

# 2 Funds for Life and Best-in-Class ETF Selection

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Director of Research

The Merriman Financial Education Foundation

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Presented to AAll New York City Chapter



What I'll talk about today

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**2 Funds for Life**

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**Best-in-Class ETF Selection**

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**Summary & Q&A**

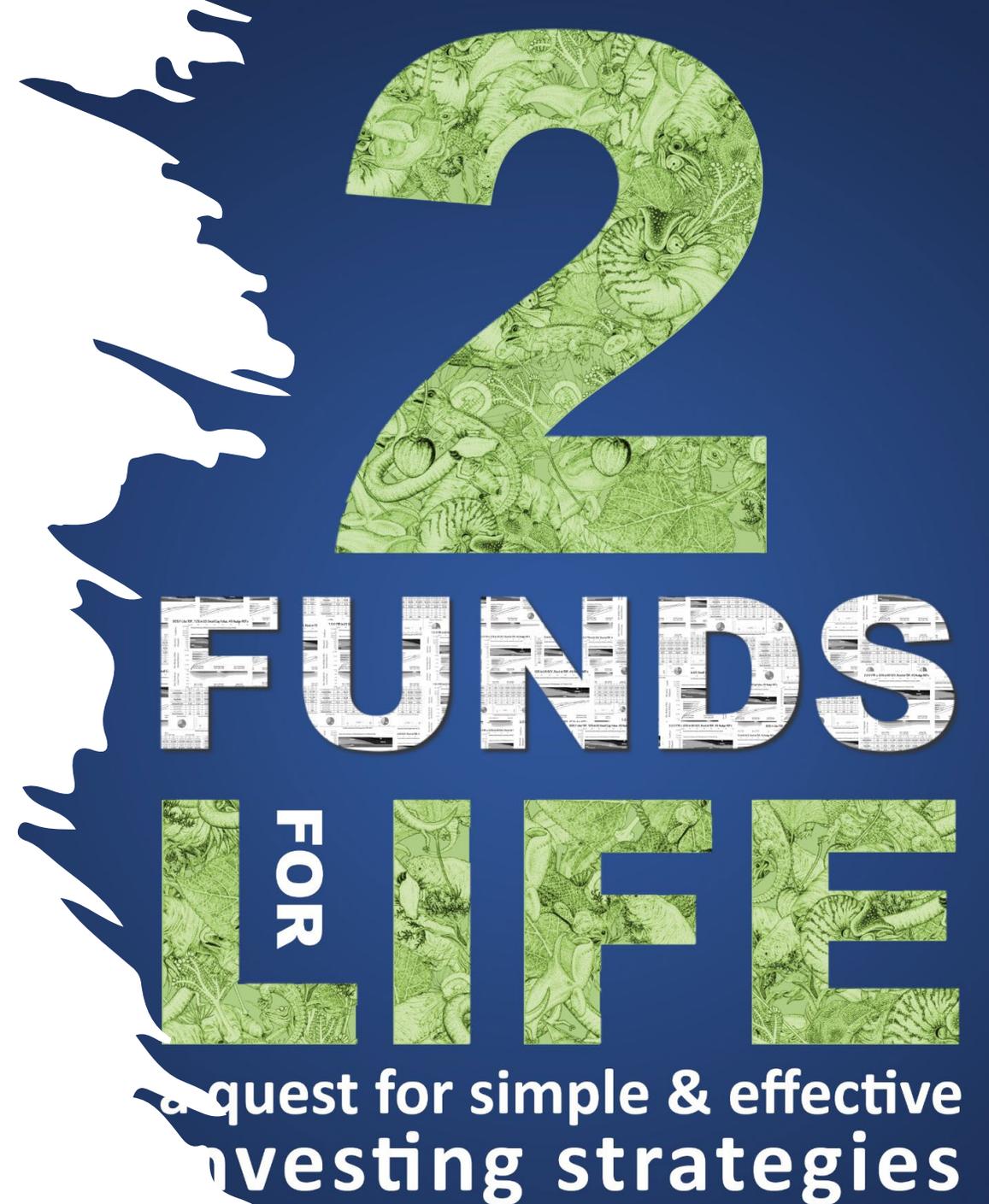


# 2 Funds for Life *2023 Update v2*

*Backtests updated to end of 2022,  
New lumpsum 2FFL fine-tuning table*

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# DIY Investing

- Pick an equities allocation
  - S&P 500,
  - *Ultimate Buy & Hold, 4-Fund, 2-Fund,*
  - All-Value
  - All Small-Cap Value
- Pick a US/International ratio
- Pick a fixed-income/equity ratio (periodically)
- Invest regularly
- Rebalance annually
- Pick fixed or flexible withdrawals
- Pick a withdrawal rate
- Take withdrawals and rebalance annually



# Jack Bogle's Pithy Advice

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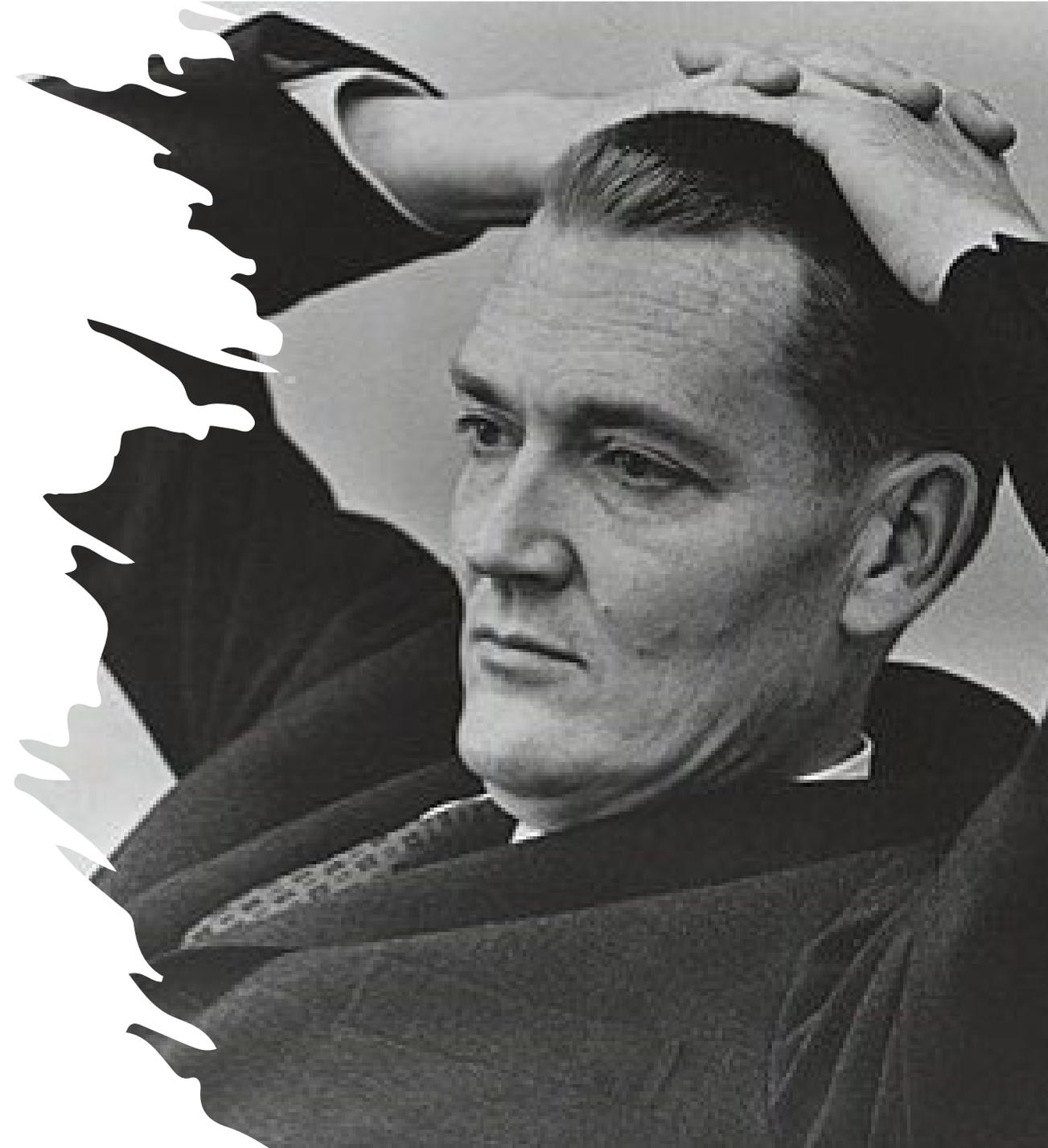
***Buy Right***

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**Hold Tight**

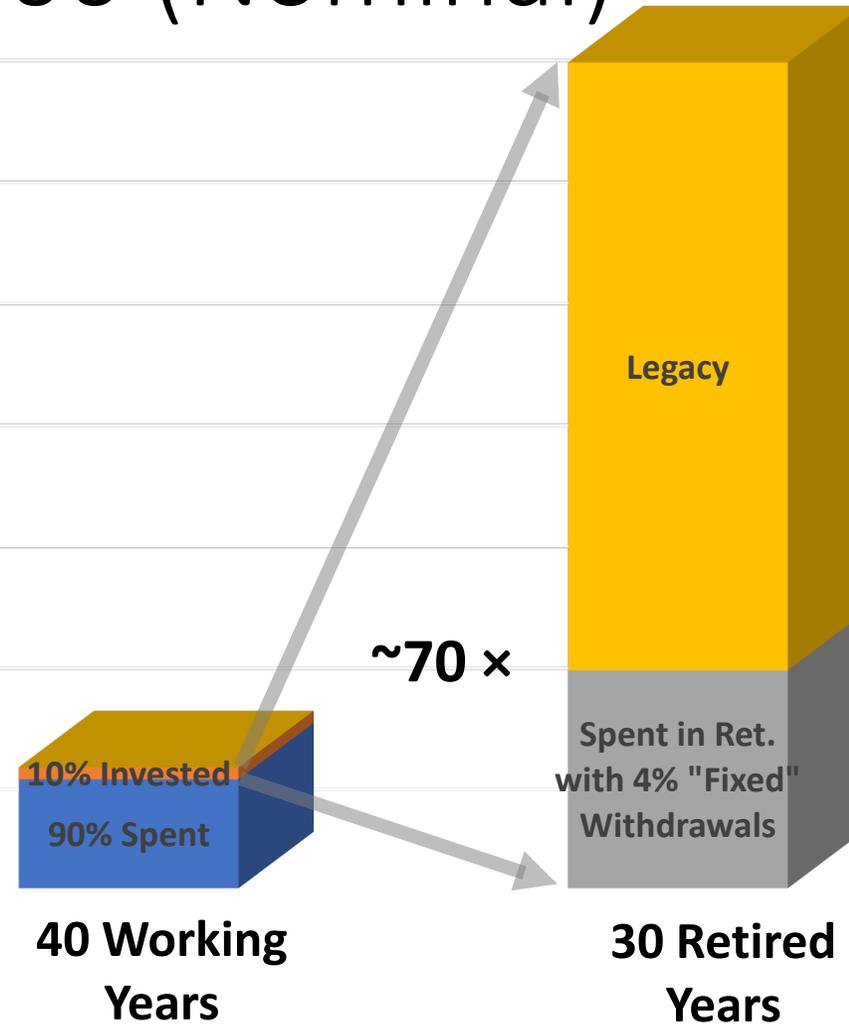
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**Don't Peek**



# Bogle -- Just the S&P 500 (Nominal)

- + Tracks the market
- + Historically very effective
- High volatility throughout
- Worst drawdowns are most likely in retirement
- Legacy >> spending
- Only 3% Safe Withdrawal Rate

