SEQUENCE OF RETURNS RISK
MORE BARK THAN BITE?

Martin Tarlie

GMO

AGENDA

- Motivation
- A Horse Race
- Our Portfolio Construction Framework
- Where Are We Going?

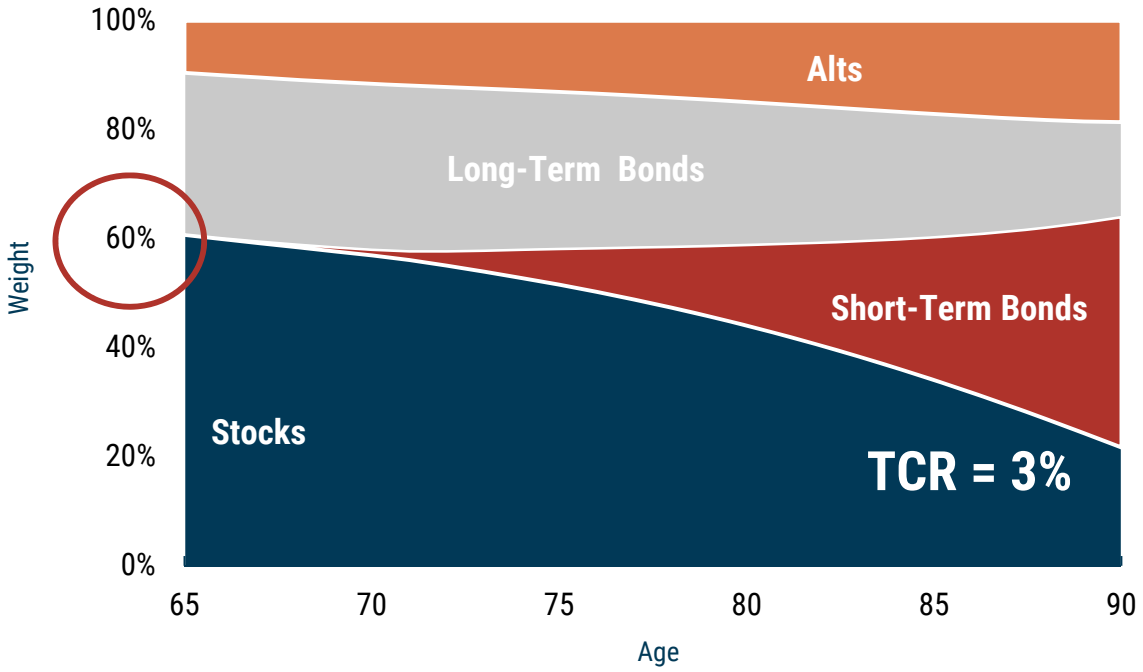
MAIN TAKEAWAYS

1. Sequence of returns “risk" is not a risk you can avoid or embrace.
   a. It's not an asset characteristic, e.g., if you have no cash flows, there is no sequence risk.
   b. It is simply a fact of life, but…
2. To manage for better outcomes (in expectation):
   a. Ask the right question – what do you need and when do you need it?
   b. Move your assets – pay attention to valuation.
3. There is an essential tension between short-term safety and long-term compounding of wealth…more to come.

MOTIVATION: THE POST RETIREMENT PROBLEM

OUR FRAMEWORK APPLIED…

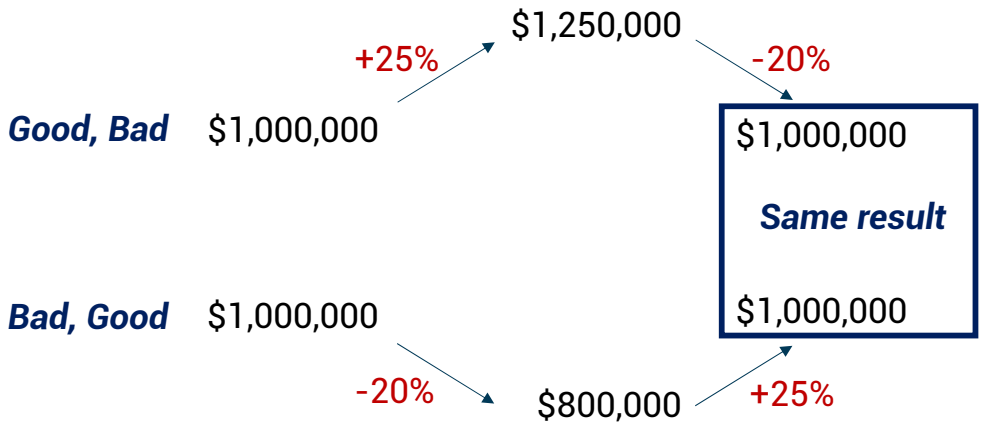
Compound at 3% real and shortfall is more important than surplus*



