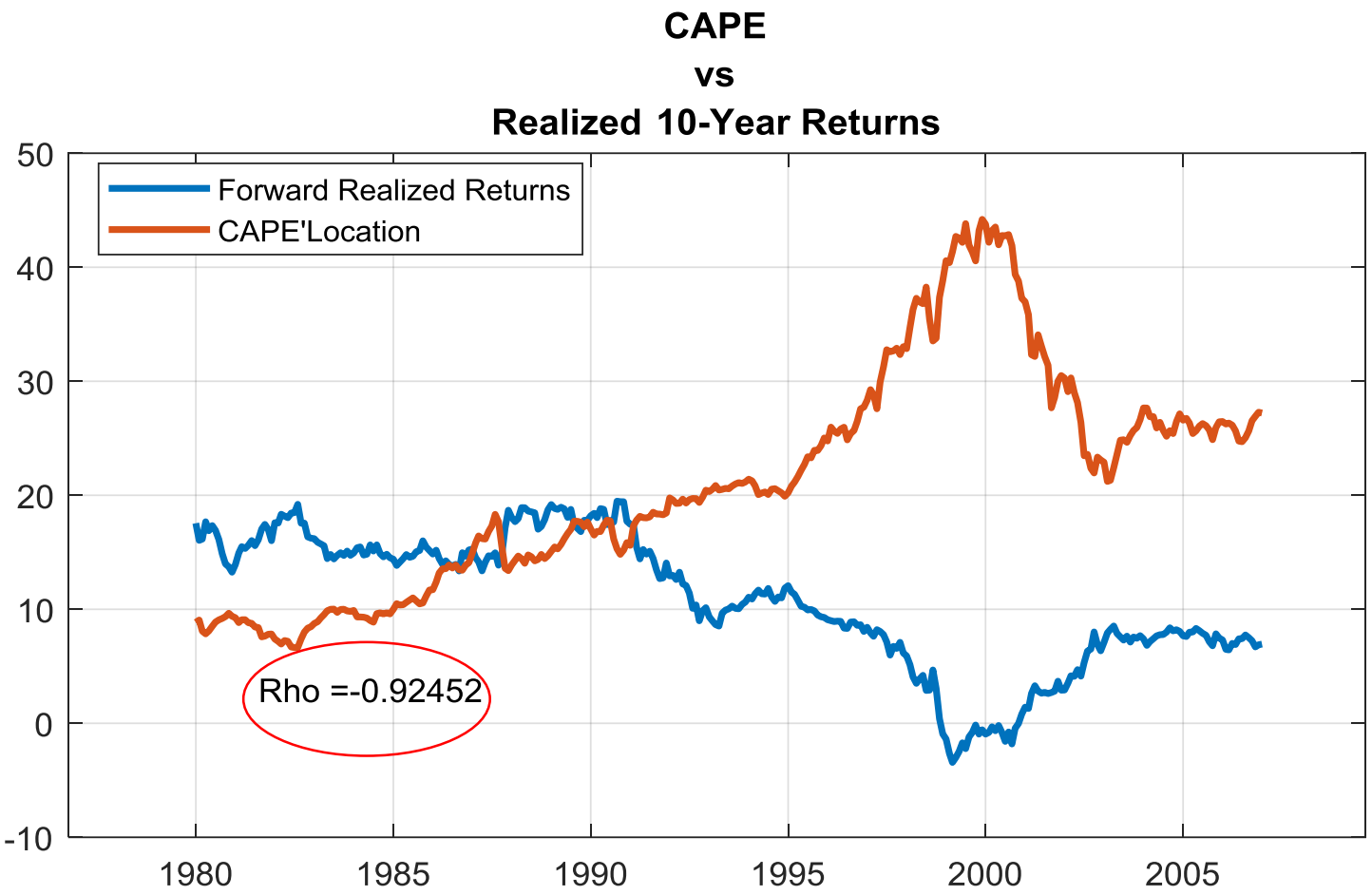
MORNINGSTAR®

Initial Conditions: Valuation Matters



Source: Robert J. Shiller & Morningstar

Initial Conditions: Valuation Matters



Source: Robert J. Shiller & Morningstar

Risk Is Not Stationary
Economic Environment

- Risk On/Risk Off

	S&P 500	IA Small Cap	EAFE	IT Govt	LT Govt	LT Corp	30 Day Tbill
S&P 500	1.00	0.87	0.87	-0.59	-0.57	-0.22	-0.22
IA Small Cap	0.87	1.00	0.78	-0.57	-0.53	-0.23	-0.17
EAFE	0.87	0.78	1.00	-0.48	-0.50	-0.15	-0.15
IT Govt	-0.59	-0.57	-0.48	1.00	0.81	0.58	0.15
LT Govt	-0.57	-0.53	-0.50	0.81	1.00	0.75	0.06
LT Corp	-0.22	-0.23	-0.15	0.58	0.75	1.00	-0.05
30 Day Tbill	-0.22	-0.17	-0.15	0.15	0.06	-0.05	1.00

- Rising Rates

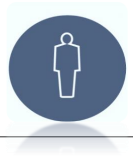
	S&P 500	IA Small Cap	EAFE	IT Govt	LT Govt	LT Corp	30 Day Tbill
S&P 500	1.00	0.73	0.54	0.42	0.47	0.48	-0.10
IA Small Cap	0.73	1.00	0.50	0.28	0.34	0.37	-0.25
EAFE	0.54	0.50	1.00	0.58	0.62	0.63	-0.23
IT Govt	0.42	0.28	0.58	1.00	0.98	0.95	0.01
LT Govt	0.47	0.34	0.62	0.98	1.00	0.98	-0.07
LT Corp	0.48	0.37	0.63	0.95	0.98	1.00	-0.14
30 Day Tbill	-0.10	-0.25	-0.23	0.01	-0.07	-0.14	1.00

Source: Morningstar Direct. Estimates are for the following indexes: the IA S&P 500, IA Small Cap, The Morgan Stanley Europe Asia Far East, and the IA Intermediate-Term, Govt, Long-term Govt, Long-Term Corporate and 30-Day T-Bill Indexes. Indexes shown are unmanaged and not available for direct investment.

Investors

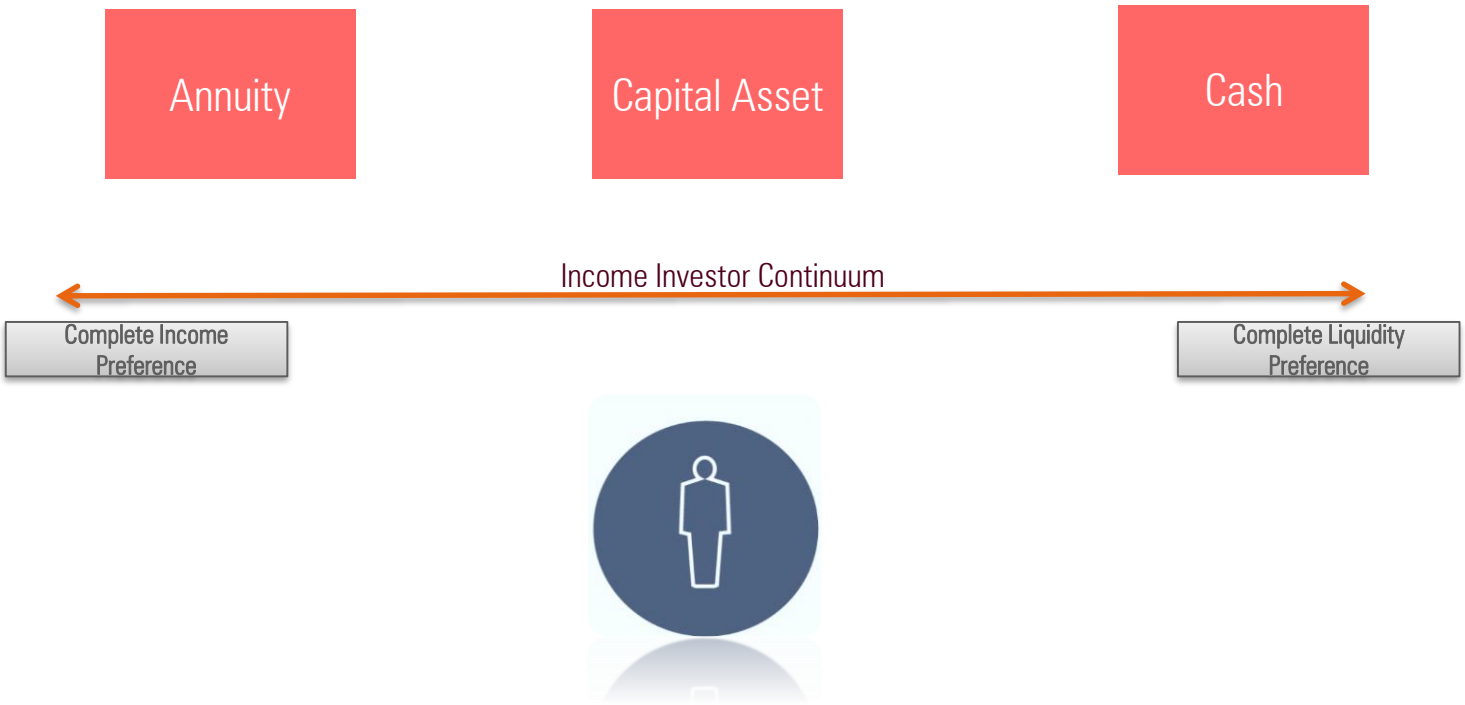
Defining the Investor

- Investors divide roughly between absolute return investors, benchmark relative (LDI) investors, and income investors.
- An income investor is willing to trade liquidity and the possibility of a high future pay-off for a tranquil income stream.
- When thinking of asset and product allocation, we traditionally think about a continuum that runs from the minimum variance option to the maximum expected return option.
- For an income investor we need to think of an *income continuum* that runs from the most liquid option (which may or may not be the minimum variance option) to the least liquid option (an annuity) which of course is not the highest expected return option but, rather, the most certain payout option and the least liquid.
- In this framework the most liquid is the *riskiest* (since the payout will change from one period to the next) while the least liquid is the *safest* since we know exactly what we'll get from period to period.
- This framework presents a useful alternative to the traditional "Mean-Variance Efficient" investor who seeks an optimal total return, total risk tradeoff.