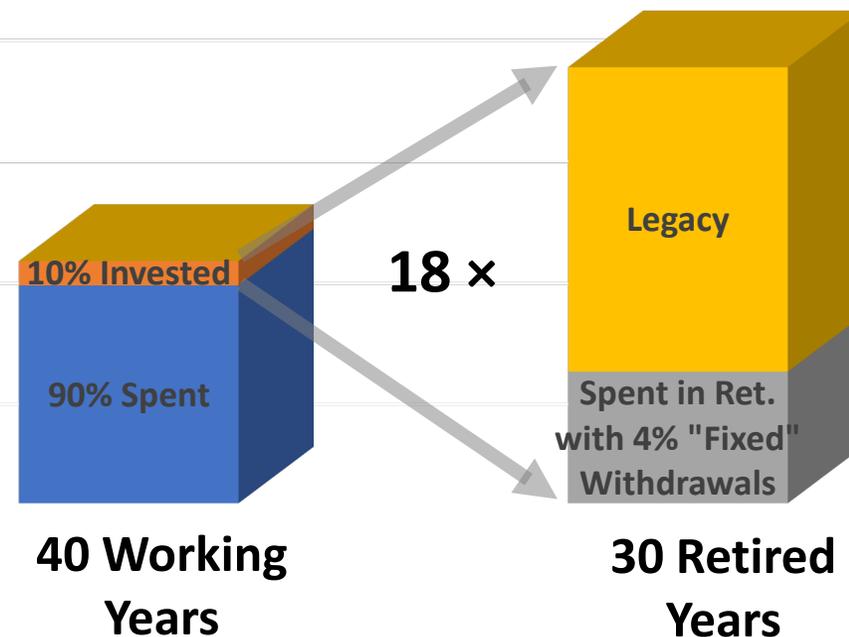


<b>Nominal CAGR</b> Low, Median, High: 9.0%, <b>10.0%</b> , 10.7%
<b>Worst Accumulation Drawdown:</b> 51%
<b>Worst Drawdown at Age-65:</b> 51%
<b>30-Year Safe Withdrawal Rate in Retirement:</b> 3.0%

**Compressed Scale Compared to Other Charts**

# Bogle -- Just the S&P 500 (*Real*)

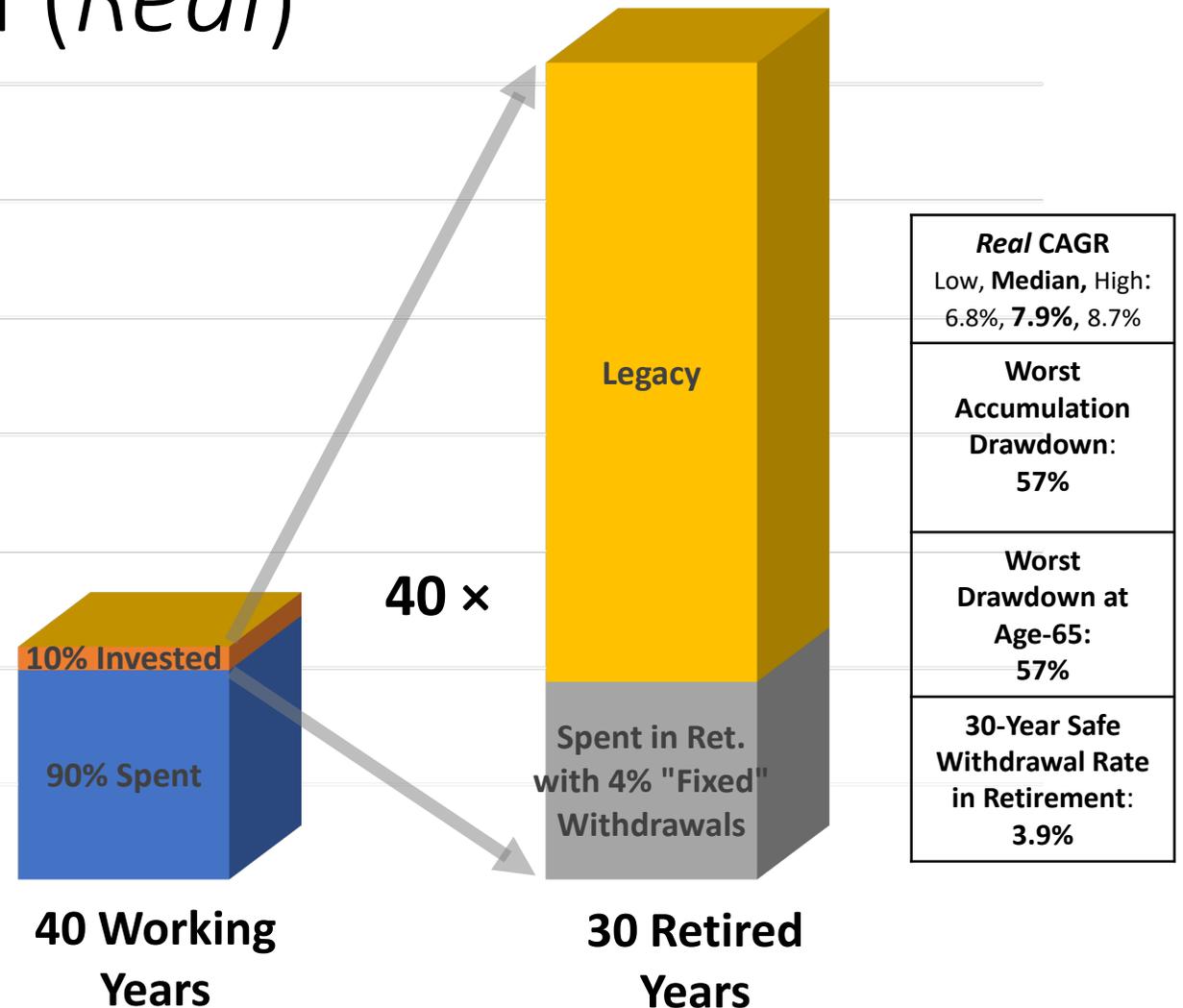
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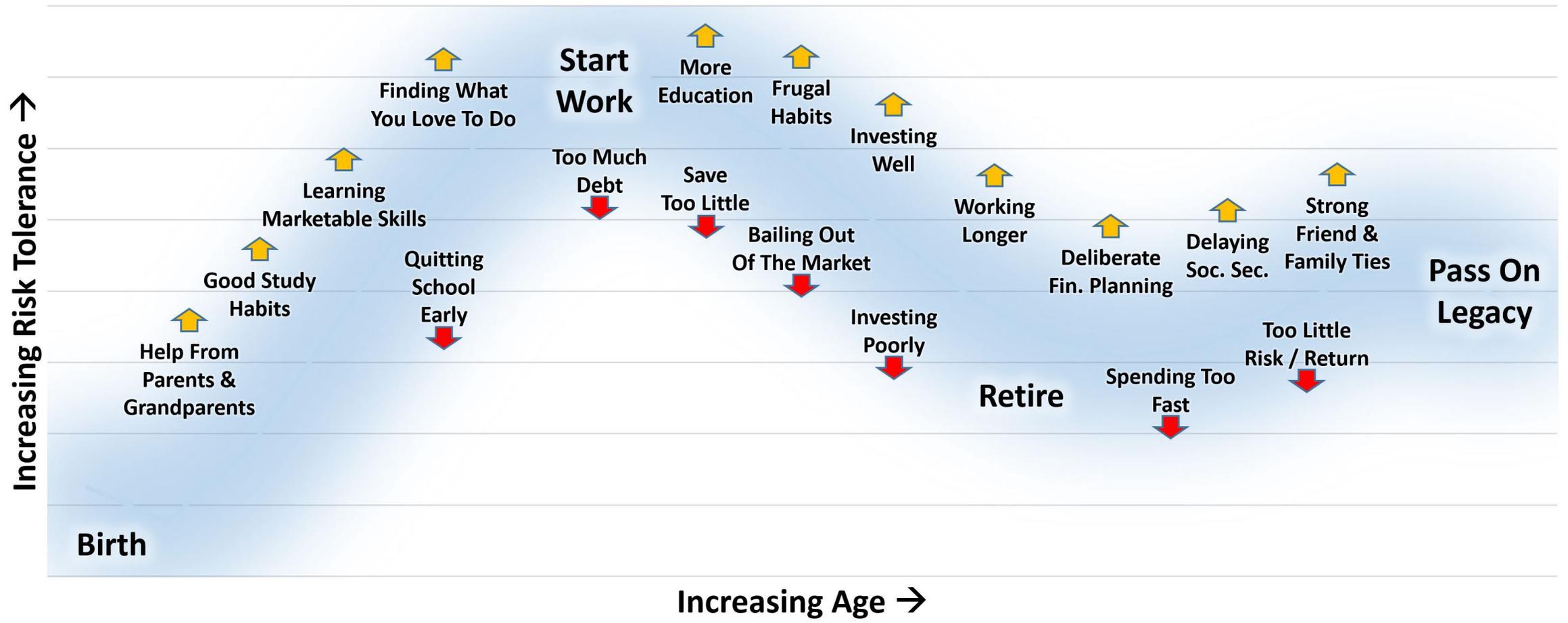
<b>Real CAGR</b> Low, Median, High: 4.8%, 5.9%, 6.6%
<b>Worst Accumulation Drawdown:</b> 51%
<b>Worst Drawdown at Age-65:</b> 51%
<b>30-Year Safe Withdrawal Rate in Retirement:</b> 3.0%

# Merriman WW 4-Fund (*Real*)

- + Massively diversified
- + > 2× S&P 500 over lifetime
- + 3.9% Safe Withdrawal Rate
- Doesn't track the market
- High volatility throughout
- Worst drawdowns are most likely in retirement
- Legacy >> Spending