*Assuming all assets are priced at fair value

A SIMPLE EXAMPLE

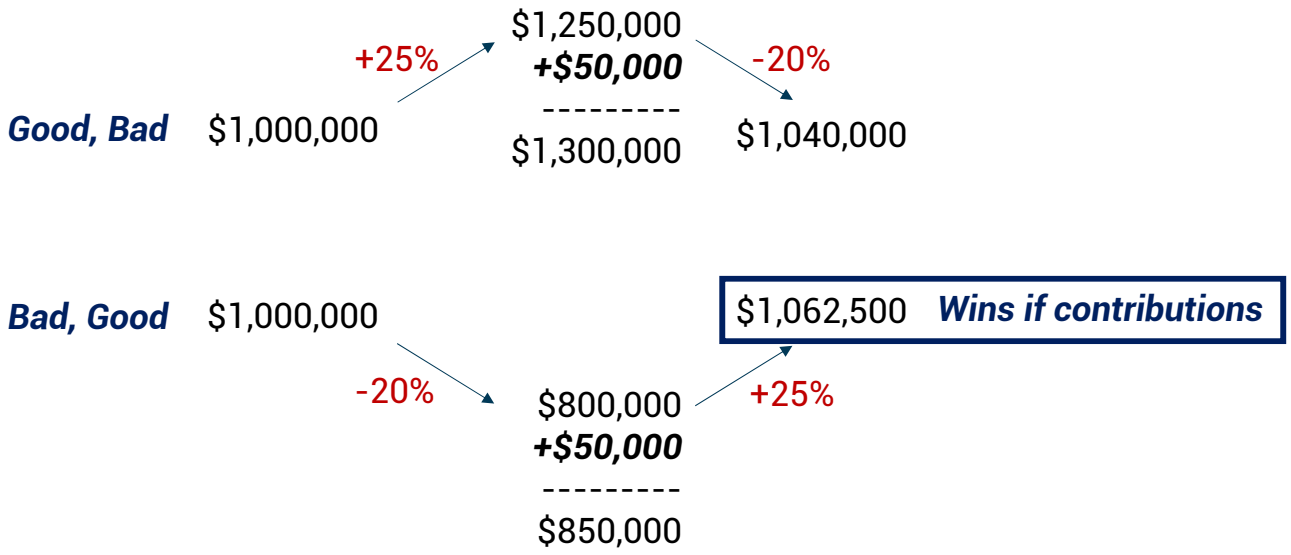
With no cash flows, order of returns doesn't matter