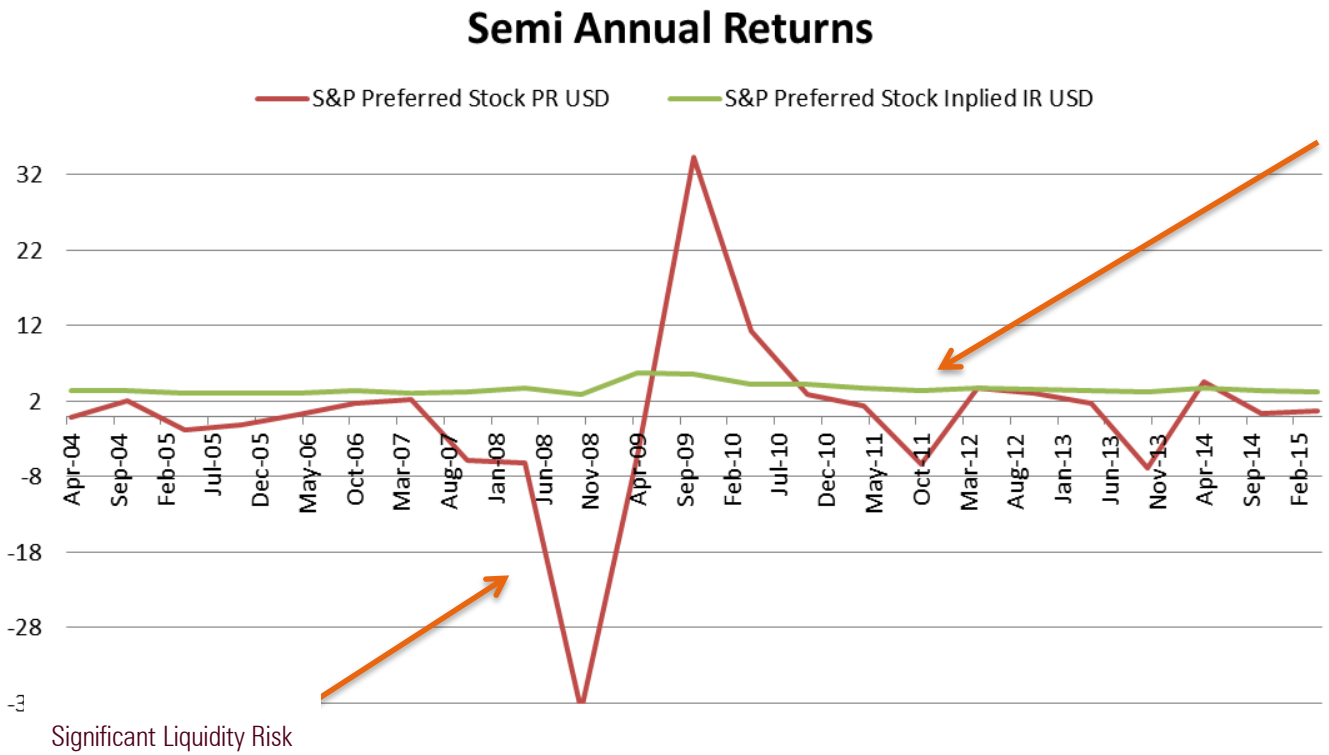
Representative Income Investor

- Income investor is willing to trade liquidity for income consistency.



Income vs. Total Return
Historical Record

Income is Comparatively Predictable



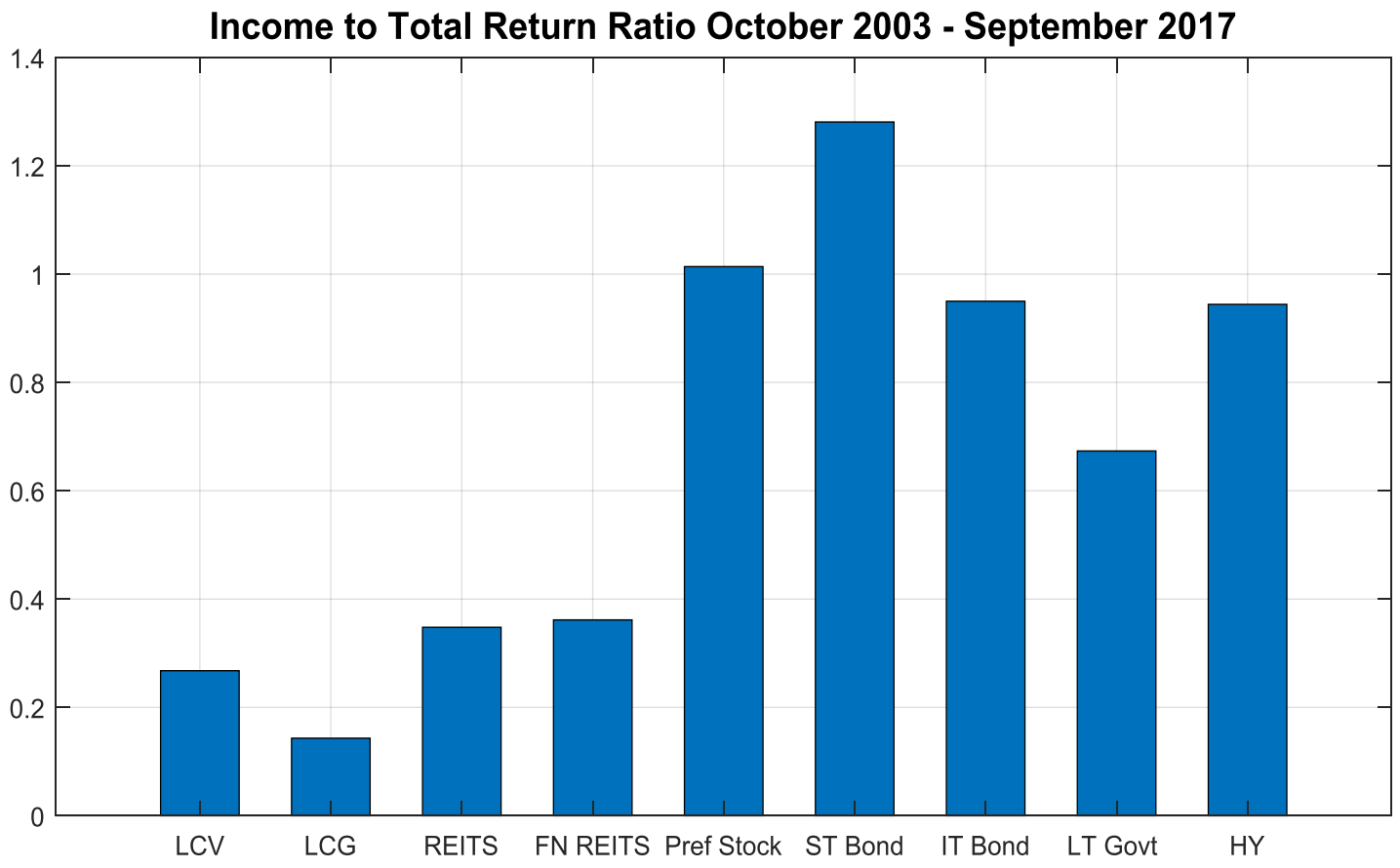
High and Consistent Income

Significant Liquidity Risk

Source: Authors calculations. For illustrative purposes only.

Source: "Building Efficient Income Portfolios" Blanchett & Ratner (2015) Journal of Portfolio Management

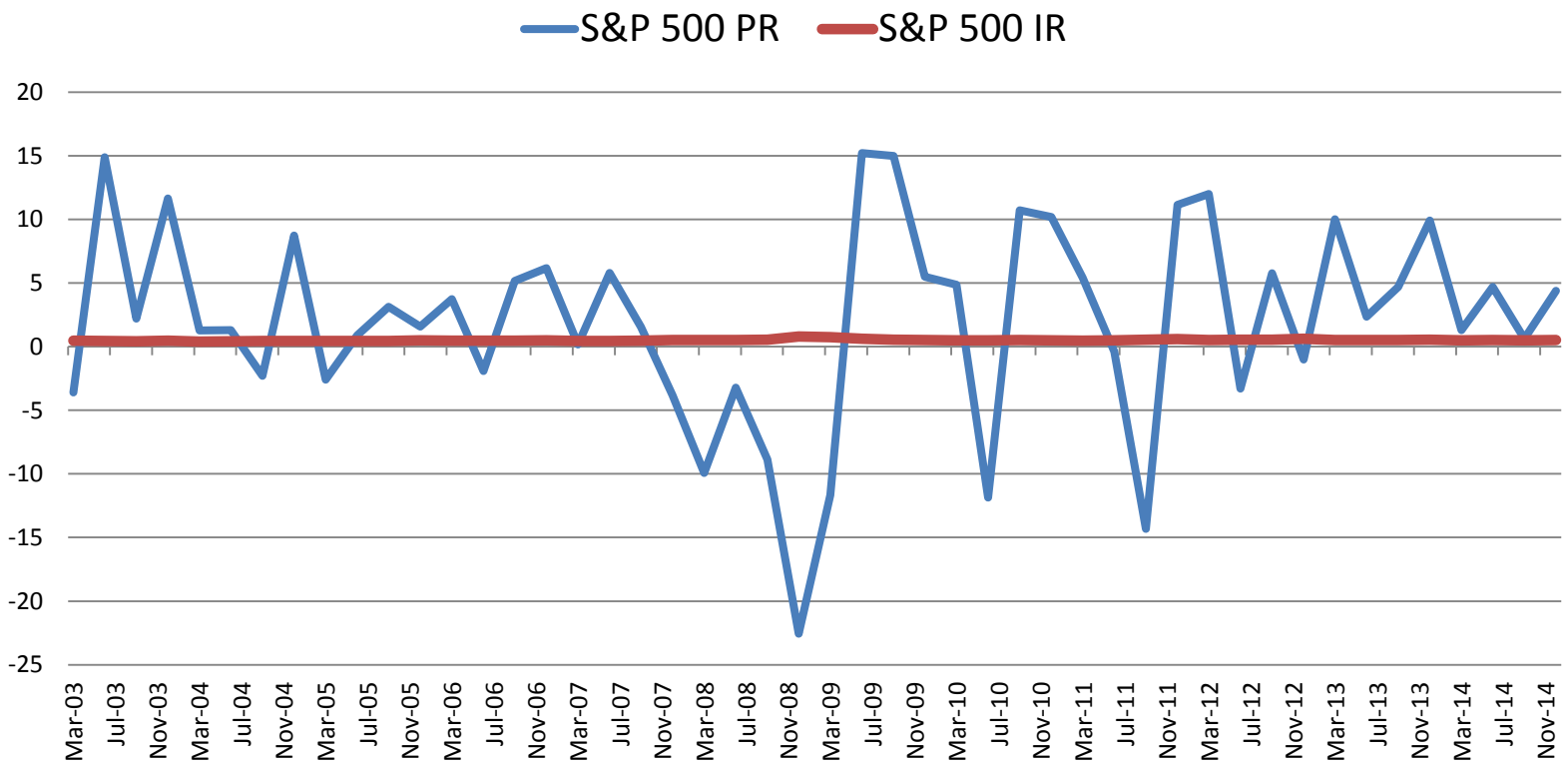
MORNINGSTAR®



Source: Morningstar Direct. For illustrative purposes only.