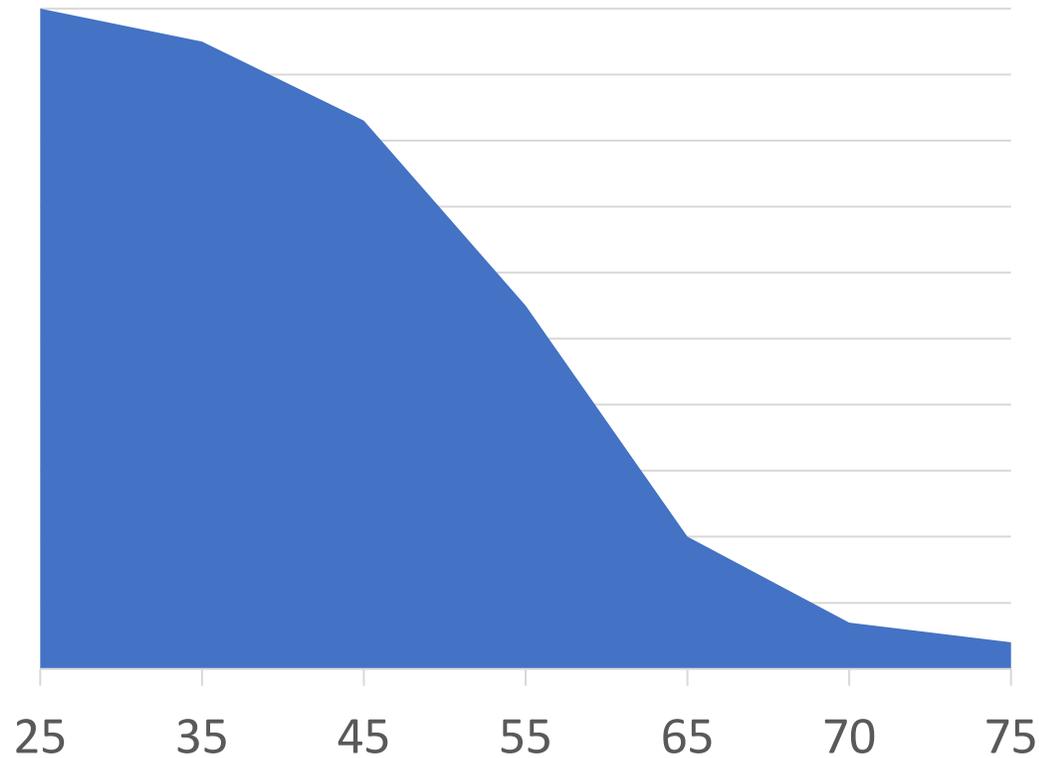


# The Problem with Buy & Hold

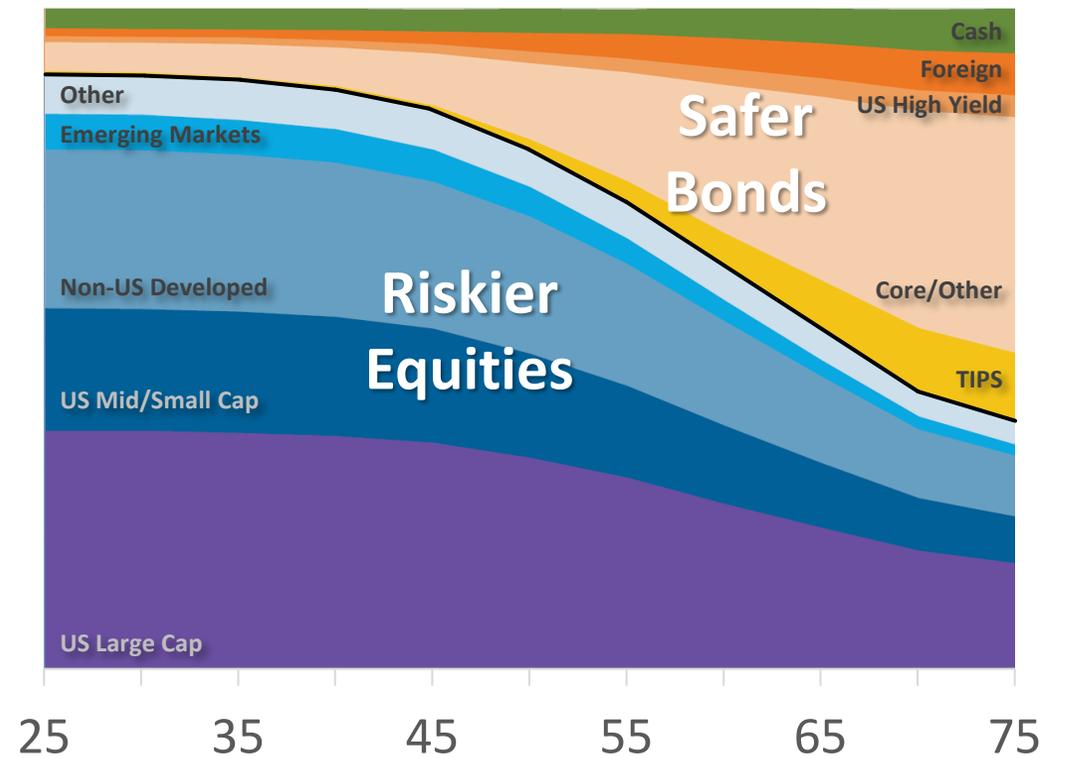


# Human Capital & Target Date Funds (TDFs)

## Human Capital vs. Age



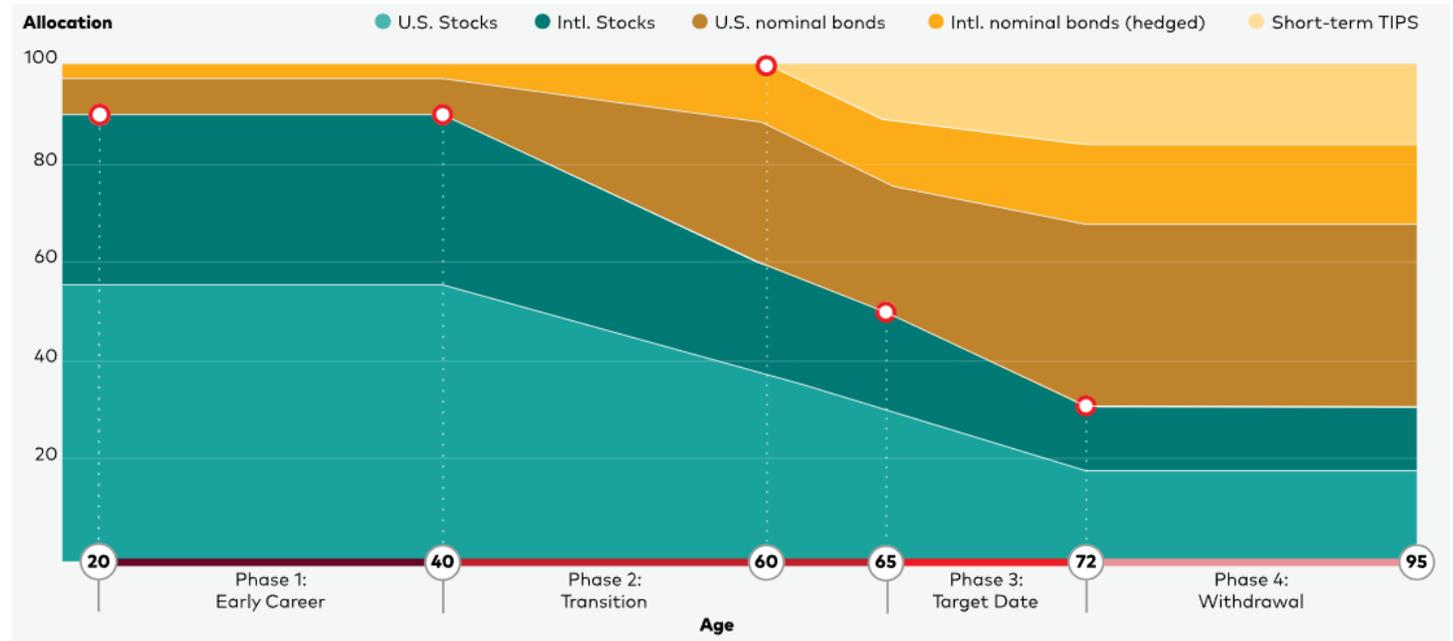
## Industry Average TDF Glidepath



Sources: Morningstar 2015 Target-Date Fund Landscape & 2013 Target-Date Series Research Paper

# Vanguard Target Retirement Funds

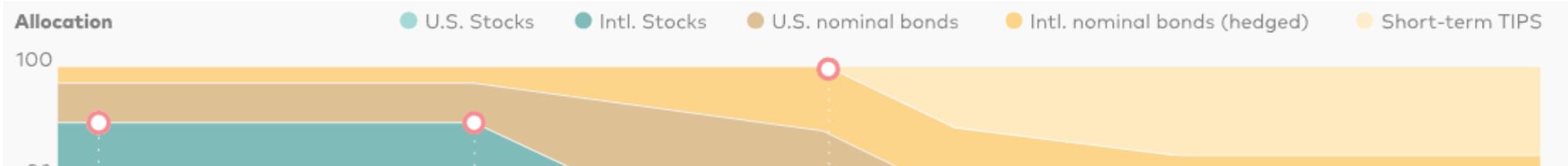
- Target Retirement 2015 (VTXVX)
- Target Retirement 2020 (VTWVX)
- Target Retirement 2025 (VTTVX)
- Target Retirement 2030 (VTHR)
- Target Retirement 2035 (VTTHX)
- Target Retirement 2040 (VFOR)
- Target Retirement 2045 (VTIVX)
- Target Retirement 2050 (VFIFX)
- Target Retirement 2055 (VFFVX)
- Target Retirement 2060 (VTTSX)
- Target Retirement 2065 (VLXVX)



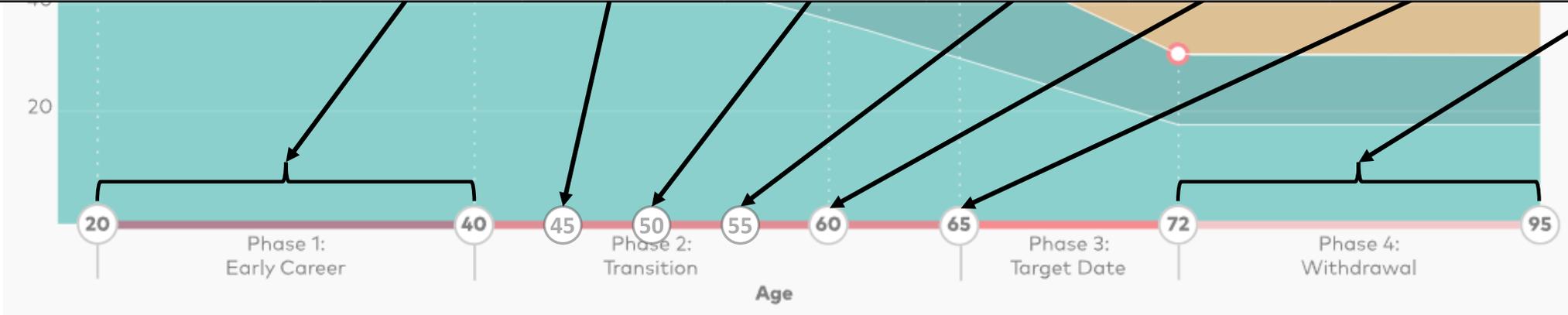
# Why Target-Date Funds Matter

- “**Ninety-five percent** of plans offered target-date funds at year-end 2021”
- “**Eighty-one percent** of all participants used target-date funds”
- “**Sixty-nine percent** of participants owning target-date funds had their entire account invested in a single target-date fund.”

# Historical TDF Lump Sum *Nominal* Results



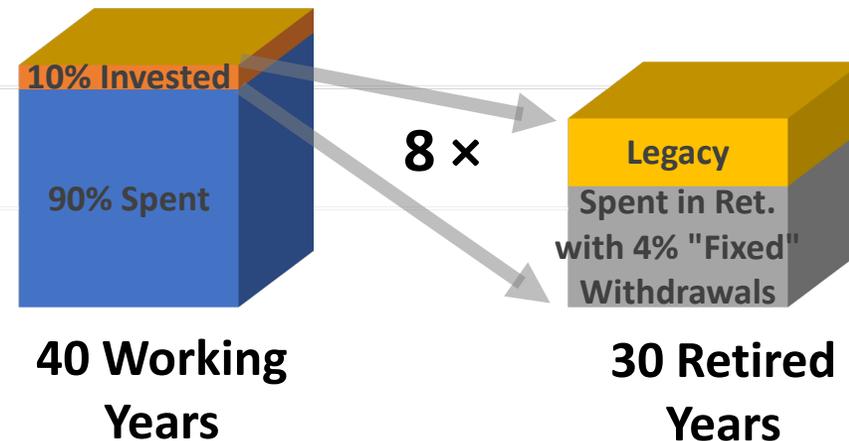
Years to Retirement	25 (Or More) e.g., 2050 TDF	20 e.g., 2045 TDF	15 e.g., 2040 TDF	10 e.g., 2035 TDF	5 e.g., 2030 TDF	0 e.g., 2025 TDF	-7 (Or Less) e.g., 2015 TDF
<b>Nominal CAGR / Worst 10-Yr. CAGR</b>	9.8% / 1.1%	9.6% / 1.8%	9.4% / 2.4%	9.2% / 3.0%	9.0% / 3.5%	8.7% / 4.2%	8.0% / 3.4%
<b>Annualized CAGR SD (Volatility)</b>	13.4%	12.4%	11.3%	10.3%	9.3%	8.1%	6.0%
<b>Worst Drawdown (Peak to Valley)</b>	-48%	-44%	-40%	-36%	-31%	-25%	-17%
<b>30-Year Safe Withdrawal Rate</b>	4.2%	4.4%	4.5%	4.3%	4.2%	4.0%	3.5%



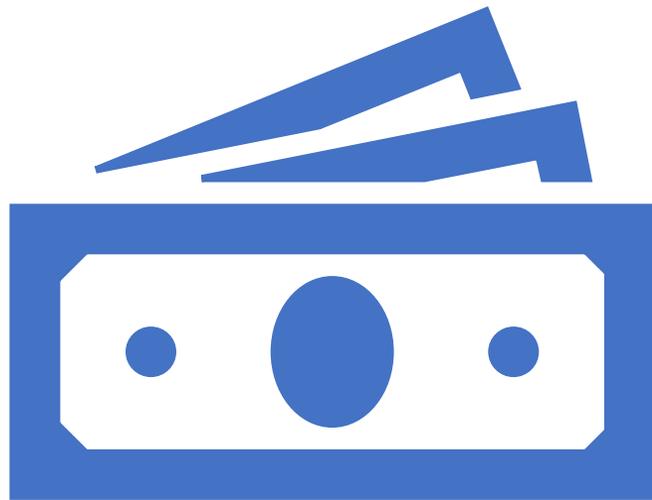
*Backtested with lump sum investment, annual rebalancing, and monthly start dates from Jan. 1970 through Dec. 2022 for CAGRs, SD & drawdowns. Safe-withdrawal rates tested back to Jan. 1928.*