$1.25 * 0.8 = 0.8 * 1.25 = 1$

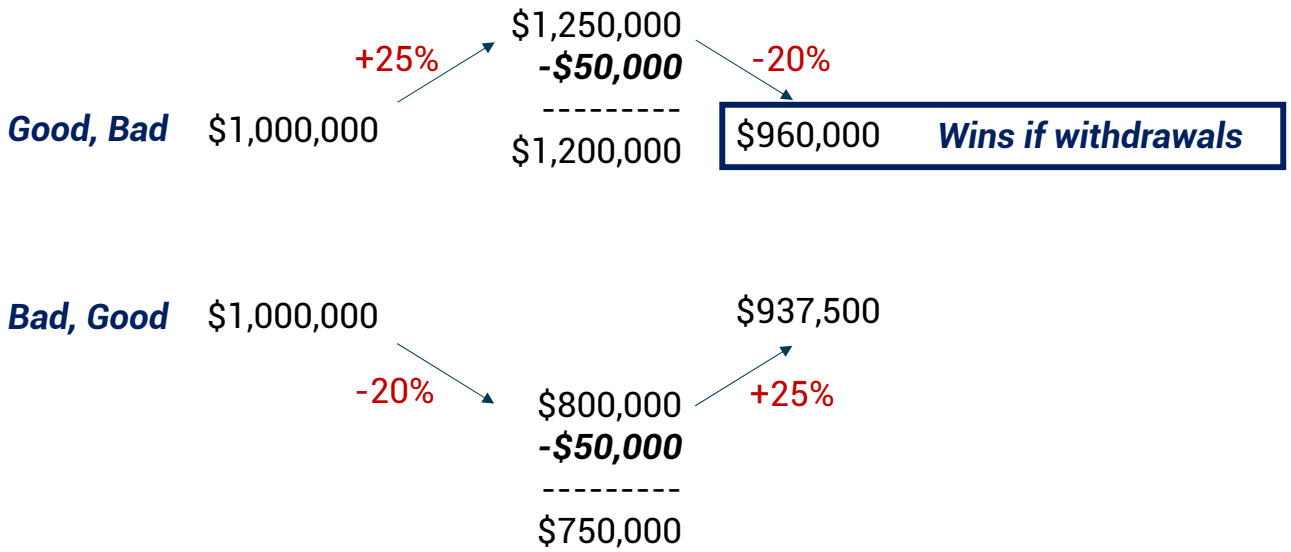
WITH CASH FLOWS, ORDER OF RETURNS MATTERS

If you're contributing, better to have bad returns followed by good



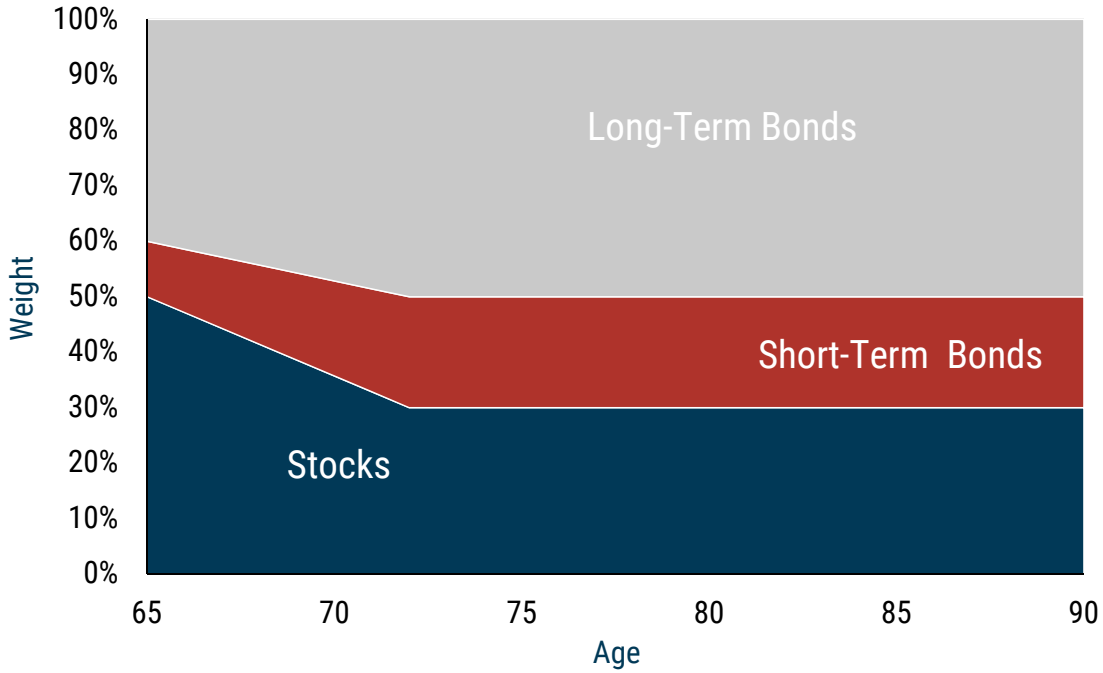
WITH CASH FLOWS, ORDER OF RETURNS MATTERS