Income vs. Total Return
Historical Record

Income is Comparatively Predictable

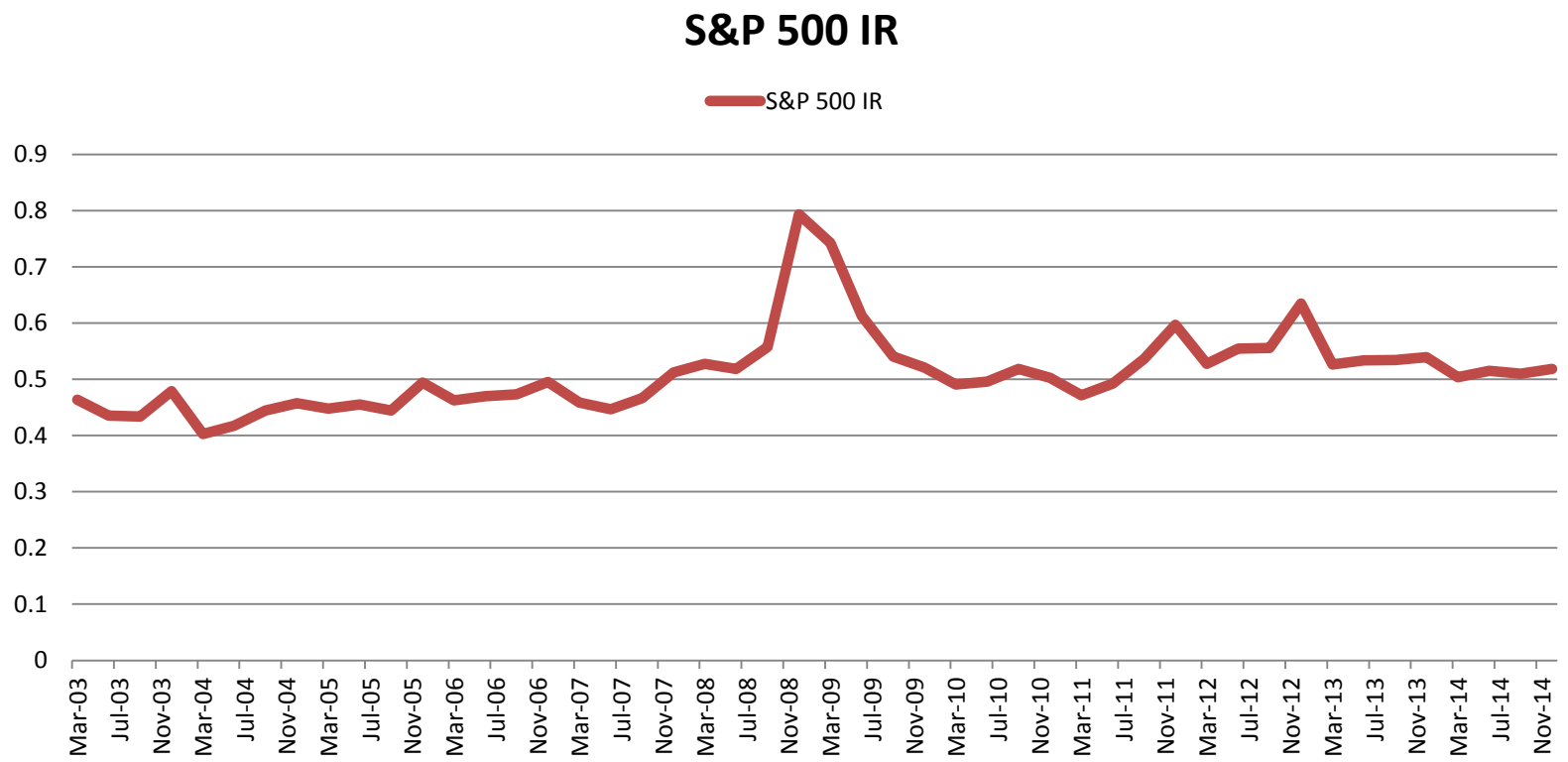


Source: Authors calculations. For illustrative purposes only.

MORNINGSTAR®

Income vs. Total Return
Historical Record

Income is Comparatively Predictable

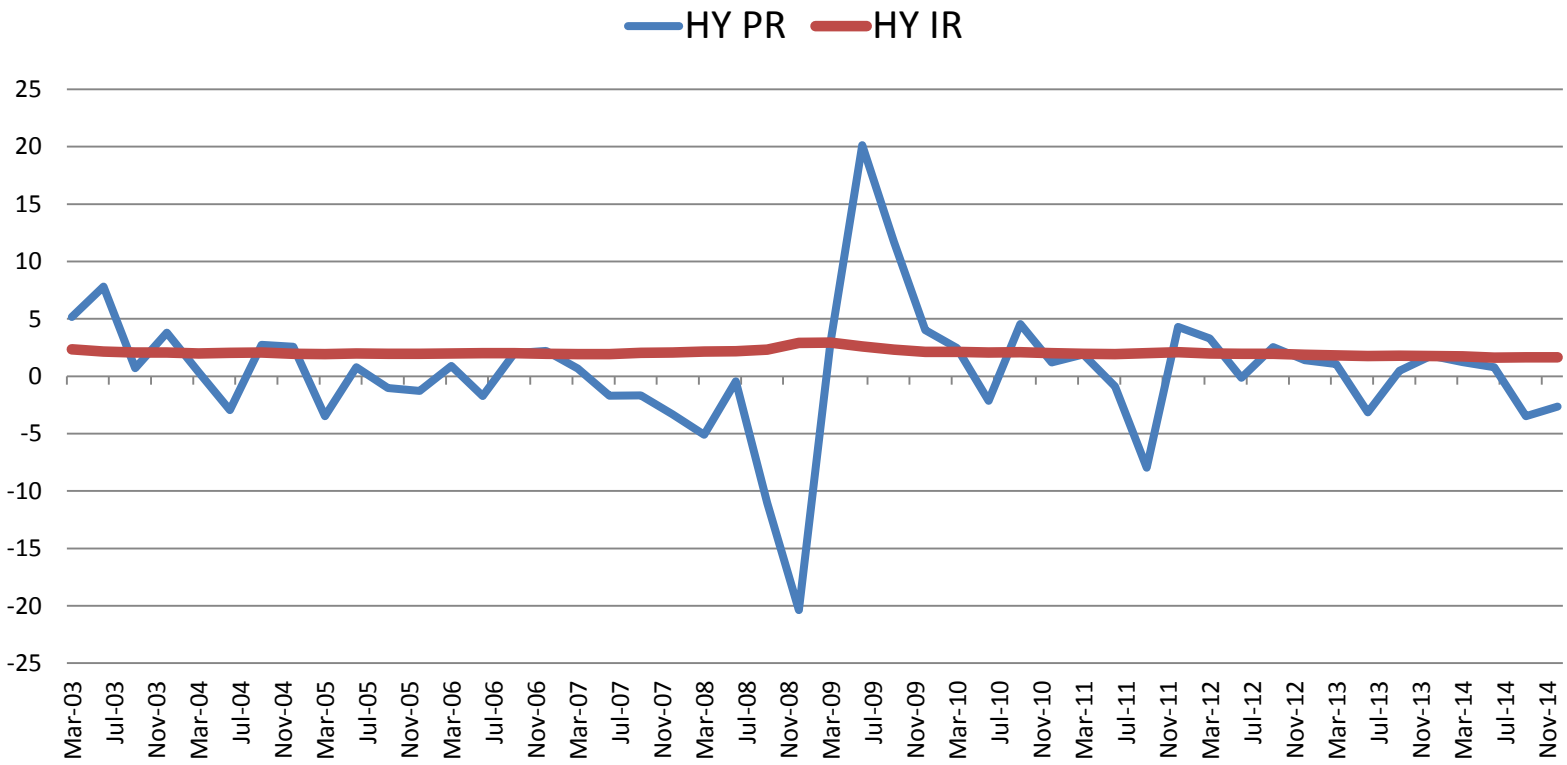


Source: Authors calculations. For illustrative purposes only.

MORNINGSTAR®

Income vs. Total Return
Historical Record

Income is Comparatively Predictable

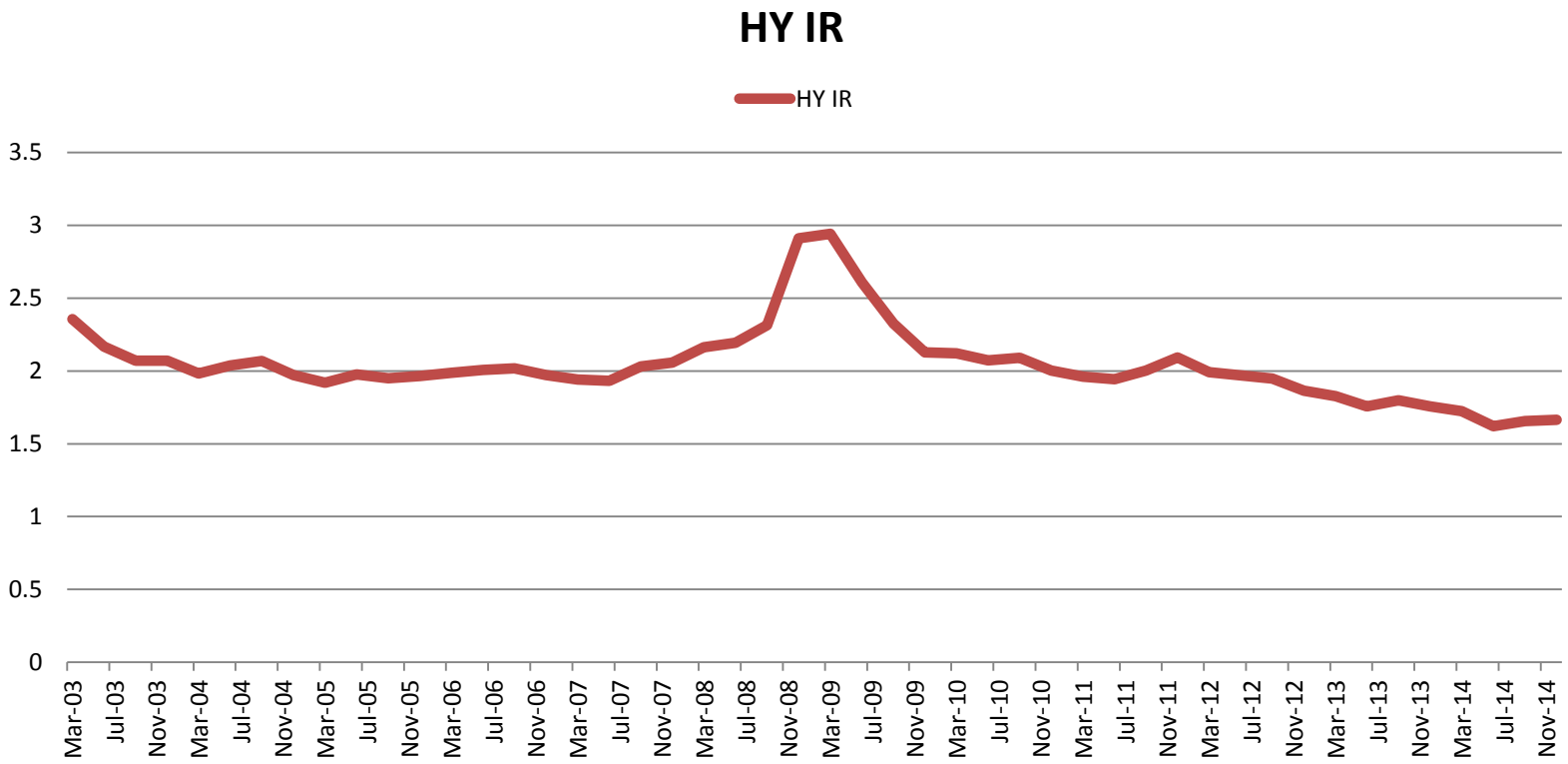


Source: Authors calculations. For illustrative purposes only.