# Vanguard-Like Target-Date Fund (Real)

- + Automatic for life!
- + Volatility declines w/ age
- + 3.7% safe withdrawal rate
- + Spend > legacy
- Lower total return



<p><b>Real CAGR</b> Low, Median, High: 4.3%, <b>5.2%</b>, 5.6%</p>
<p><b>Worst Accumulation Drawdown:</b> <b>42%</b> (48% w/o contributions)</p>
<p><b>Worst Drawdown at Age-65:</b> <b>27%</b></p>
<p><b>30-Year Safe Withdrawal Rate in Retirement:</b> <b>3.7%</b></p>



# Would an 8× *real* multiple be bad?

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- Assume \$100k/yr income, \$10k/yr savings for 40 years
- Spend \$90k/yr while working
- *Real* 4% withdrawals = ~\$68k/yr
- If +10% employer match = ~\$75k/yr
- Social security likely adds more
- And a *real* legacy of \$1M+ at age-95

# Easy 2 Funds for Life Strategy

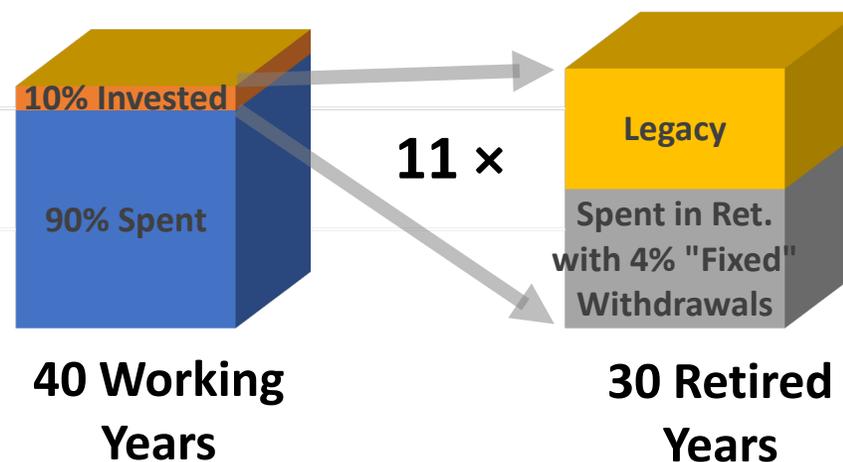
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- Put 90% of retirement savings in target-date fund
- Put 10% into US small-cap value fund
- No rebalancing
- Take 4% “fixed” annual retirement withdrawals from the fund that’s bigger than its target allocation to “nudge” rebalance over time.



# Easy 90/10 2 Funds for Life (*Real*)

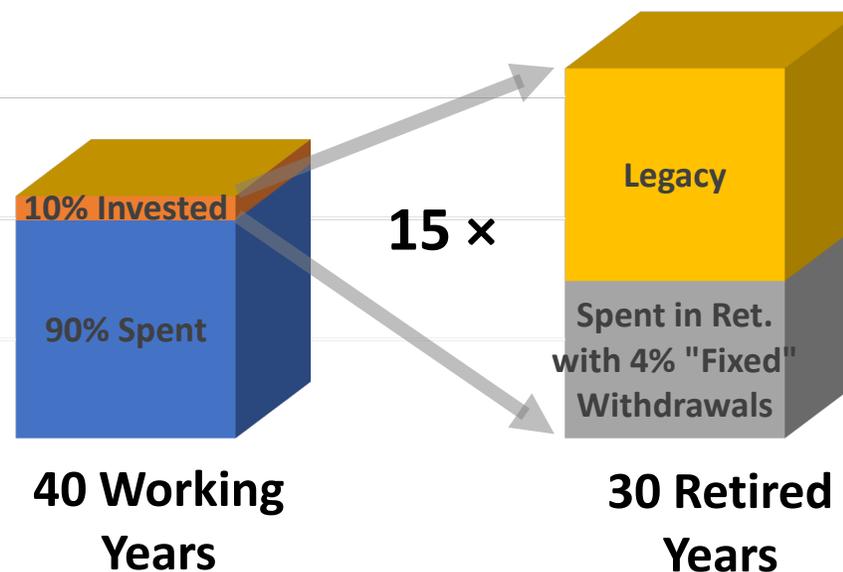
- + More 1.3× TDF over lifetime
- + Volatility declines w/age
- + >4% safe withdrawal rate
- More volatile than TDF alone
- Doesn't track the market



<b>Real CAGR</b> Low, Median, High: 4.7%, <b>5.8%</b> , 6.2%
<b>Worst Accumulation Drawdown:</b> <b>44%</b> (49% w/o contributions)
<b>Worst Drawdown at Age-65:</b> <b>35%</b>
<b>30-Year Safe Withdrawal Rate in Retirement:</b> <b>4.1%</b>

# Easy 80/20 2 Funds for Life (*Real*)

- + Almost 2× TDF over lifetime
- + >4.5% safe withdrawal rate
- Higher volatility later
- Doesn't track the market

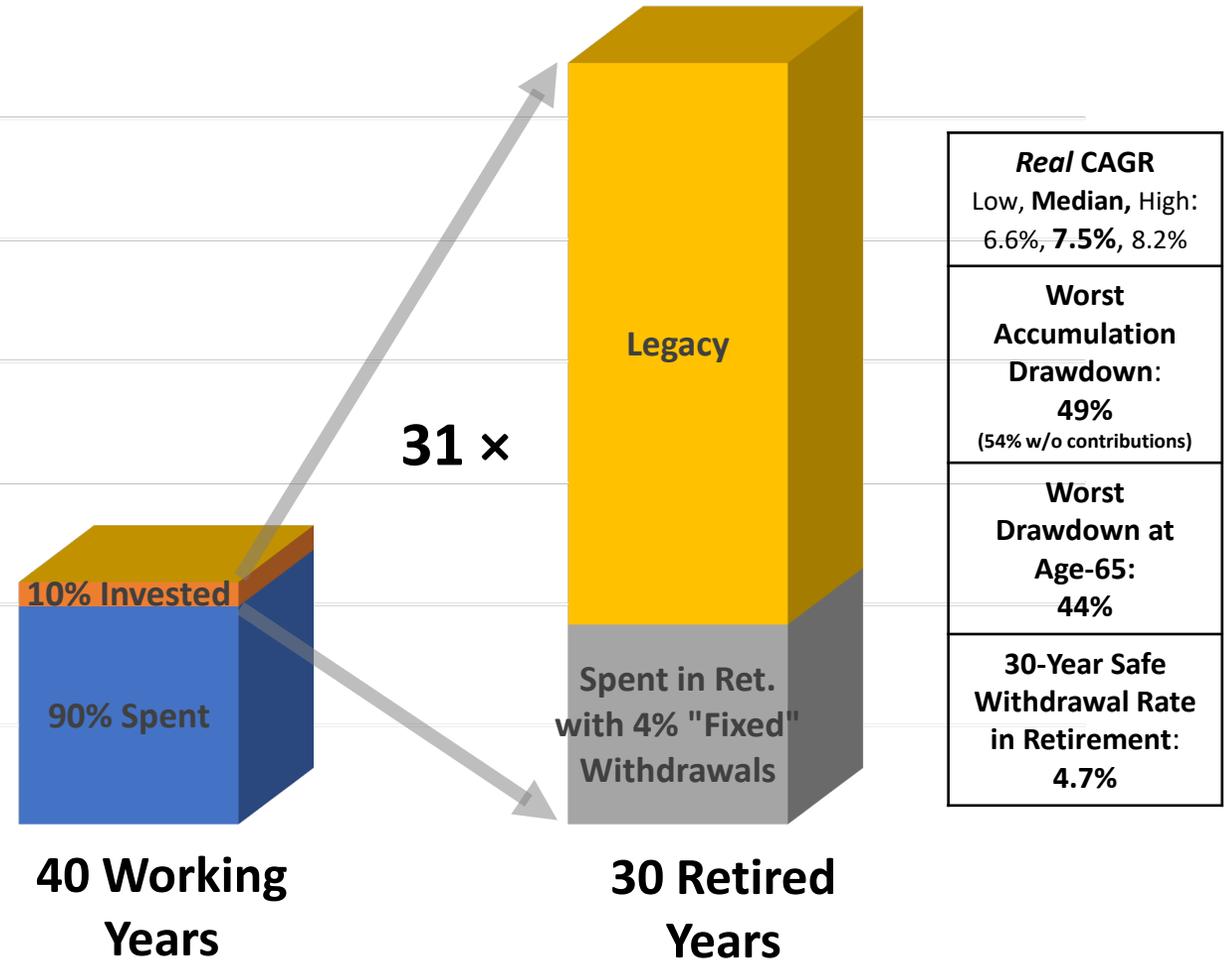


<b>Real CAGR</b> Low, Median, High: 5.3%, <b>6.3%</b> , 6.9%
<b>Worst Accumulation Drawdown:</b> <b>47%</b> (50% w/o contributions)
<b>Worst Drawdown at Age-65:</b> <b>42%</b>
<b>30-Year Safe Withdrawal Rate in Retirement:</b> <b>4.6%</b>

# 50/50 2 Funds for Life (*Real*)

## Rebalanced Annually

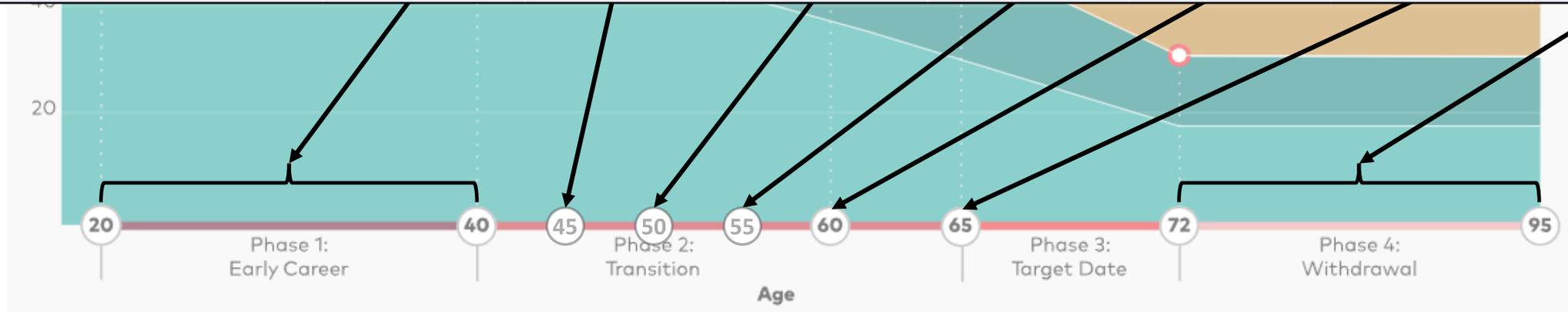
- + Almost 4× TDF over lifetime
- + Massively diversified
- + >4.5% safe withdrawal rate
- Higher volatility later
- Doesn't track the market