If you're withdrawing, better to have good returns followed by bad



A COMMON POST RETIREMENT GLIDEPATH

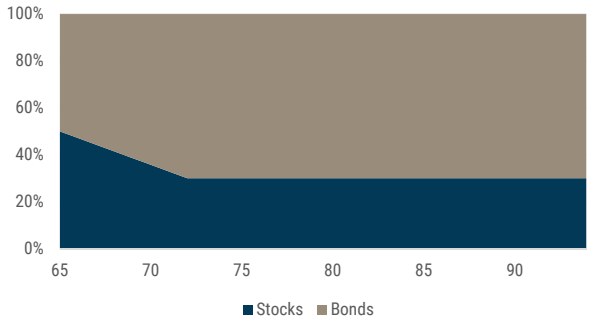
Lower weight in equities motivated, in part, by sequence of return risk



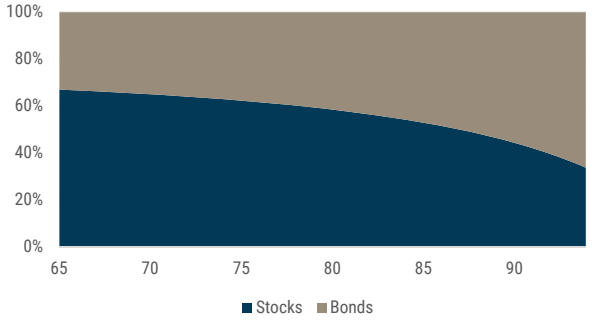
A HORSE RACE

THREE HORSES

COMMON GLIDEPATH

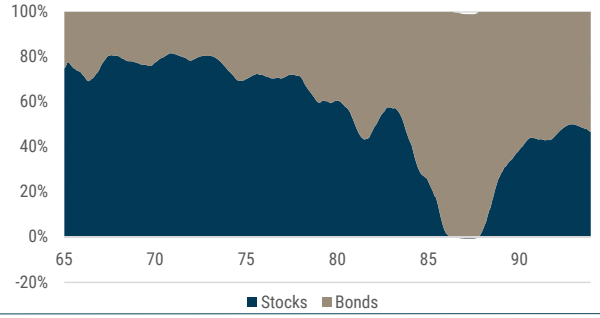


OPTIMAL SHORTFALL



Portfolios only depend on horizon

VALUATION-SENSITIVE OPTIMAL SHORTFALL



Portfolios depend on horizon and asset valuation

TWO KINDS OF RACES

Historical backtest and simulations with fixed-dollar monthly withdrawals

Historical backtest*

- For Valuation-Sensitive Optimal Shortfall, valuation based on Shiller P/E (price to trailing 10-year real earnings)

Simulations**

	Stocks	*Bonds*
Expected real return	6.0%	2.5%
Volatility	17.5%	7.3%
Return/volatility	0.34	0.34
Mean reversion (years)	7	4
Expected return volatility	2.5%	2.0%

* For each month from Jan-1881 through Dec-1988, compute the dynamics of wealth over the next 29 years based on strategy weights, historical real stock and bond returns, and a fixed-dollar monthly withdrawal.
**Generate 1,000 independent samples each with a duration of 29 years. Assume mean-reverting expected returns. For each of the 1000 simulations, compute the dynamics of wealth over the next 29 years based on strategy weights, simulated real stock and bond returns, and a fixed-dollar monthly withdrawal.
Rebalancing is monthly for both Historical and Simulations.