MORNINGSTAR®

Income vs. Total Return
Historical Record

Income is Comparatively Predictable

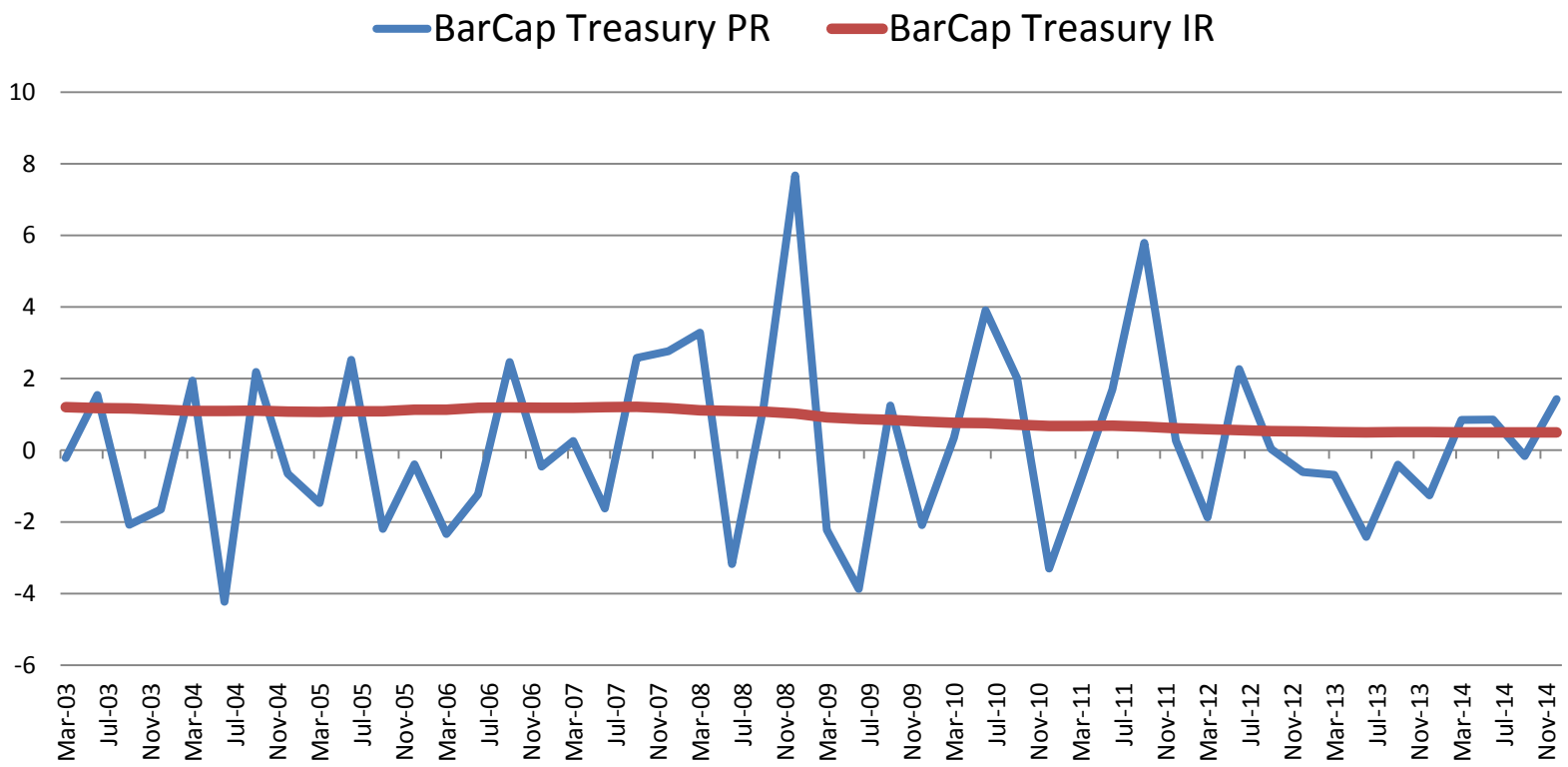


Source: Authors calculations. For illustrative purposes only.

MORNINGSTAR®

Income vs. Total Return
Historical Record

Income is Comparatively Predictable

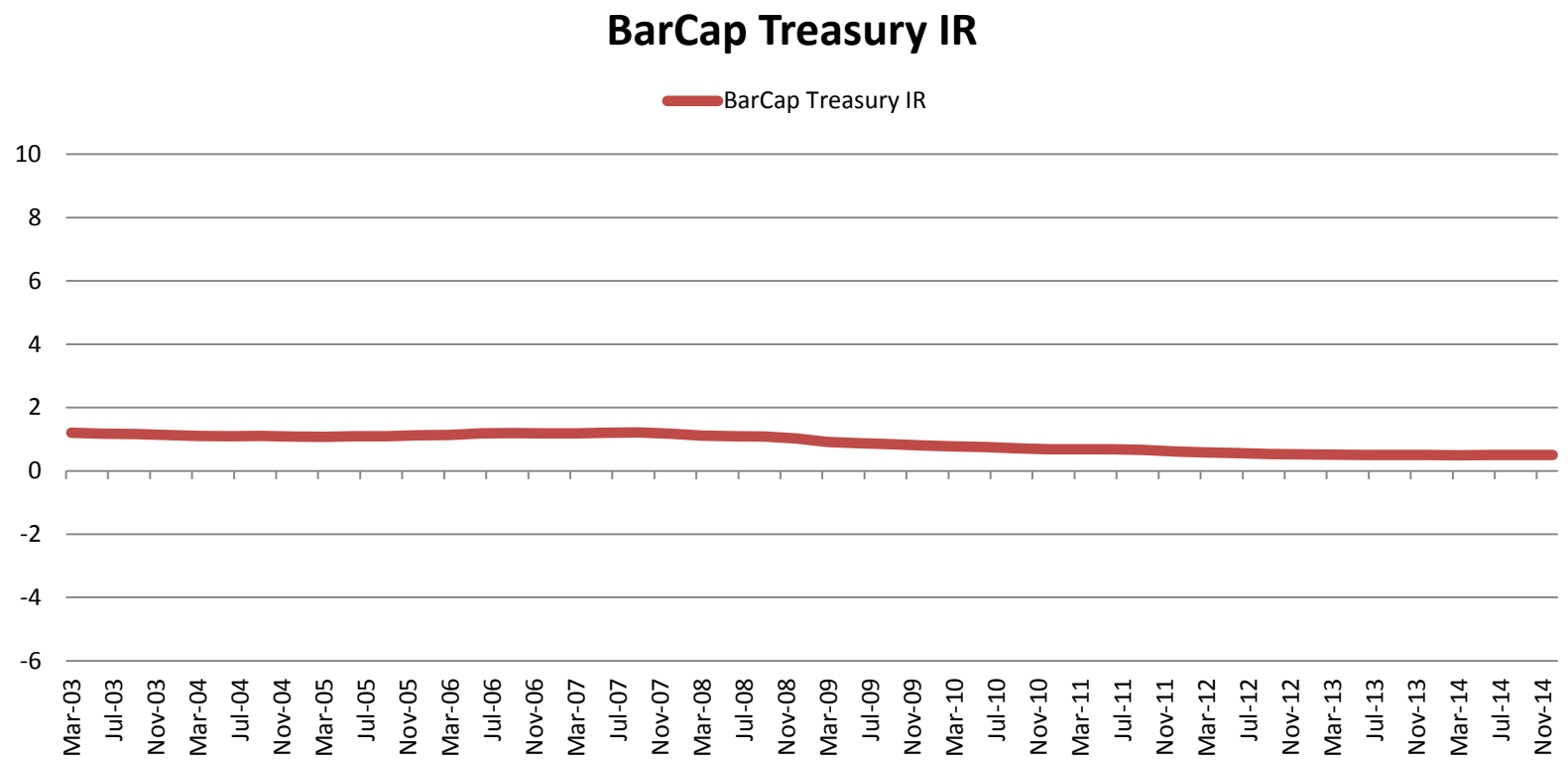


Source: Authors calculations. For illustrative purposes only.

MORNINGSTAR®

Income vs. Total Return
Historical Record

Income is Comparatively Predictable

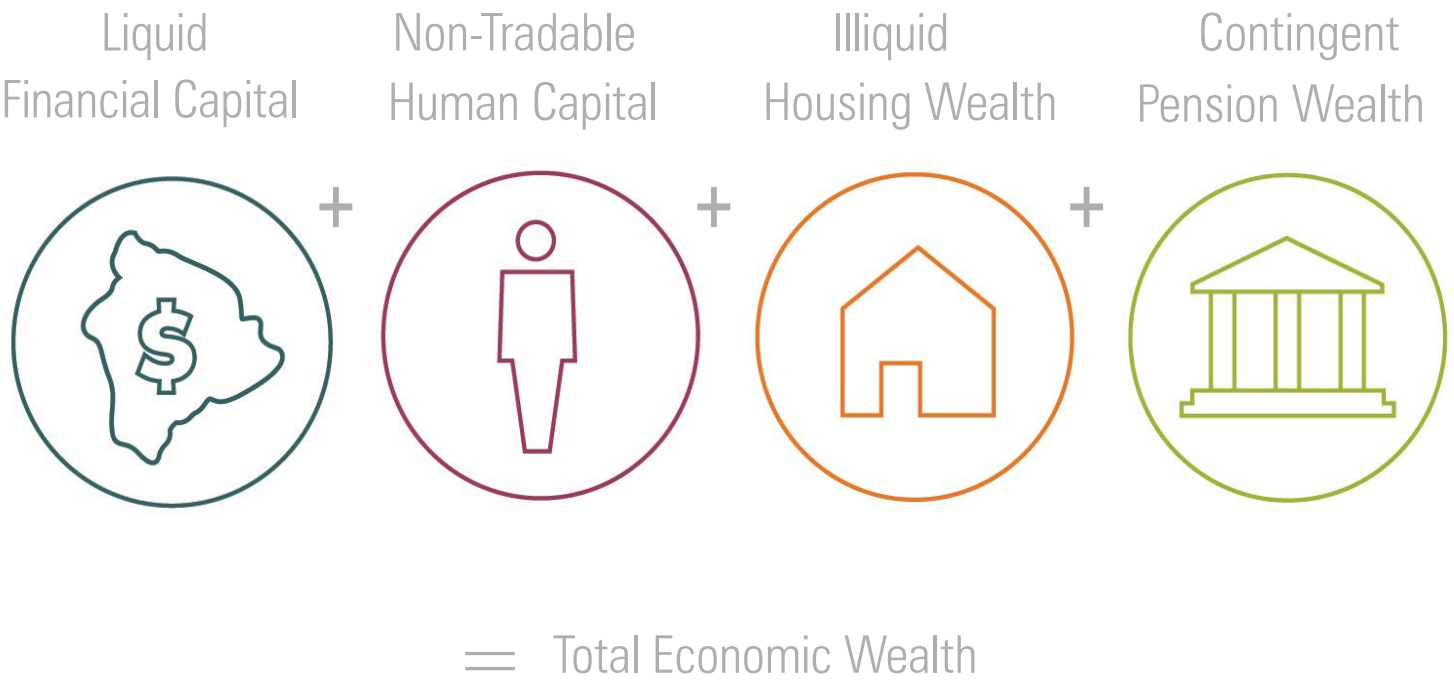


Source: Authors calculations. For illustrative purposes only.