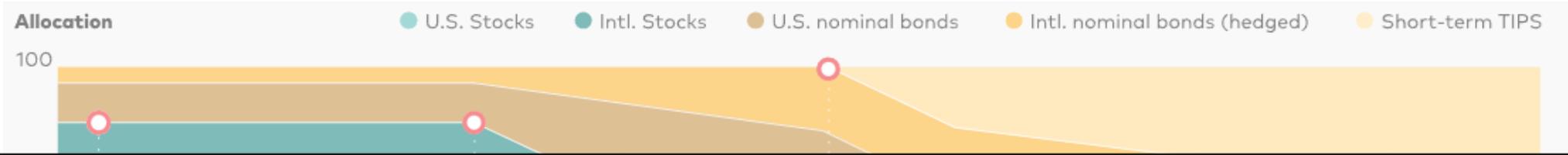
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<b>Nominal CAGR / Worst 10-Yr. CAGR</b>	9.8% / 1.1%	9.6% / 1.8%	9.4% / 2.4%	9.2% / 3.0%	9.0% / 3.5%	8.7% / 4.2%	8.0% / 3.4%
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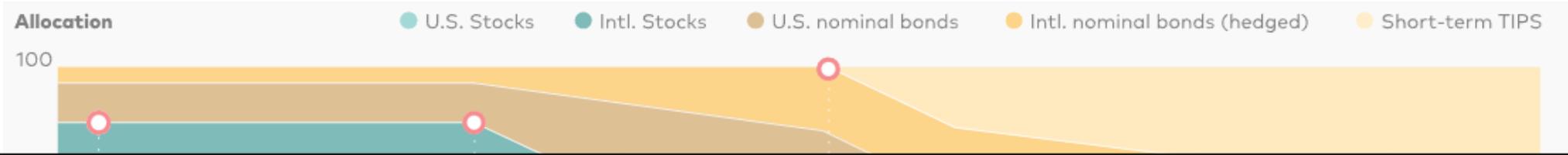


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<b>30-Year Safe Withdrawal Rate</b>	4.2%	4.4%	4.5%	4.3%	4.2%	4.0%	3.5%
<b>10% US SCV, 90% TDF</b>	<b>Nominal CAGR / Worst 10-Yr. CAGR</b>	10.3% / 1.9%	10.2% / 2.5%	10.0% / 3.0%	9.8% / 3.6%	9.6% / 4.0%	8.7% / 4.2%
	<b>Annualized CAGR SD (Volatility)</b>	13.8%	12.8%	11.9%	11.0%	10.1%	6.8%
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	<b>30-Year Safe Withdrawal Rate</b>	4.2%	4.4%	4.6%	4.6%	4.6%	4.1%
<b>20% US SCV, 80% TDF</b>	<b>Nominal CAGR / Worst 10-Yr. CAGR</b>	10.8% / 2.6%	10.7% / 3.1%	10.5% / 3.6%	10.4% / 4.1%	10.2% / 4.5%	9.4% / 4.9%
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## 2 Funds for Life, Fixed Allocation, Lump Sum, Annually Rebalanced, Fine-Tuning Table

Target Date Fund Years to Retirement:		25 (Or More) e.g., 2050 TDF	20 e.g., 2045 TDF	15 e.g., 2040 TDF	10 e.g., 2035 TDF	5 e.g., 2030 TDF	0 e.g., 2025 TDF	-7 (Or Less) e.g., 2015 TDF
<b>Simplified TDF Allocations</b>	<b>TDF Total US Stock Allocation</b>	<b>54%</b>	<b>49.5%</b>	<b>45%</b>	<b>40.5%</b>	<b>36%</b>	<b>30%</b>	<b>18%</b>
	<b>TDF International LCB Stock Allocation</b>	<b>36%</b>	<b>33%</b>	<b>30%</b>	<b>27%</b>	<b>24%</b>	<b>20%</b>	<b>12%</b>
	<b>TDF Int.-Term Gov't Bonds Allocation</b>	<b>10%</b>	<b>17.5%</b>	<b>25%</b>	<b>32.5%</b>	<b>40%</b>	<b>50%</b>	<b>70%</b>
<b>0% US SCV, 100% TDF</b>	<b>Nominal CAGR / Worst 10-Yr. CAGR</b>	9.8% / 1.1%	9.6% / 1.8%	9.4% / 2.4%	9.2% / 3.0%	9.0% / 3.5%	8.7% / 4.2%	8.0% / 3.4%
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<b>30% US SCV, 70% TDF</b>	<b>Nominal CAGR / Worst 10-Yr. CAGR</b>	11.2% / 3.2%	11.1% / 3.7%	11.0% / 4.2%	10.9% / 4.6%	10.8% / 5.0%	10.6% / 5.5%	10.1% / 5.6%
	<b>Annualized CAGR SD (Volatility)</b>	14.8%	14.1%	13.4%	12.6%	11.9%	11.0%	9.3%
	<b>Worst Drawdown (Peak to Valley)</b>	-51%	-48%	-46%	-43%	-40%	-36%	-27%
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<b>40% US SCV, 60% TDF</b>	<b>Nominal CAGR / Worst 10-Yr. CAGR</b>	11.7% / 3.9%	11.6% / 4.3%	11.5% / 4.7%	11.4% / 5.1%	11.3% / 5.4%	11.1% / 5.8%	10.8% / 6.2%
	<b>Annualized CAGR SD (Volatility)</b>	15.5%	14.9%	14.2%	13.6%	13.0%	12.2%	10.7%
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	<b>Annualized CAGR SD (Volatility)</b>	16.2%	15.7%	15.2%	14.7%	14.2%	13.5%	12.3%
	<b>Worst Drawdown (Peak to Valley)</b>	-54%	-52%	-51%	-49%	-47%	-44%	-39%
	<b>30-Year Safe Withdrawal Rate</b>	3.6%	3.7%	3.9%	4.0%	4.1%	4.3%	4.7%
<b>100% US SCV</b>	<b>Nominal CAGR / Worst-10Yr CAGR: 13.9% / 4.2% (-9.8% in 1928)</b>		<b>Annualized CAGR SD: 20.6%</b>		<b>Worst Drawdown: -61%</b>		<b>30-Year SWR: 2.5%</b>	

Sources & Assumptions: Assumes fixed asset class allocations, lumpsum investment, w/ annual rebalancing, for January 1970 through December 2022 returns. Safe withdrawal rates calculated with 1928-2022 annual returns.

US Stock allocation modeled with US total market returns. International stock allocation modeled with International Large Cap blend. Bond allocation modeled with US Intermediate-term Government bonds.

- Young investors who contribute regularly will likely see lower drawdowns while contributions are large relative to account balance.
  - Investors who rebalance less frequently will likely see higher returns and higher drawdowns.
  - Real returns (adjusted for inflation) were about 3-4% less than the nominal returns shown.
- Past performance doesn't guarantee future returns. Drawdowns from 1928-1970 were worse by an additional 10% to more than 30%.

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Simplified TDF Allocations	TDF Total US Stock Allocation	54%	49.5%	45%	40.5%	36%	30%	18%
	TDF International LCB Stock Allocation	36%	33%	30%	27%	24%	20%	12%
	TDF Int.-Term Gov't Bonds Allocation	10%	17.5%	25%	32.5%	40%	50%	70%
0% US SCV, 100% TDF	Nominal CAGR / Worst 10-Yr. CAGR	9.8% / 1.1%	9.6% / 1.8%	9.4% / 2.4%	9.2% / 3.0%	9.0% / 3.5%	8.7% / 4.2%	8.0% / 3.4%
	Annualized CAGR SD (Volatility)	13.4%	12.4%	11.3%	10.3%	9.3%	8.1%	6.0%
	Worst Drawdown (Peak to Valley)	-48%	-44%	-40%	-36%	-31%	-25%	-17%
	30-Year Safe Withdrawal Rate	4.2%	4.4%	4.5%	4.3%	4.2%	4.0%	3.5%
10% US SCV, 90% TDF	Nominal CAGR / Worst 10-Yr. CAGR	10.3% / 1.9%	10.2% / 2.5%	10.0% / 3.0%	9.8% / 3.6%	9.6% / 4.0%	9.4% / 4.6%	8.7% / 4.2%
	Annualized CAGR SD (Volatility)	13.8%	12.8%	11.9%	11.0%	10.1%	8.9%	6.8%
	Worst Drawdown (Peak to Valley)	-49%	-45%	-42%	-38%	-34%	-29%	-17%
	30-Year Safe Withdrawal Rate	4.2%	4.4%	4.6%	4.6%	4.6%	4.5%	4.1%
20% US SCV, 80% TDF	Nominal CAGR / Worst 10-Yr. CAGR	10.8% / 2.6%	10.7% / 3.1%	10.5% / 3.6%	10.4% / 4.1%	10.2% / 4.5%	10.0% / 5.1%	9.4% / 4.9%
	Annualized CAGR SD (Volatility)	14.3%	13.4%	12.6%	11.8%	10.9%	9.9%	7.9%
	Worst Drawdown (Peak to Valley)	-50%	-47%	-44%	-41%	-37%	-32%	-22%
	30-Year Safe Withdrawal Rate	4.1%	4.3%	4.5%	4.7%	4.7%	4.8%	4.6%
30% US SCV, 70% TDF	Nominal CAGR / Worst 10-Yr. CAGR	11.2% / 3.2%	11.1% / 3.7%	11.0% / 4.2%	10.9% / 4.6%	10.8% / 5.0%	10.6% / 5.5%	10.1% / 5.6%
	Annualized CAGR SD (Volatility)	14.8%	14.1%	13.4%	12.6%	11.9%	11.0%	9.3%
	Worst Drawdown (Peak to Valley)	-51%	-48%	-46%	-43%	-40%	-36%	-27%
	30-Year Safe Withdrawal Rate	4.0%	4.2%	4.3%	4.5%	4.7%	4.8%	4.8%
40% US SCV, 60% TDF	Nominal CAGR / Worst 10-Yr. CAGR	11.7% / 3.9%	11.6% / 4.3%	11.5% / 4.7%	11.4% / 5.1%	11.3% / 5.4%	11.1% / 5.8%	10.8% / 6.2%
	Annualized CAGR SD (Volatility)	15.5%	14.9%	14.2%	13.6%	13.0%	12.2%	10.7%
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	30-Year Safe Withdrawal Rate	3.8%	4.0%	4.1%	4.3%	4.4%	4.6%	4.9%
50% US SCV, 50% TDF	Nominal CAGR / Worst 10-Yr. CAGR	12.1% / 4.5%	12.0% / 4.9%	12.0% / 5.2%	11.9% / 5.5%	11.8% / 5.8%	11.7% / 6.2%	11.4% / 6.4%
	Annualized CAGR SD (Volatility)	16.2%	15.7%	15.2%	14.7%	14.2%	13.5%	12.3%
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100% US SCV	Nominal CAGR / Worst-10Yr CAGR: 13.9% / 4.2% (-9.8% in 1928)    Annualized CAGR SD: 20.6%    Worst Drawdown: -61%    30-Year SWR: 2.5%							

≥ 11%  
CAGR

Sources & Assumptions: Assumes fixed asset class allocations, lumpsum investment, w/ annual rebalancing, for January 1970 through December 2022 returns. Safe withdrawal rates calculated with 1928-2022 annual returns. US Stock allocation modeled with US total market returns. International stock allocation modeled with International Large Cap blend. Bond allocation modeled with US Intermediate-term Government bonds.