PROBABILITY OF RUIN – CASES WHERE THE HORSES NEVER FINISH

Probability that wealth falls below zero at any point in time

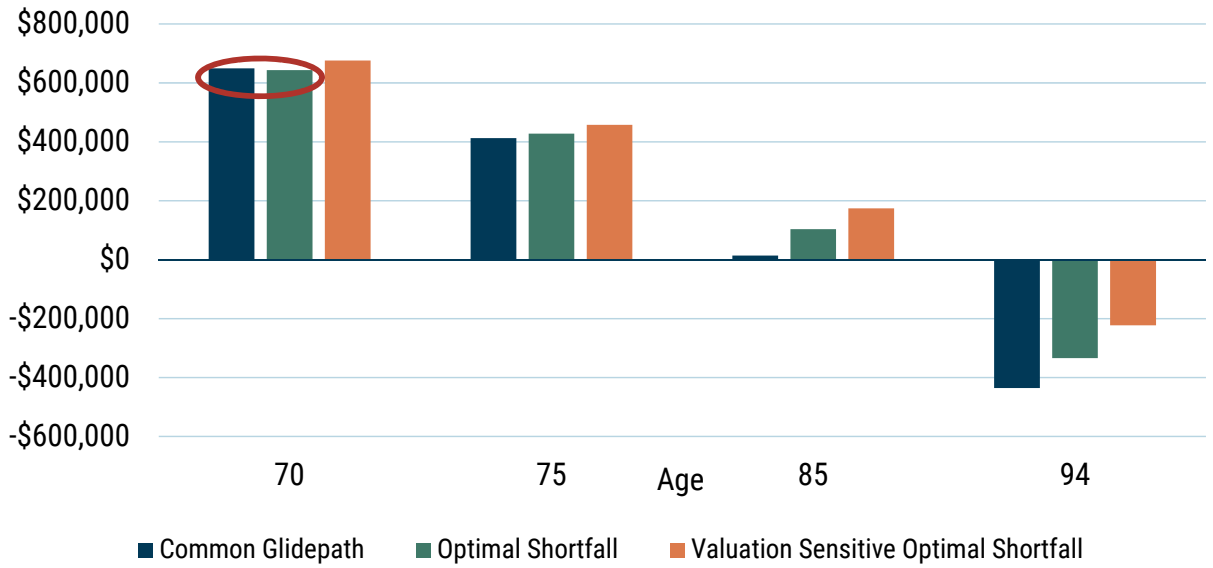
Withdrawal Rate*	Common Glidepath	Optimal Shortfall	Valuation-Sensitive Optimal Shortfall
	*Historical backtest***		
3%	0%	0%	0%
4%	5.9%	3.1%	0.7%
5%	49%	25%	18%
	*Simulations****		
3%	0.9%	0.7%	0.3%
4%	7.2%	3.6%	2.0%
5%	25%	15%	10%

Asking the right question ***Moving your assets***

- Asking the right question effectively cuts your probability of ruin in half.
- Moving your assets effectively cuts the probability of ruin by another third.

* For 5%, withdrawal is $4,167 per month ($50,000 per year) regardless of asset base, $40,000 per year for 4%, and $30,000 per year for 3%. Starting asset base at age 65 is $1 million. Monthly withdrawal is fixed at $1 million times withdrawal rate/12, regardless of asset base.
** Historical backtests using Robert Shiller data from 1881-2018.
*** 1,000 independent simulations.