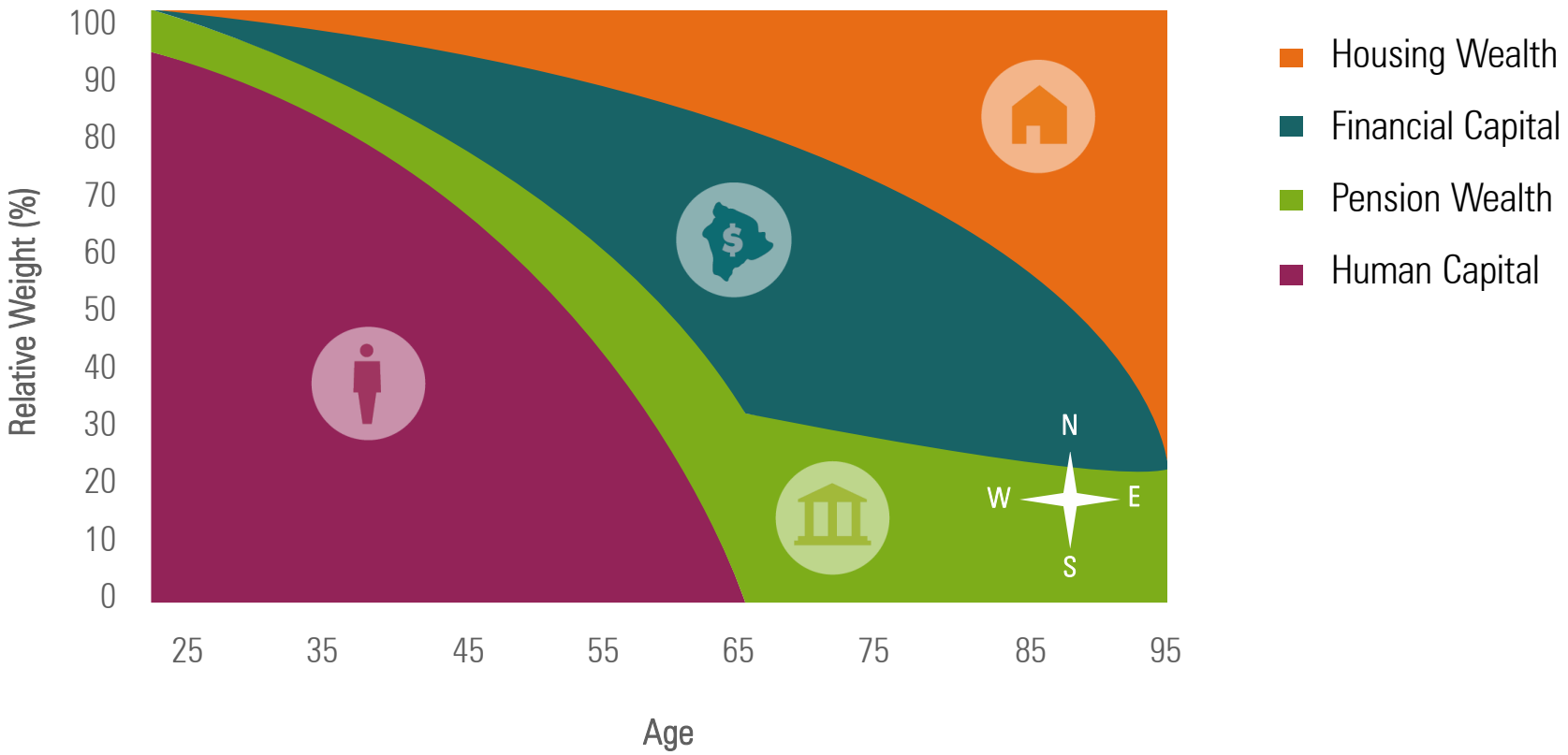
MORNINGSTAR®

The Investor Model

Total Wealth Allocation: No Portfolio is an Island

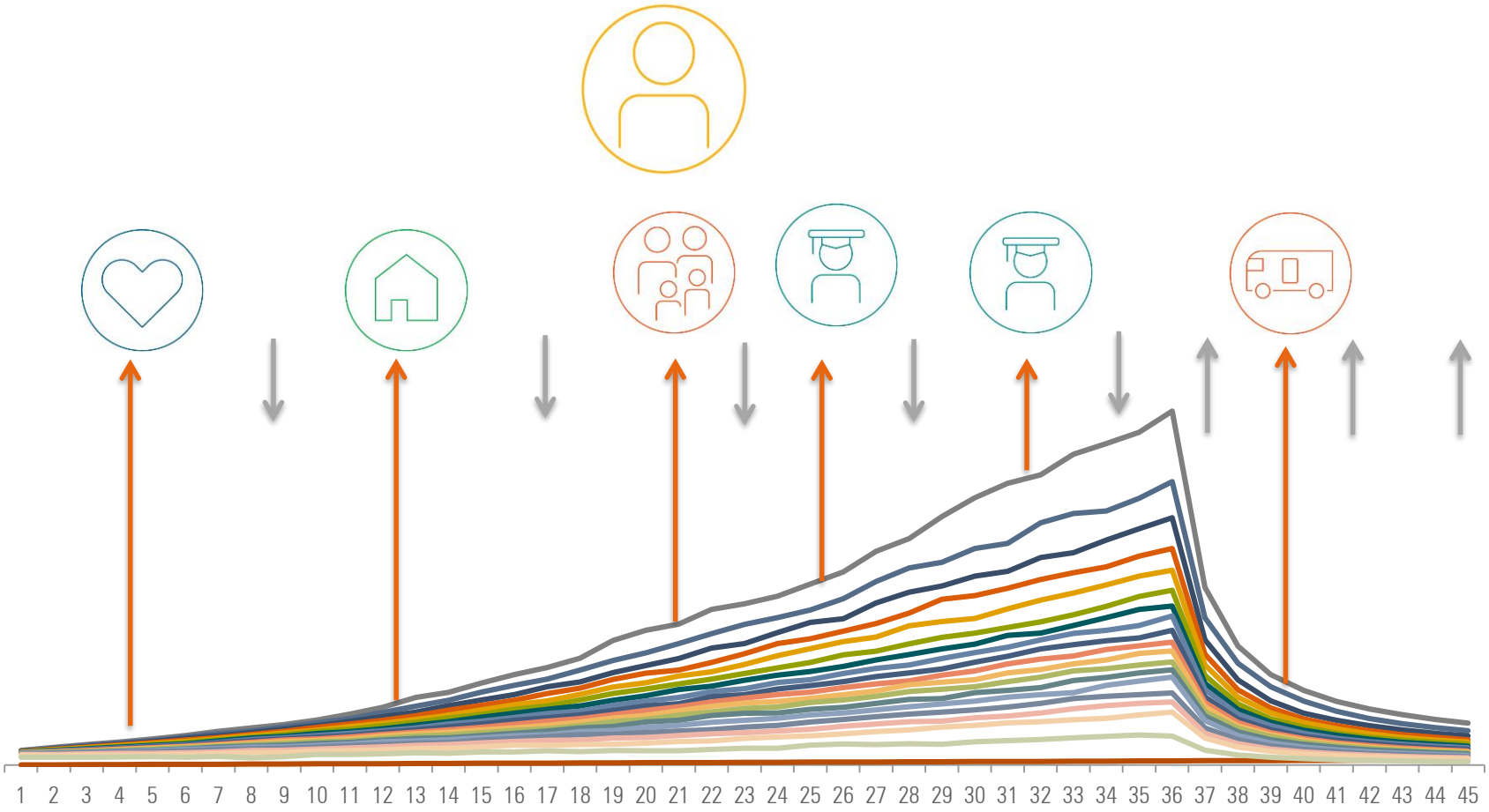


A Total Wealth Perspective Over the Lifecycle



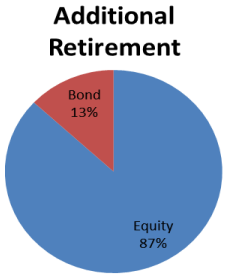
For illustration only.

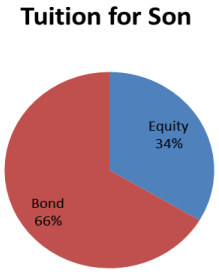
Lifecycle Investing Using Simulation: Using “robo” technology to power your service.

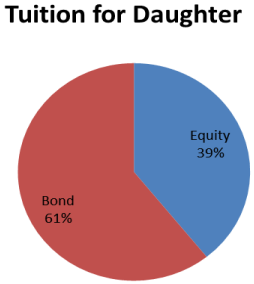


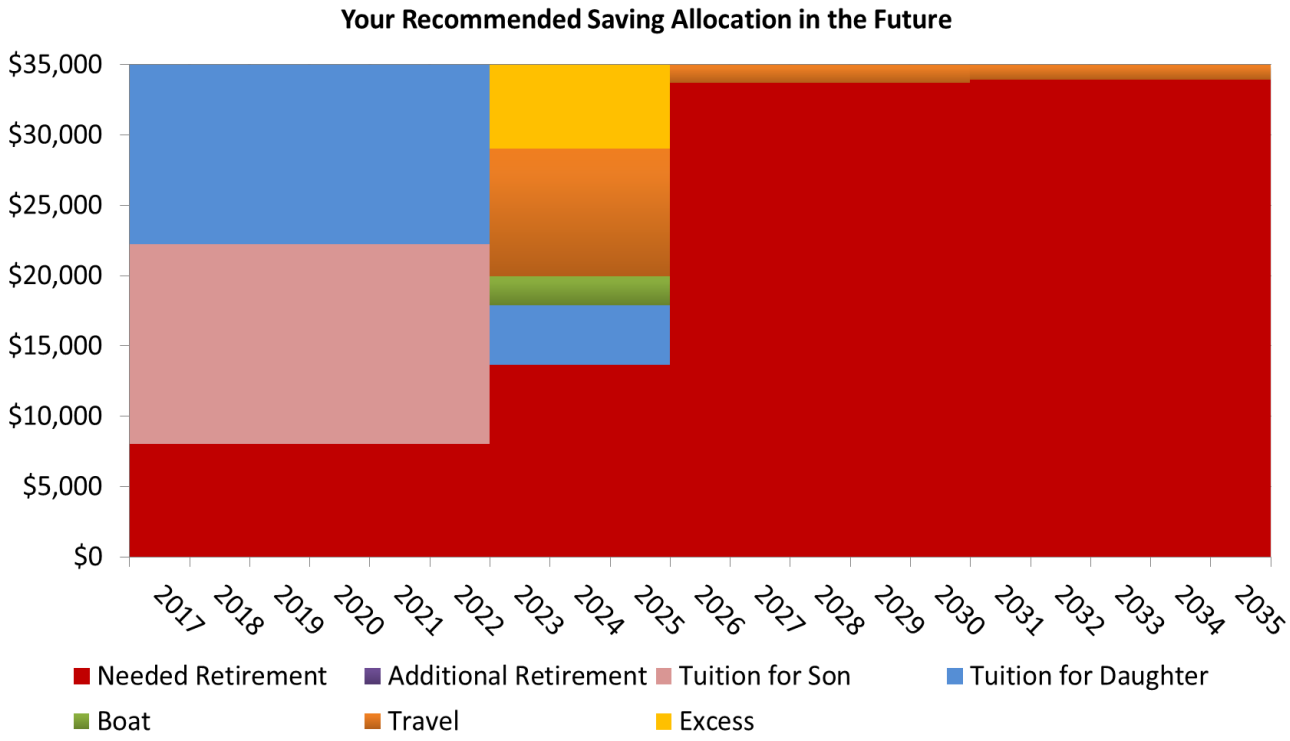
MORNINGSTAR®

Lifecycle Investing using Optimization: Cascading—Investing Optimally *Through Time*







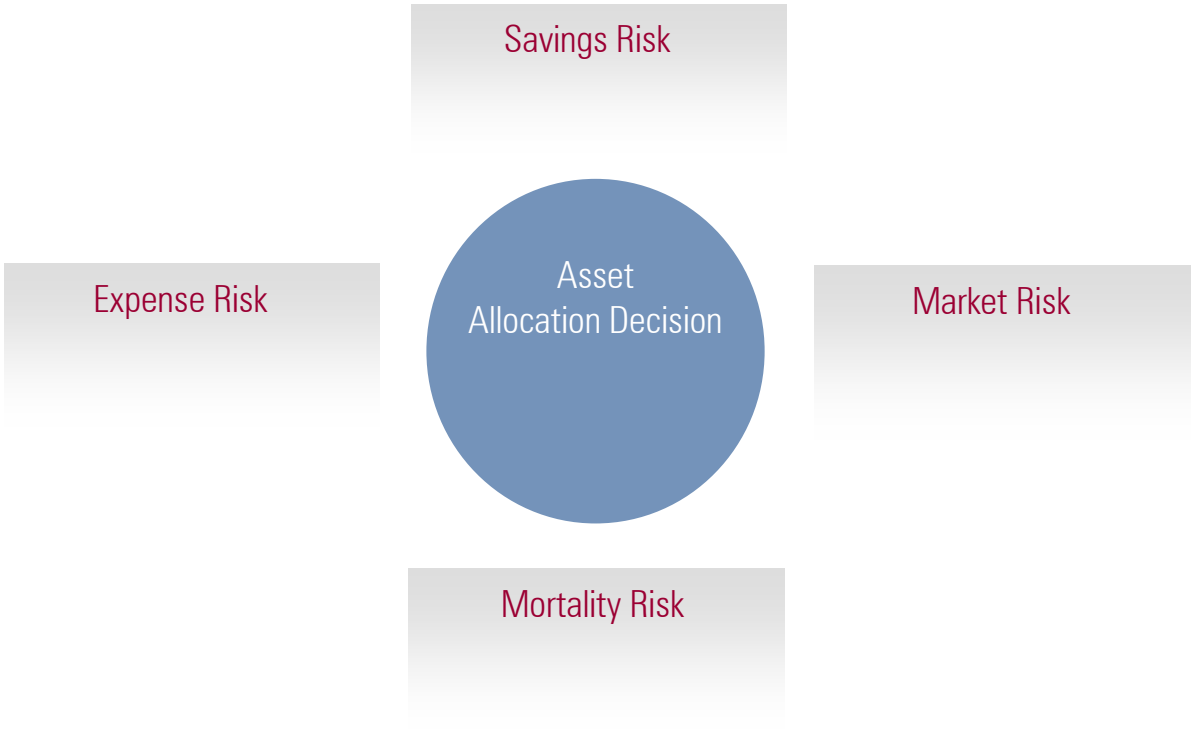


79%	78%	81%	81%
Expected Shortfall	Expected Shortfall	Expected Shortfall	Expected Shortfall
$157,872	**$691**	**$945**	**$1,506**