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0% US SCV, 100% TDF	Nominal CAGR / Worst 10-Yr. CAGR	9.8% / 1.1%	9.6% / 1.8%	9.4% / 2.4%	9.2% / 3.0%	9.0% / 3.5%	8.7% / 4.2%	8.0% / 3.4%
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10% US SCV, 90% TDF	Nominal CAGR / Worst 10-Yr. CAGR	10.3% / 1.9%	10.2% / 2.5%	10.0% / 3.0%	9.8% / 3.6%	9.6% / 4.0%	9.4% / 4.6%	8.7% / 4.2%
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	30-Year Safe Withdrawal Rate	4.2%	4.4%	4.6%	4.6%	4.6%	4.5%	4.1%
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	Annualized CAGR SD (Volatility)	14.3%	13.4%	12.6%	11.8%	10.9%	9.9%	7.9%
	Worst Drawdown (Peak to Valley)	-50%	-47%	-44%	-41%	-37%	-32%	-22%
	30-Year Safe Withdrawal Rate	4.1%	4.3%	4.5%	4.7%	4.7%	4.8%	4.6%
30% US SCV, 70% TDF	Nominal CAGR / Worst 10-Yr. CAGR	11.2% / 3.2%	11.1% / 3.7%	11.0% / 4.2%	10.9% / 4.6%	10.8% / 5.0%	10.6% / 5.5%	10.1% / 5.6%
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	30-Year Safe Withdrawal Rate	4.0%	4.2%	4.3%	4.5%	4.7%	4.8%	4.8%
40% US SCV, 60% TDF	Nominal CAGR / Worst 10-Yr. CAGR	11.7% / 3.9%	11.6% / 4.3%	11.5% / 4.7%	11.4% / 5.1%	11.3% / 5.4%	11.1% / 5.8%	10.8% / 6.2%
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	Worst Drawdown (Peak to Valley)	-52%	-50%	-48%	-46%	-44%	-40%	-33%
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50% US SCV, 50% TDF	Nominal CAGR / Worst 10-Yr. CAGR	12.1% / 4.5%	12.0% / 4.9%	12.0% / 5.2%	11.9% / 5.5%	11.8% / 5.8%	11.7% / 6.2%	11.4% / 6.4%
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100% US SCV	Nominal CAGR / Worst-10Yr CAGR: 13.9% / 4.2% (-9.8% in 1928)    Annualized CAGR SD: 20.6%    Worst Drawdown: -61%    30-Year SWR: 2.5%							

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Less Than 40% Peak To Trough Loss

## 2 Funds for Life, Fixed Allocation, Lump Sum, Annually Rebalanced, Fine-Tuning Table

Target Date Fund Years to Retirement:		25 (Or More) e.g., 2050 TDF	20 e.g., 2045 TDF	15 e.g., 2040 TDF	10 e.g., 2035 TDF	5 e.g., 2030 TDF	0 e.g., 2025 TDF	-7 (Or Less) e.g., 2015 TDF
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0% US SCV, 100% TDF	Nominal CAGR / Worst 10-Yr. CAGR	9.8% / 1.1%	9.6% / 1.8%	9.4% / 2.4%	9.2% / 3.0%	9.0% / 3.5%	8.7% / 4.2%	8.0% / 3.4%
	Annualized CAGR SD (Volatility)	13.4%	12.4%	11.3%	10.3%	9.3%	8.1%	6.0%
	Worst Drawdown (Peak to Valley)	-48%	-44%	-40%	-36%	-31%	-25%	-17%
	30-Year Safe Withdrawal Rate	4.2%	4.4%	4.5%	4.3%	4.2%	4.0%	3.5%
10% US SCV, 90% TDF	Nominal CAGR / Worst 10-Yr. CAGR	10.3% / 1.9%	10.2% / 2.5%	10.0% / 3.0%	9.8% / 3.6%	9.6% / 4.0%	9.4% / 4.6%	8.7% / 4.2%
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20% US SCV, 80% TDF	Nominal CAGR / Worst 10-Yr. CAGR	10.8% / 2.6%	10.7% / 3.1%	10.5% / 3.6%	10.4% / 4.1%	10.2% / 4.5%	10.0% / 5.1%	9.4% / 4.9%
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	30-Year Safe Withdrawal Rate	4.1%	4.3%	4.5%	4.7%	4.7%	4.8%	4.6%
30% US SCV, 70% TDF	Nominal CAGR / Worst 10-Yr. CAGR	11.2% / 3.2%	11.1% / 3.7%	11.0% / 4.2%	10.9% / 4.6%	10.8% / 5.0%	10.6% / 5.5%	10.1% / 5.6%
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40% US SCV, 60% TDF	Nominal CAGR / Worst 10-Yr. CAGR	11.7% / 3.9%	11.6% / 4.3%	11.5% / 4.7%	11.4% / 5.1%	11.3% / 5.4%	11.1% / 5.8%	10.8% / 6.2%
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50% US SCV, 50% TDF	Nominal CAGR / Worst 10-Yr. CAGR	12.1% / 4.5%	12.0% / 4.9%	12.0% / 5.2%	11.9% / 5.5%	11.8% / 5.8%	11.7% / 6.2%	11.4% / 6.4%
	Annualized CAGR SD (Volatility)	16.2%	15.7%	15.2%	14.7%	14.2%	13.5%	12.3%
	Worst Drawdown (Peak to Valley)	-54%	-52%	-51%	-49%	-47%	-44%	-39%
	30-Year Safe Withdrawal Rate	3.6%	3.7%	3.9%	4.0%	4.1%	4.3%	4.7%
100% US SCV	Nominal CAGR / Worst-10Yr CAGR: 13.9% / 4.2% (-9.8% in 1928)    Annualized CAGR SD: 20.6%    Worst Drawdown: -61%    30-Year SWR: 2.5%							

≥ 4.4%  
SWR

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50% US SCV, 50% TDF	Nominal CAGR / Worst 10-Yr. CAGR	12.1% / 4.5%	12.0% / 4.9%	12.0% / 5.2%	11.9% / 5.5%	11.8% / 5.8%	11.7% / 6.2%	11.4% / 6.4%
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≥ 11%  
CAGR

&

< 40%  
Worst  
DD

&

≥ 4.4%  
SWR

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# Best-in- Class Fund Selection

# How to pick the best funds?



Cheapest?



Least  
turnover?



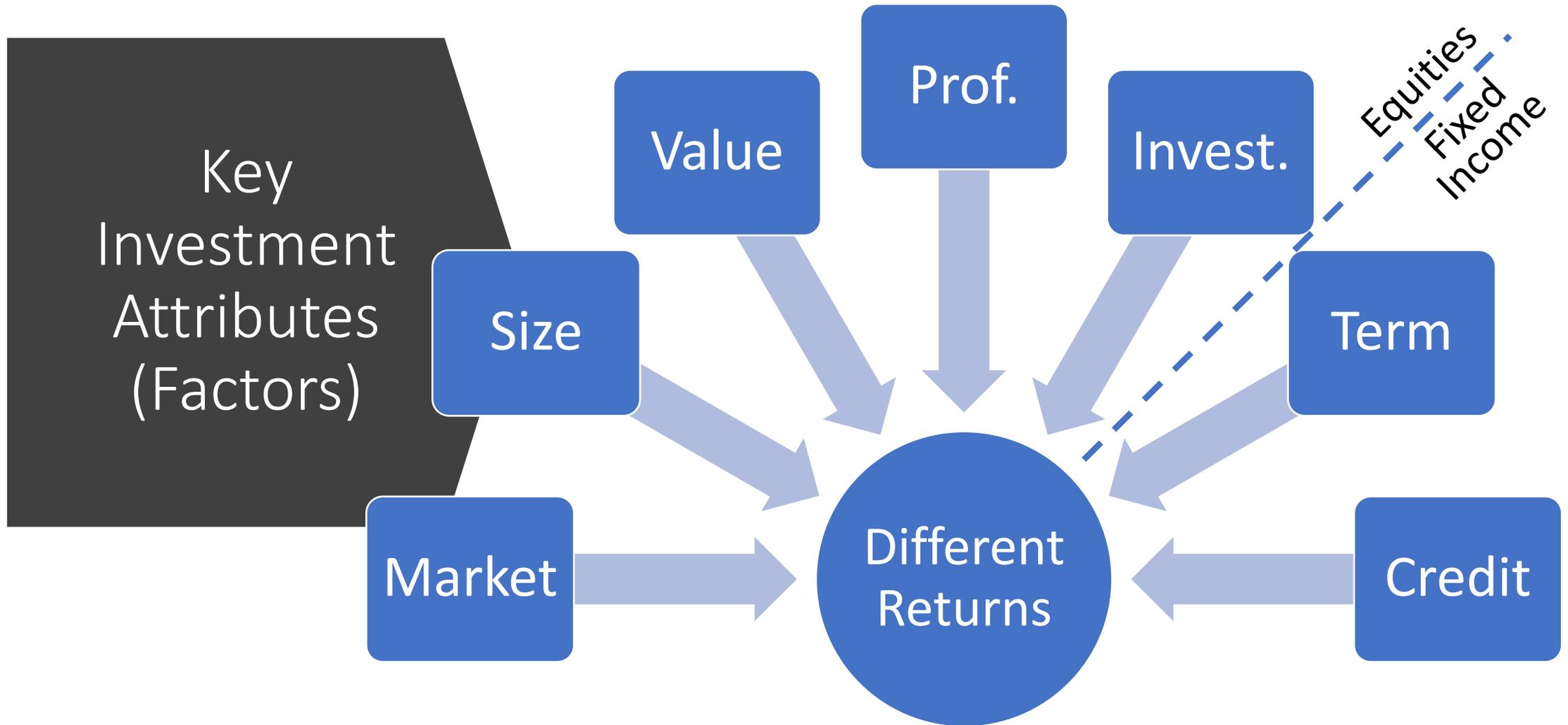
Least style  
drift?



Smallest  
companies?



Cheapest  
companies?



# Many Models, Many Premiums

	Fama-French (Jan 1964 – Jun 2023)			AQR (Jan 1964 – May 2023)		Alpha Architects (Jan 1992 – Jun 2023)			q-Factors (Jan 1967 – Dec 2022)		
Market	5.6%	5.6%	<u>5.5%</u>	5.2%	5.2%	7.8%	7.8%	7.8%	5.6%	5.6%	5.6%
Size	2.2%	2.2%	<u>2.2%</u>	1.1%	1.1%	3.3%	3.3%	3.3%	2.8%	2.8%	2.8%
Value	2.8%	2.8%	<u>2.8%</u>	2.5%	2.5%	2.3%	2.3%	2.3%			
Momentum		6.3%			6.9%		1.9%	1.9%			
Profitability			<u>3.1%</u>								
Investment			<u>3.2%</u>						4.5%	4.5%	4.5%
Quality					4.4%			0.8%			
Bet-Against-Beta					9.1%						
Return on Equity										6.2%	6.2%
Expected Growth											9.4%

Source: Portfolio Visualizer Factor Statistics Page – US Risk premia shown rounded to nearest 0.1%.

# Portfolio Visualizer Tools



## Factor Analysis

Run regression analysis using Fama-French and Carhart factor models for individual assets or a portfolio to analyze returns against market, size, value and momentum factors.

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- [Factor Regression »](#)
- [Risk Factor Allocation »](#)
- [Match Factor Exposures »](#)
- [Principal Component Analysis »](#)
- [Factor Statistics »](#)
- [Fund Factor Regressions »](#)
- [Fund Performance Attribution »](#)

# PV Factor Regression

Factor Analysis Results [Link](#) [PDF](#) [Excel](#)

**Note:** The time period was constrained by the available data for DFA US Small Cap Value I (DFSVX) [Mar 1993 - Jun 2023].