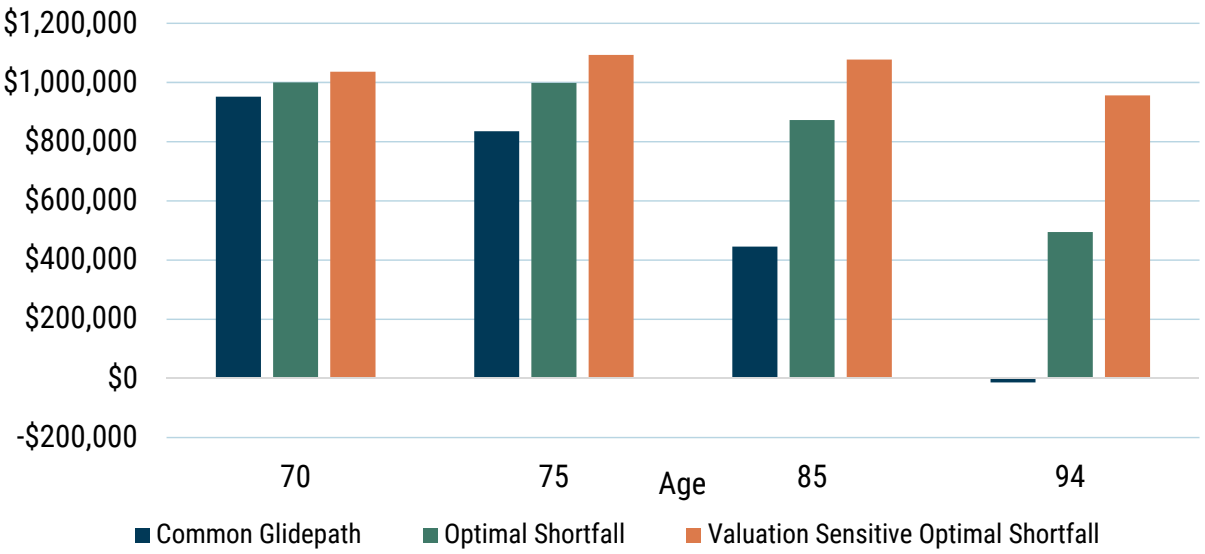
BAD OUTCOMES* – HISTORICAL BACKTEST**



At short horizons, there is a small benefit to holding fewer stocks. As horizon grows, this benefit erodes.

* Worst 10th percentile of outcomes.
**Historical backtests using Robert Shiller data from 1881-2018. Starting asset base at age 65 is $1 million. Withdrawal is $4,167 per month ($50,000 per year) regardless of asset base.

MEDIAN OUTCOMES – HISTORICAL BACKTEST



For typical outcomes, Valuation-Sensitive > Shortfall > Common

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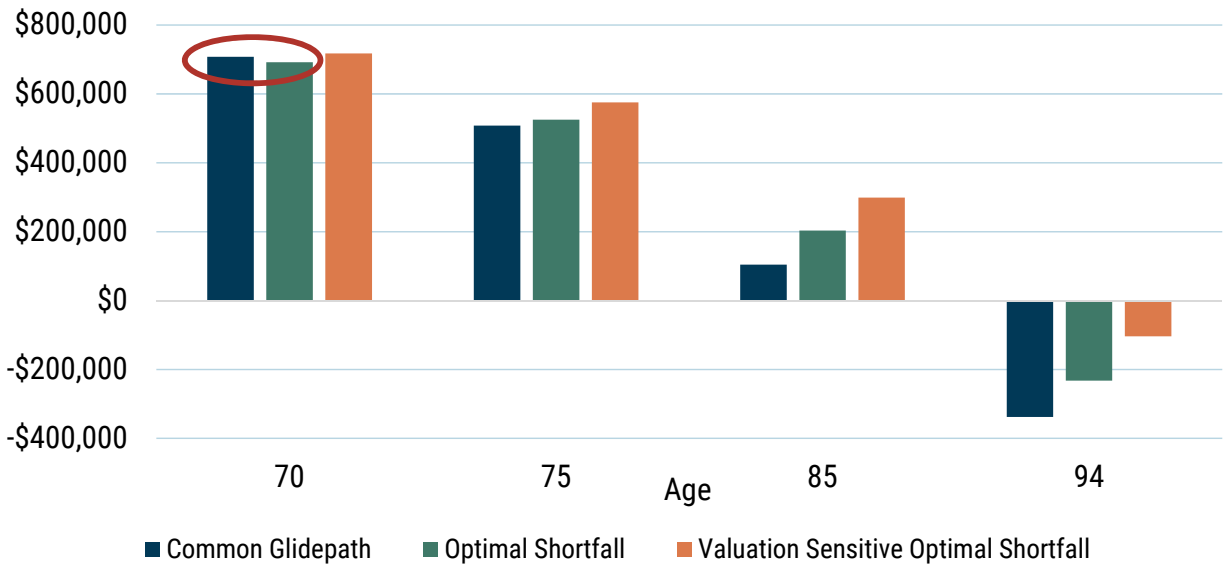
BAD OUTCOMES* – **SIMULATIONS****