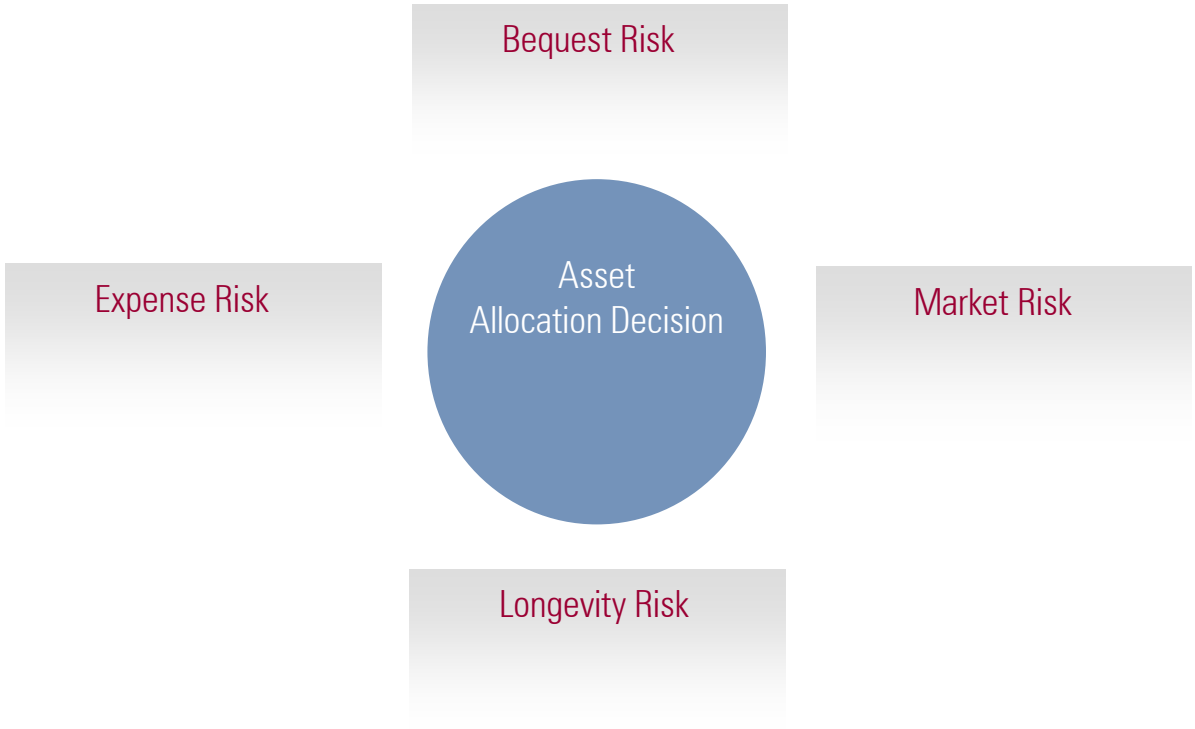
MORNINGSTAR®

Insurance

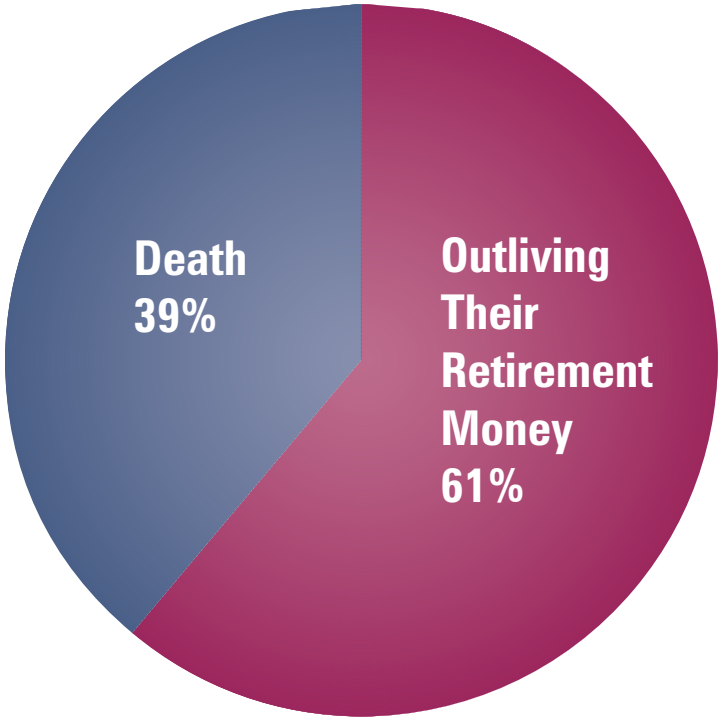
Managing Investment Outcomes: Accumulation Phase



Managing Investment Outcomes: Disbursement Phase

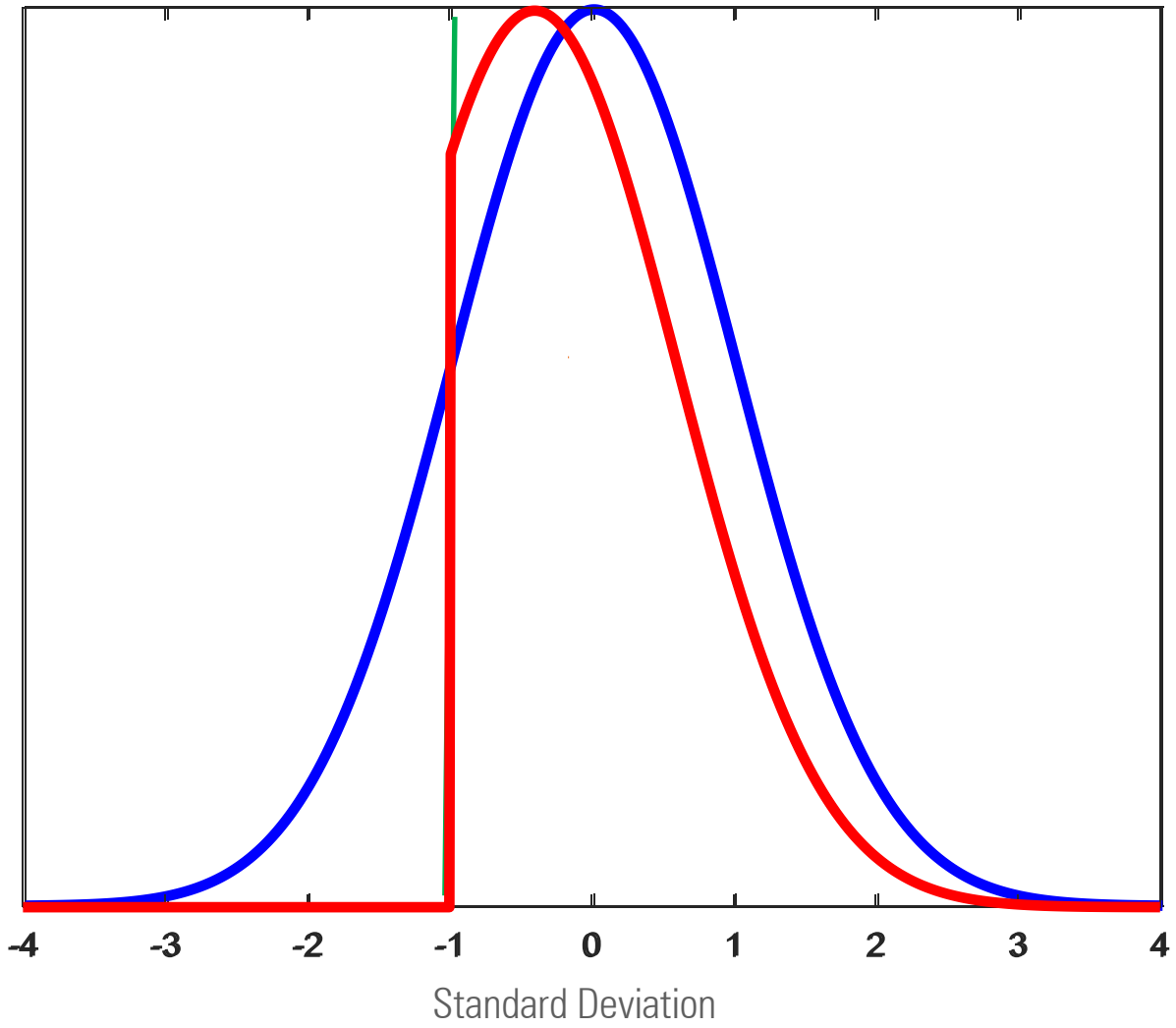


Annuity Allocation: What do Retirees Fear More?



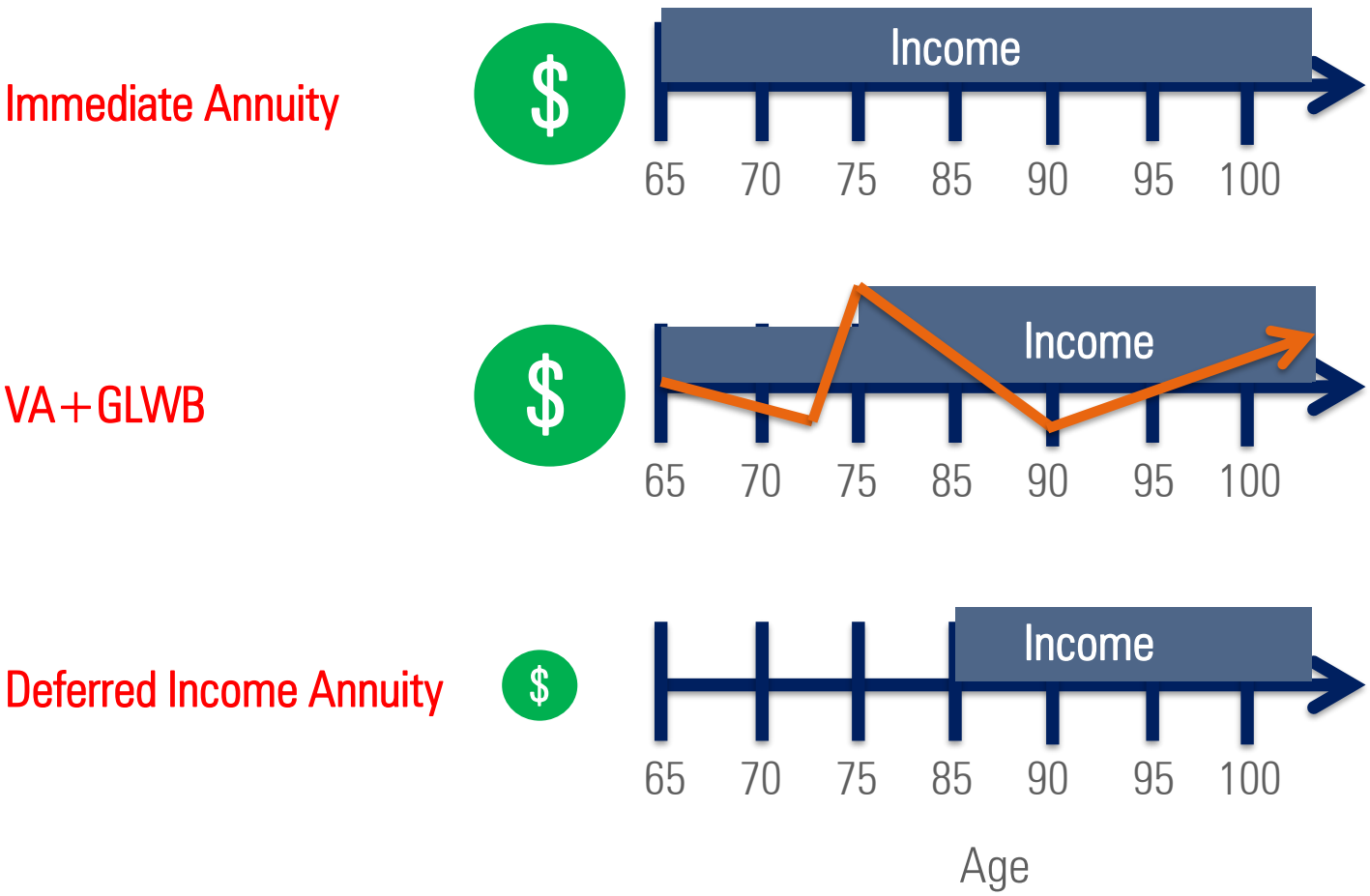
Source: https://www.allianzlife.com/content/public/Literature/Documents/ent-1154.pdf