Factor Regression Performance Attribution Residuals Rolling Regression Rolling Returns

### DFA US Small Cap Value I

<b>Ticker</b>	DFSVX				
<b>Time Period</b>	Mar 1993 - Apr 2023				
<b>Regression Basis</b>	362 monthly samples				
<b>Coefficient of Determination (R<sup>2</sup>)</b>	97.3%				
<b>Adjusted R<sup>2</sup></b>	97.2%				
<b>Regression F statistic</b>	2,536.62 (p-value = 0.000)				
<b>Autocorrelation</b>	No autocorrelation confirmed (Durbin-Watson test value is 1.984 with p-value 0.431)				
<b>Heteroscedasticity</b>	No heteroscedasticity confirmed (Breusch-Pagan test value is 8.545 with p-value 0.129)				
Factor	Loading	Standard Error	t-stat	p-value	95% Confidence Interval
Market (Rm-Rf)	1.04	0.013	79.520	0.000	1.013...1.065
Size (SMB)	0.86	0.019	44.863	0.000	0.824...0.900
Value (HML)	0.45	0.022	20.602	0.000	0.406...0.491
Profitability (RMW)	0.13	0.024	5.196	0.000	0.078...0.173
Investment (CMA)	0.06	0.033	1.789	0.075	-0.006...0.122
Alpha (α)	-9.63bps	0.001	-1.779	0.076	-0.20%...0.01%
Annualized Alpha (α)	-1.16%				

# PV Factor Statistics

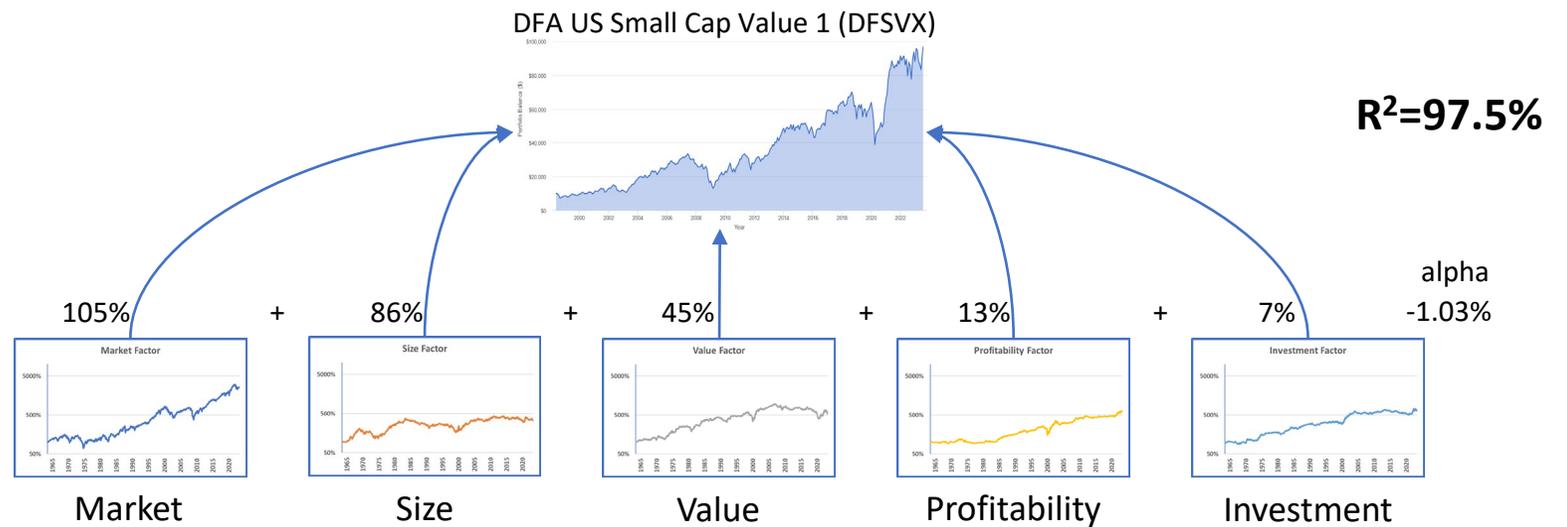
Factor Return Statistics (Jan 1964 - Apr 2023) [Link](#) [Excel](#)

## Factor Correlations

Factor	Key	Rm-Rf	SMB	SMB5	HML	MOM	RMW	CMA	STREV	LTREV	Annualized Return	Annualized Standard Deviation
Market	FF-MKT-RF	1.00	0.29	0.28	-0.21	-0.17	-0.18	-0.37	0.32	-0.00	5.52%	15.61%
Size (FF3)	FF-SMB	0.29	1.00	0.98	-0.17	-0.04	-0.41	-0.18	0.18	0.26	1.74%	10.60%
Size (FF5)	FF-SMB5	0.28	0.98	1.00	-0.02	-0.07	-0.35	-0.10	0.18	0.32	2.18%	10.53%
Value	FF-HML	-0.21	-0.17	-0.02	1.00	-0.19	0.09	0.68	0.02	0.51	2.97%	10.39%
Momentum	FF-MOM	-0.17	-0.04	-0.07	-0.19	1.00	0.08	-0.00	-0.32	-0.09	6.37%	14.68%
Profitability	FF-RMW	-0.18	-0.41	-0.35	0.09	0.08	1.00	-0.01	-0.09	-0.27	3.13%	7.72%
Investment	FF-CMA	-0.37	-0.18	-0.10	0.68	-0.00	-0.01	1.00	-0.14	0.52	3.34%	7.16%
Short Term Reversal	FF-STREV	0.32	0.18	0.18	0.02	-0.32	-0.09	-0.14	1.00	0.09	5.10%	10.92%
Long Term Reversal	FF-LTREV	-0.00	0.26	0.32	0.51	-0.09	-0.27	0.52	0.09	1.00	2.47%	9.24%

Factor correlations and returns statistics from January 1964 to April 2023

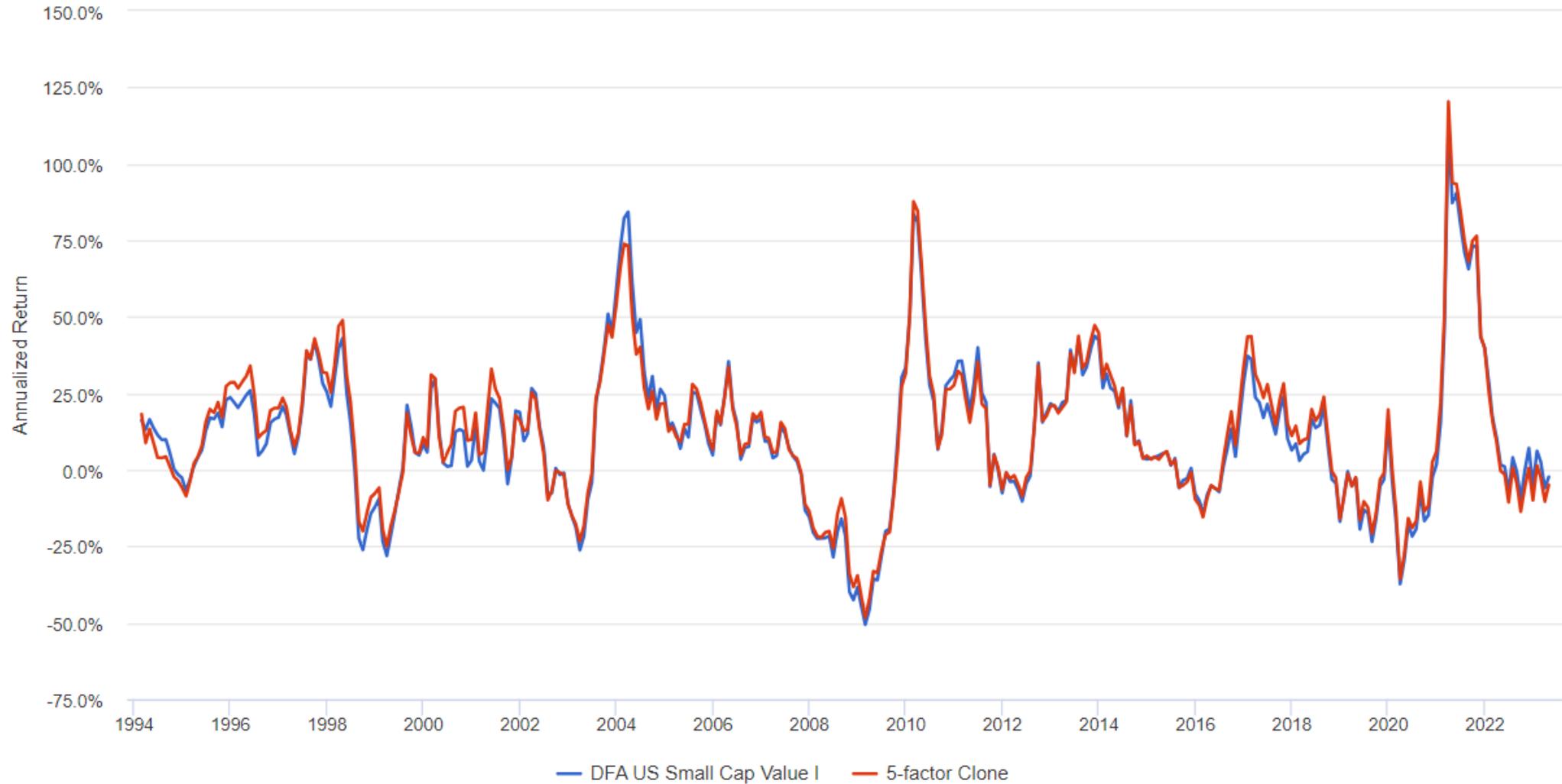
Factor models  
can explain  
>95% of return  
variations



Source: [portfoliovisualizer.com](http://portfoliovisualizer.com)

## DFA US Small Cap Value I

### DFA US Small Cap Value I - 12-month Rolling Excess Return

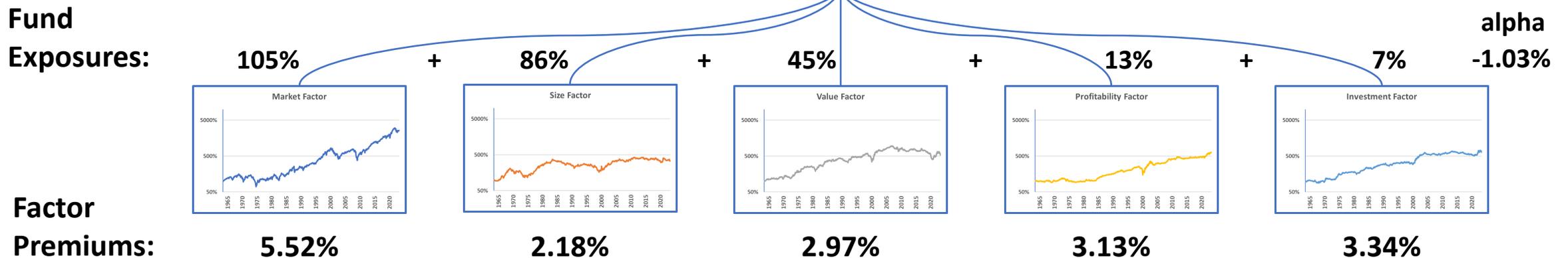


We can estimate expected returns using past exposures & premiums – e.g., DFSVX

DFA US Small Cap Value 1 (DFSVX 0.30% Expense Ratio)



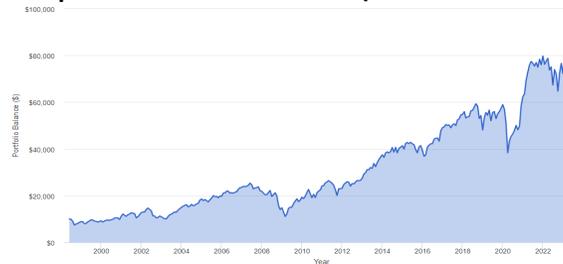
$R^2=97.5\%$



$$(105\% \times 5.52\%) + (86\% \times 2.18\%) + (45\% \times 2.97\%) + (13\% \times 3.13\%) + (7\% \times 3.34\%) - 1.03\% = \sim \underline{\underline{8.6\%}} \text{ (above risk-free)}$$

We can estimate expected returns using past exposures & premiums – e.g., VISVX

Vanguard Small-Cap Value Index Inv (VISVX 0.19% Expense Ratio)



$R^2=95.3\%$

Fund Exposures:

102%

+

63%

+

41%

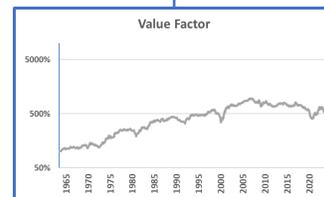
+

22%

+

-4%

alpha  
-1.43%



Factor

Premiums:

5.52%

2.18%

2.97%

3.13%

3.34%

$$(102\% \times 5.52\%) + (63\% \times 2.18\%) + (41\% \times 2.97\%) + (22\% \times 3.13\%) + (-4\% \times 3.34\%) - 1.43\% = \sim \underline{\underline{7.3\% \text{ (above risk-free)}}}$$