Adding Insurance: Trimming the Tails



Source: Morningstar Investment Management,, LLC

Insuring against Longevity Risk: Different Types of Annuities



For illustration only.

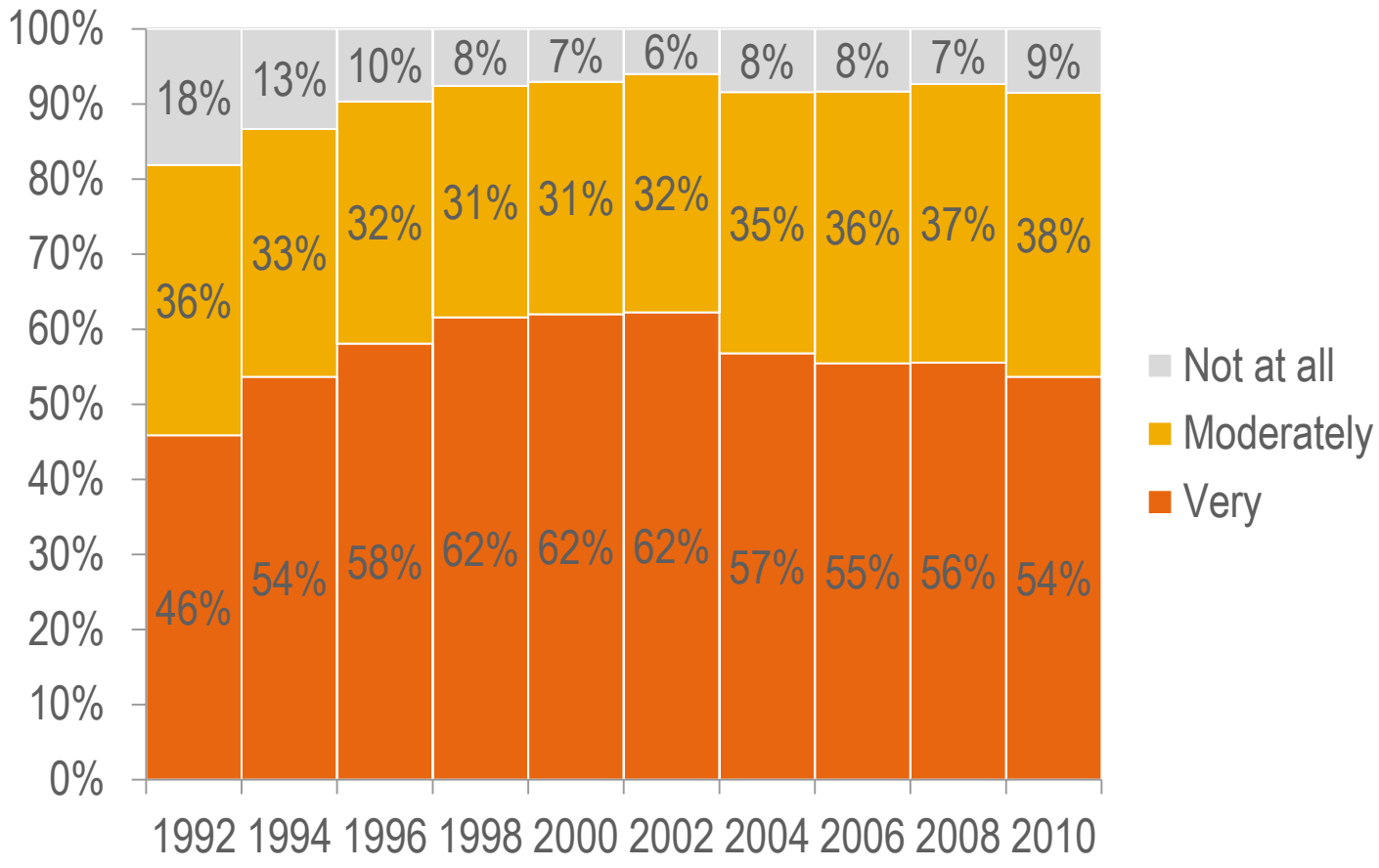
Retirement Crisis?

Do We Have Global Retirement Crisis?

- Expected $224 trillion-dollar gap by 2015 for US, UK, Japan, Netherlands, Canada & Australia
- If we add China and India: $400 trillion 5x current GDP.
  - Longer expected longevity
  - Lower savings rates.
- Largest gap is in the US. Current $28 trillion expected to rise to $137 trillion by 2050.

Retirement Satisfaction

Are Retirees Happy? (Yes)



Source: "Exploring Retiree Satisfaction" by David Blanchett. Morningstar Investment Management group White Paper.

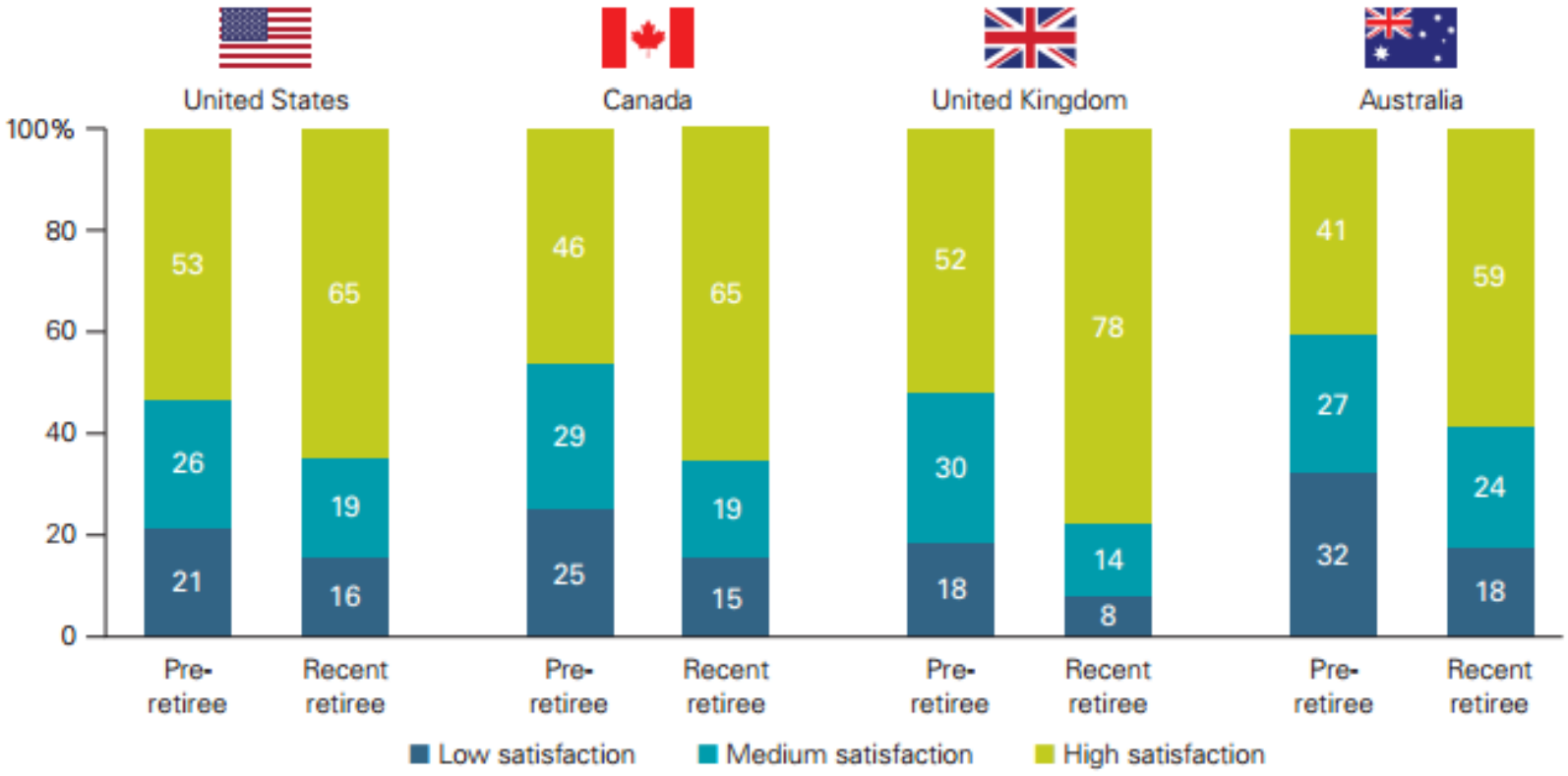
MORNINGSTAR®

What Makes Retirees Happy (Relatively Speaking)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.6100	0.1067	5.7168	0.0000
Age	0.76%	0.0008	9.4218	0.0000
Male	0.17%	0.0141	0.1186	0.9056
Married	4.41%	0.0159	2.7698	0.0056
Education	1.02%	0.0056	1.8430	0.0654
Health Status	16.88%	0.0065	25.8874	0.0000
Financial Assets	2.51%	0.0025	9.9918	0.0000
Real Estate Assets	0.40%	0.0016	2.5340	0.0113
Income	4.08%	0.0093	4.3660	0.0000

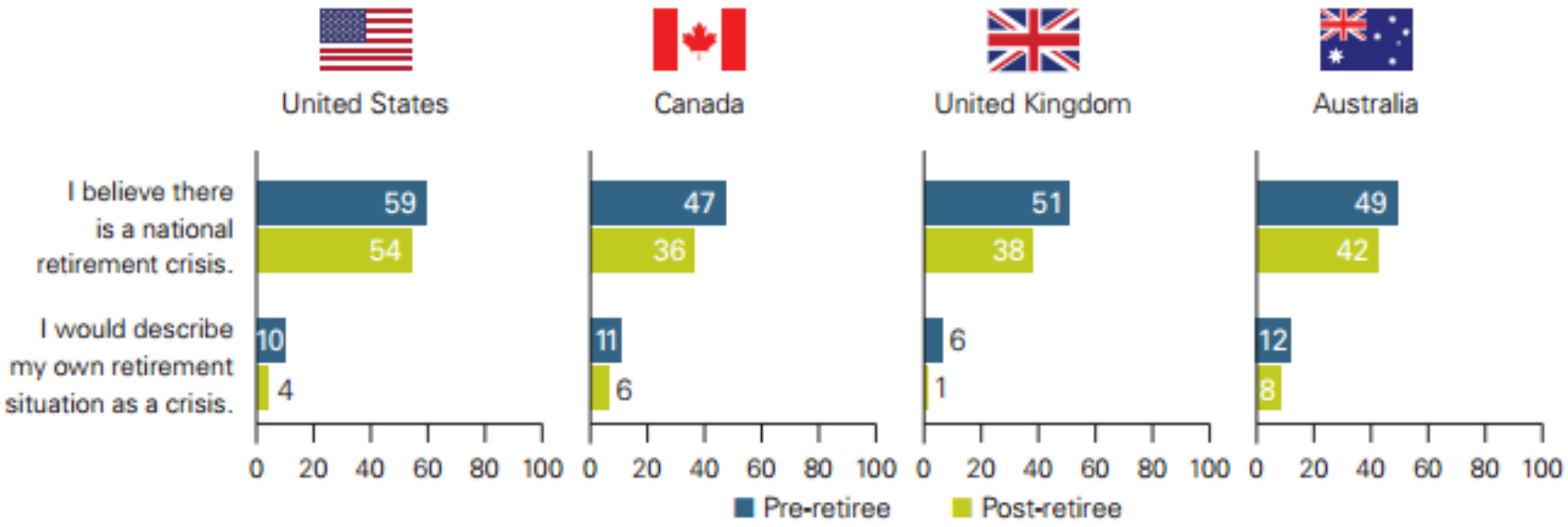
Source: "Exploring Retiree Satisfaction" by David Blanchett. Morningstar Investment Management group White Paper.

Satisfaction with Financial Situation



Source: Madamba & Utkus (2017)

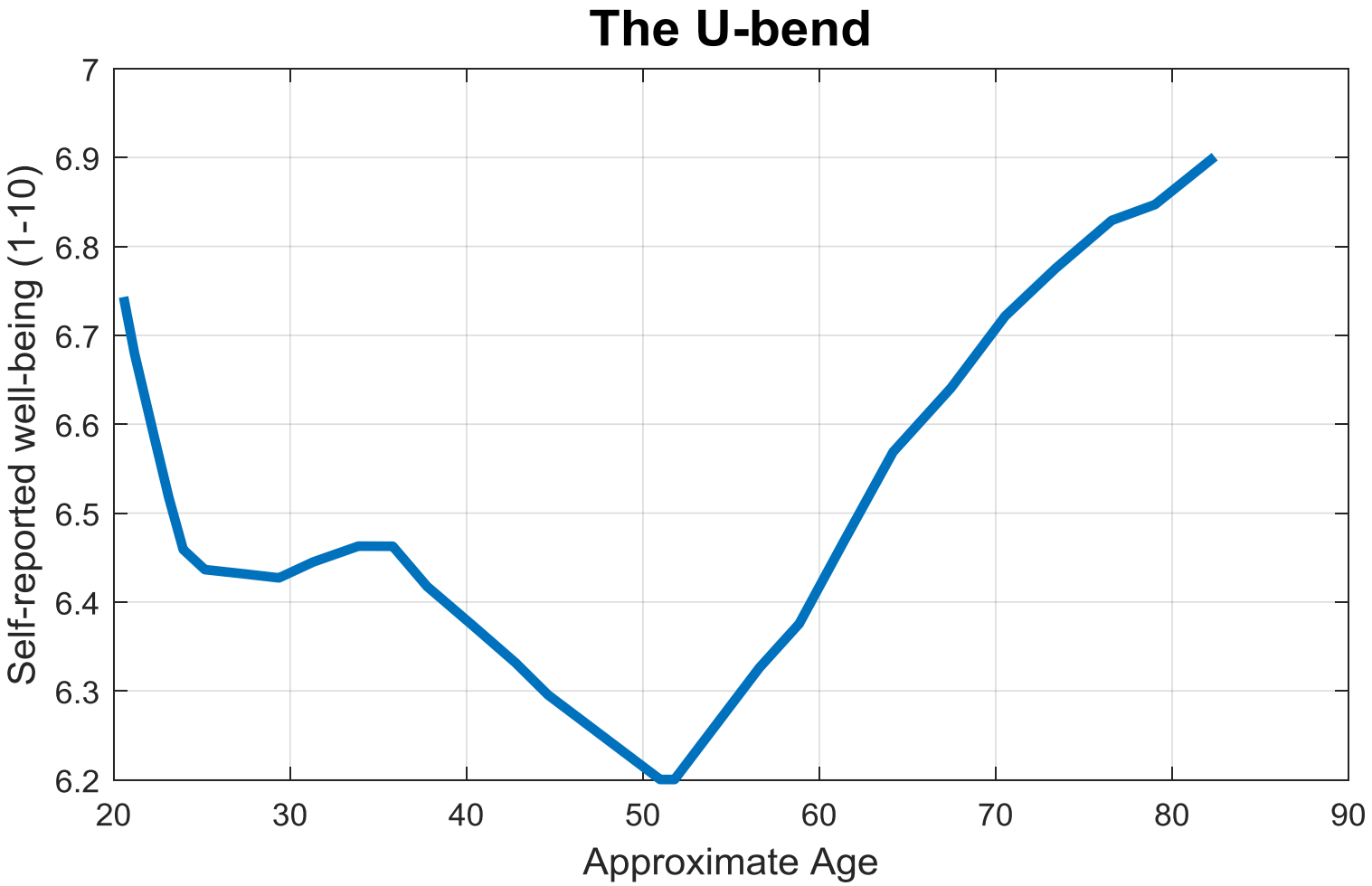
Somebody Else's Crisis…



Source: Madamba & Utkus (2017)

MORNINGSTAR®

Somebody Else's Crisis…



Secondary source: The Economist ((12/23/2016) Primary source: PNAS paper: "A Snapshot of the age distribution of psychological well-being in the United States" Arthur Stone.

MORNINGSTAR®

Thank You: Q&A

Some Examples: Base Case (Male)

Investor Profile	Inputs
Age	30
Retirement Age	65
Gender	M
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£	61,445
Desired Income At Retirement	£	45,000

Percentile	SSA	sortfall/ surplus
75	£91,312	£46,312
50	£71,288	£26,288
25	£57,429	£12,429
10	£48,401	£3,401
5	£44,669	-£331
2.5	£42,270	-£2,730

Beginning Equity	100%
Terminal Equity	60%

Some Examples: Base Case (Female)

Investor Profile	Inputs
Age	30
Retirement Age	65
Gender	F
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£ 61,445
Desired Income At Retirement	£ 45,000

Percentile	SSA	sortfall/ surplus
75	£85,353	£40,353
50	£67,082	£22,082
25	£54,403	£9,403
10	£46,177	£1,177
5	£42,822	-£2,178
2.5	£40,616	-£4,384

Beginning Equity	100%
Terminal Equity	60%

Some Examples: Less-aggressive Allocation

Investor Profile	Inputs
Age	30
Retirement Age	65
Gender	M
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£ 61,445
Desired Income At Retirement	£ 45,000

Percentile	SSA	sortfall/ surplus
75	£77,978	£32,978
50	£64,603	£19,603
25	£54,775	£9,775
10	£48,055	£3,055
5	£45,096	£96
2.5	£43,180	-£1,820

Beginning Equity	85%
Terminal Equity	35%

Some Examples: Retire Later

Investor Profile	Inputs
Age	30
Retirement Age	67
Gender	M
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£ 61,445
Desired Income At Retirement	£ 45,000

Percentile	SSA	sortfall/ surplus
75	£89,065	£44,065
50	£72,485	£27,485
25	£60,249	£15,249
10	£52,009	£7,009
5	£48,470	£3,470
2.5	£46,135	£1,135

Beginning Equity	85%
Terminal Equity	35%

Some Examples: Pre-retirement Expenditure

Investor Profile	Inputs
Age	30
Retirement Age	67
Gender	M
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£	61,445
Desired Income At Retirement	£	45,000

Extraordinary CF Pre retirement	-£	10,000
Year of CF		3

Percentile	SSA	sortfall/ surplus
75	£82,264	£37,264
50	£67,918	£22,918
25	£57,246	£12,246
10	£49,763	£4,763
5	£46,733	£1,733
2.5	£44,361	-£639

Beginning Equity	85%
Terminal Equity	35%

Some Examples: Post-retirement Cash Flow

Investor Profile	Inputs
Age	30
Retirement Age	67
Gender	M
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£ 61,445
Desired Income At Retirement	£ 45,000

Extraordinary CF Pre retirement	-£ 10,000
Year of CF	3
Extradonory CF Post retirement	£ 250,000
Year of CF	5

Percentile	SSA	sortfall/ surplus
75	£98,925	£53,925
50	£84,521	£39,521
25	£73,596	£28,596
10	£66,064	£21,064
5	£62,714	£17,714
2.5	£60,058	£15,058

Beginning Equity	85%
Terminal Equity	35%

Some Examples: Post-retirement Expenditure--Later

Investor Profile	Inputs
Age	30
Retirement Age	67
Gender	M
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£ 61,445
Desired Income At Retirement	£ 45,000

Extraordinary CF Pre retirement	-£ 10,000
Year of CF	3
Extradonory CF Post retirement	£ 250,000
Year of CF	20

Percentile	SSA	sortfall/ surplus
75	£86,235	£41,235
50	£71,867	£26,867
25	£61,241	£16,241
10	£53,804	£8,804
5	£50,723	£5,723
2.5	£48,529	£3,529

Beginning Equity	85%
Terminal Equity	35%

Some Examples: Base Case--Investment In Annuity

Investor Profile	Inputs
Age	30
Retirement Age	65
Gender	M
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£ 61,445
Desired Income At Retirement	£ 45,000

Immediate Annuity at Retirement	50%
Expected Annuity Rate	7.0%
Inflation Rate	3.5%

Percentile	SSA	sortfall/ surplus
75	£86,782	£41,782
50	£69,313	£24,313
25	£56,562	£11,562
10	£48,488	£3,488
5	£44,951	-£49
2.5	£42,294	-£2,706

Beginning Equity	100%
Terminal Equity	60%

Some Examples: Base Case--Investment In Annuity--Female

Investor Profile	Inputs
Age	30
Retirement Age	65
Gender	F
Current Wealth	£ 22,000
Current Income	£ 50,000
Real Pension	£ 25,000
Contribution Rate	7.00%

Terminal Salary	£ 61,445
Desired Income At Retirement	£ 45,000

Immediate Annuity at Retirement	50%
Expected Annuity Rate	7.0%
Inflation Rate	3.5%

Percentile	SSA	sortfall/ surplus
75	£80,998	£35,998
50	£65,156	£20,156
25	£53,585	£8,585
10	£46,241	£1,241
5	£43,005	-£1,995
2.5	£40,623	-£4,377

Beginning Equity	100%
Terminal Equity	60%

This commentary may contain forward-looking statements, which reflect our current expectations or forecasts of future events. Forward-looking statements are inherently subject to, among other things, risks, uncertainties and assumptions which could cause actual events, results, performance or prospects to differ materiality from those expressed in, or implied by, these forward-looking statements. The forward-looking information contained in this commentary is as of the date of this report and subject to change. There should not be an expectation that such information will in all circumstances be updated, supplemented or revised whether as a result of new information, changing circumstances, future events or otherwise.

The results from the simulations described, while hypothetical in nature and not actual investment results or guarantees of future results, can provide an important look at strategies designed to help retirees reach their goals.

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. This should not be considered tax or financial planning advice. Please consult a tax and/or financial professional for advice specific to your individual circumstances.

Learn more at http://global.morningstar.com/MIM