# Factor- Predicted Return Gotchas

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Timeframes should match

---

Don't trust regressions with low  $R^2$  values

---

Look at 95% confidence Intervals

---

Be skeptical of estimated alpha

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It's just a model

# Other Fund Attributes to Consider

Expense  
Ratios

Number of  
holdings

Turnover

Parent  
company

Fund  
managers &  
methodology

# The Merriman Financial Education Foundation Best- In-Class ETF Recommendations

	<b>Best-in-Class (<i>New in 2023</i>)</b>	<b>Alternative Recommendations</b>
US Large Cap Blend	<b>Avantis U.S. Equity (AVUS)</b>	DFA US Equity ETF (DFUS), Vanguard S&P 500 (VOO), Vanguard Total US Market (VTI), iShares Core S&P 500 (IVV), SPDR Large Cap (SPLG), Schwab Large-Cap (SCHX)
US Large Cap Value	<b>Invesco S&amp;P 500 Pure Value (RPV)</b>	Avantis US Large Cap Value (AVLV), Vanguard Russell 1000 Value Index (VONV), iShares Core US Value (IUSV), Schwab S&P 500 Value (SPYV), U.S. Large-Cap Value (SCHV)
US Small Cap Blend	<b>iShares Core S&amp;P Small-Cap (IJR)</b>	Avantis US Small Cap Equity (AVSC), DFA US Small Cap ETF (DFAS), Vanguard S&P Small-Cap 600 Index (VIOO), Russell Micro-Cap (IWC), Schwab U.S. Small-Cap (SCHA), SPDR Small Cap (SPSM)
US Small Cap Value	<b>Avantis U.S. Small Cap Value (AVUV)</b>	DFA US Small Cap Value ETF (DFSV), Vanguard S&P Small-Cap 600 Value (VIOV), SPDR Small Cap Value (SLYV), iShares S&P; SmCap 600 Value (IJS), Invesco S&P SmallCap 600 Pure Value ETF (RZV)
US REIT	<b>Vanguard Real Estate Index (VNQ)</b>	Fidelity MSCI Real Estate (FREL), iShares U.S. REIT (USRT), Schwab U.S. REIT (SCHH)
Int'l Large Cap Blend	<b>Avantis International Equity (AVDE)</b>	Vanguard FTSE Developed Markets (VEA), iShares Core MSCI EAFE (IEFA), SPDR World Ex-US (SPDW), Schwab Intl Equity (SCHF)
Int'l Large Cap Value	<b><u>DFA International Value (DFIV)</u></b>	Vanguard International High Dividend (VYMI), Avantis International Large Cap Val ETF (AVIV), iShares MSCI EAFE Value (EFV), iShares MSCI EAFE Value, Fidelity International Value Factor ETF (FIVA), SPDR S&P Intl Dividend (DWX)
Int'l Small Cap Blend	<b>Schwab Fundamental International Small Company Index (FNDC)</b>	DFA International Small Cap ETF (DFIS), Vanguard FTSE All-World ex-US Small-Cap Index (VSS), iShares MSCI EAFE SmCap (SCZ), SPDR S&P Intl. Small Cap (GWX), Schwab Intl Sm-Cp Equity (SCHC)
Int'l Small Cap Value	<b>Avantis International Small Cap Value (AVDV)</b>	DFA International Small Cap Value I (DISV), WisdomTree Intl. S. Cap Div (DLS)
Emerging Markets	<b>Avantis Emerging Markets Equity (AVEM)</b>	DFA Emerging Core Equity Market ETF (DFAE), Vanguard FTSE Emerging Markets (VWO), iShares Core MSCI EmMkts. (IEMG), SPDR Emerging Markets (SPEM), Schwab Emerging Mkt Eq (SCHE)
EM Large Cap Value	<b><u>Avantis Emerging Markets Value (AVES)</u></b>	Dimensional Emerging Markets Value ETF (DFEV)
EM Small Cap Blend	<b><u>iShares MSCI Em. Mkts. Sm.-Cap (EEMS)</u></b>	SPDR Emerging Mkts. S. Cap (EWX), WisdomTree Em. Markets SmCap Div ETF (DGS)
Int'l REITs	---	Vanguard Global ex-US Real Estate (VNQI), iShares FTSE Real Estate ex-US (IFGL),
Short-Term Bonds	<b>Vanguard Short-Term Gov't Bond (VGSH)</b>	iShares Barclays ST Treas. (SHY), SPDR ST Treas. (SPTS), Schwab ST U.S. Treas. (SCHO)
Int.-Term Bonds	<b>SPDR Inter. Term Treasury (SPTI)</b>	iShares Barclays 7-10 Yr Treasury (IEF), Vanguard Intermediate-Term Government Bond (VGIT), Schwab I-T U.S. Treasury (SCHR)
Infl.-Prot. Bonds	<b>Vanguard Short-Term Infl. Prot. Sec. (VTIP)</b>	iShares Barclays 0-5 TIPS (STIP), Schwab U.S. TIPS (SCHP)

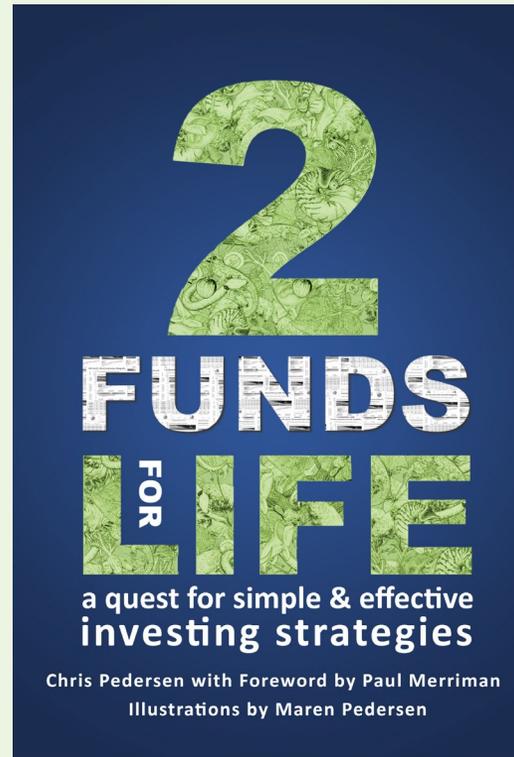
# Summary

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- Buy right (for you)!
  - Right complexity
  - Right diversification
  - Right reward/risk
  - Right resilience
  - Right funds
- Hold tight!
- Zoom out & keep learning!



# To learn more



- [www.paulmerriman.com](http://www.paulmerriman.com) for books, articles, fund recommendations, videos, podcasts and more.
- *Sign up* for the free newsletter to get a download link for *We're Talking Millions* and *2 Funds for Life*

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# *Any Questions?*

*(for more Iceland eye candy: [bit.ly/44xp0Uw](https://bit.ly/44xp0Uw))*

Paul Merriman & Chris Pedersen  
The Merriman Financial Education  
Foundation

October 11, 2023



Backup

## 2 Funds for Life, Fixed Allocation, Lump Sum, Annually Rebalanced, Fine-Tuning Table

Target Date Fund Years to Retirement:		25 (Or More) e.g., 2050 TDF	20 e.g., 2045 TDF	15 e.g., 2040 TDF	10 e.g., 2035 TDF	5 e.g., 2030 TDF	0 e.g., 2025 TDF	-7 (Or Less) e.g., 2015 TDF
Simplified TDF Allocations	TDF Total US Stock Allocation	54%	49.5%	45%	40.5%	36%	30%	18%
	TDF International LCB Stock Allocation	36%	33%	30%	27%	24%	20%	12%
	TDF Int.-Term Gov't Bonds Allocation	10%	17.5%	25%	32.5%	40%	50%	70%
0% US SCV, 100% TDF	Nominal CAGR / Worst 10-Yr. CAGR	9.8% / 1.1%	9.6% / 1.8%	9.4% / 2.4%	9.2% / 3.0%	9.0% / 3.5%	8.7% / 4.2%	8.0% / 3.4%
	Annualized CAGR SD (Volatility)	13.4%	12.4%	11.3%	10.3%	9.3%	8.1%	6.0%
	Worst Drawdown (Peak to Valley)	-48%	-44%	-40%	-36%	-31%	-25%	-17%
	30-Year Safe Withdrawal Rate	4.2%	4.4%	4.5%	4.3%	4.2%	4.0%	3.5%
10% US SCV, 90% TDF	Nominal CAGR / Worst 10-Yr. CAGR	10.3% / 1.9%	10.2% / 2.5%	10.0% / 3.0%	9.8% / 3.6%	9.6% / 4.0%	9.4% / 4.6%	8.7% / 4.2%
	Annualized CAGR SD (Volatility)	13.8%	12.8%	11.9%	11.0%	10.1%	8.9%	6.8%
	Worst Drawdown (Peak to Valley)	-49%	-45%	-42%	-38%	-34%	-29%	-17%
	30-Year Safe Withdrawal Rate	4.2%	4.4%	4.6%	4.6%	4.6%	4.5%	4.1%
20% US SCV, 80% TDF	Nominal CAGR / Worst 10-Yr. CAGR	10.8% / 2.6%	10.7% / 3.1%	10.5% / 3.6%	10.4% / 4.1%	10.2% / 4.5%	10.0% / 5.1%	9.4% / 4.9%
	Annualized CAGR SD (Volatility)	14.3%	13.4%	12.6%	11.8%	10.9%	9.9%	7.9%
	Worst Drawdown (Peak to Valley)	-50%	-47%	-44%	-41%	-37%	-32%	-22%
	30-Year Safe Withdrawal Rate	4.1%	4.3%	4.5%	4.7%	4.7%	4.8%	4.6%
30% US SCV, 70% TDF	Nominal CAGR / Worst 10-Yr. CAGR	11.2% / 3.2%	11.1% / 3.7%	11.0% / 4.2%	10.9% / 4.6%	10.8% / 5.0%	10.6% / 5.5%	10.1% / 5.6%
	Annualized CAGR SD (Volatility)	14.8%	14.1%	13.4%	12.6%	11.9%	11.0%	9.3%
	Worst Drawdown (Peak to Valley)	-51%	-48%	-46%	-43%	-40%	-36%	-27%
	30-Year Safe Withdrawal Rate	4.0%	4.2%	4.3%	4.5%	4.7%	4.8%	4.8%
40% US SCV, 60% TDF	Nominal CAGR / Worst 10-Yr. CAGR	11.7% / 3.9%	11.6% / 4.3%	11.5% / 4.7%	11.4% / 5.1%	11.3% / 5.4%	11.1% / 5.8%	10.8% / 6.2%
	Annualized CAGR SD (Volatility)	15.5%	14.9%	14.2%	13.6%	13.0%	12.2%	10.7%
	Worst Drawdown (Peak to Valley)	-52%	-50%	-48%	-46%	-44%	-40%	-33%
	30-Year Safe Withdrawal Rate	3.8%	4.0%	4.1%	4.3%	4.4%	4.6%	4.9%
50% US SCV, 50% TDF	Nominal CAGR / Worst 10-Yr. CAGR	12.1% / 4.5%	12.0% / 4.9%	12.0% / 5.2%	11.9% / 5.5%	11.8% / 5.8%	11.7% / 6.2%	11.4% / 6.4%
	Annualized CAGR SD (Volatility)	16.2%	15.7%	15.2%	14.7%	14.2%	13.5%	12.3%
	Worst Drawdown (Peak to Valley)	-54%	-52%	-51%	-49%	-47%	-44%	-39%
	30-Year Safe Withdrawal Rate	3.6%	3.7%	3.9%	4.0%	4.1%	4.3%	4.7%
100% US SCV	Nominal CAGR / Worst-10Yr CAGR: 13.9% / 4.2% (-9.8% in 1928)    Annualized CAGR SD: 20.6%    Worst Drawdown: -61%    30-Year SWR: 2.5%							

~60/40  
Eq./FI

Sources & Assumptions: Assumes fixed asset class allocations, lumpsum investment, w/ annual rebalancing, for January 1970 through December 2022 returns. Safe withdrawal rates calculated with 1928-2022 annual returns. US Stock allocation modeled with US total market returns. International stock allocation modeled with International Large Cap blend. Bond allocation modeled with US Intermediate-term Government bonds.

- Young investors who contribute regularly will likely see lower drawdowns while contributions are large relative to account balance.
  - Investors who rebalance less frequently will likely see higher returns and higher drawdowns.
  - Real returns (adjusted for inflation) were about 3-4% less than the nominal returns shown.
- Past performance doesn't guarantee future returns. Drawdowns from 1928-1970 were worse by an additional 10% to more than 30%.

# Not all factors equally available