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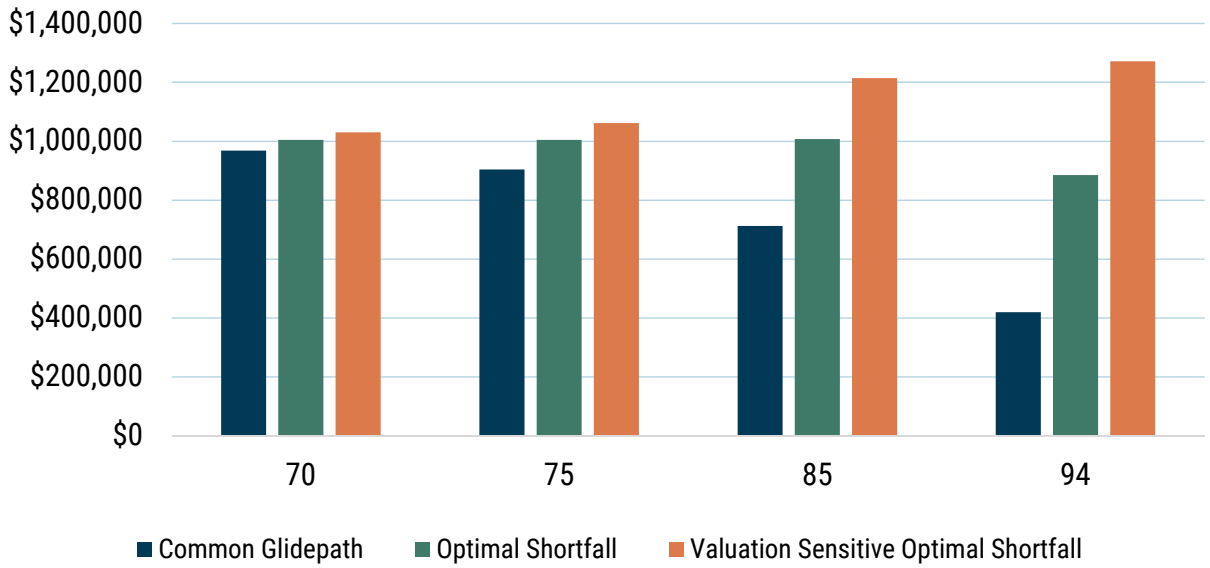

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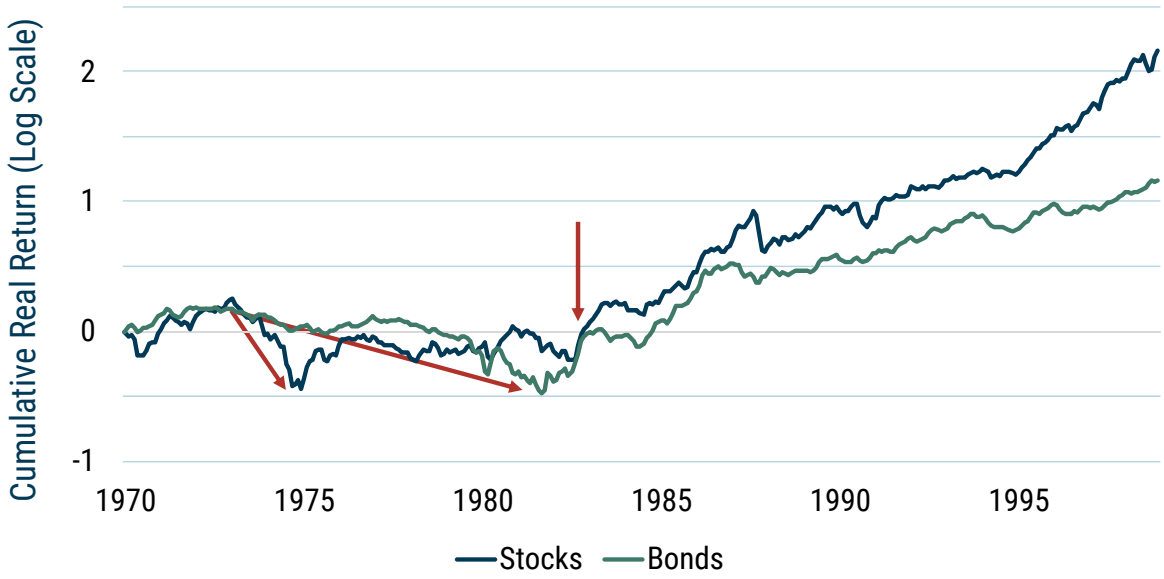
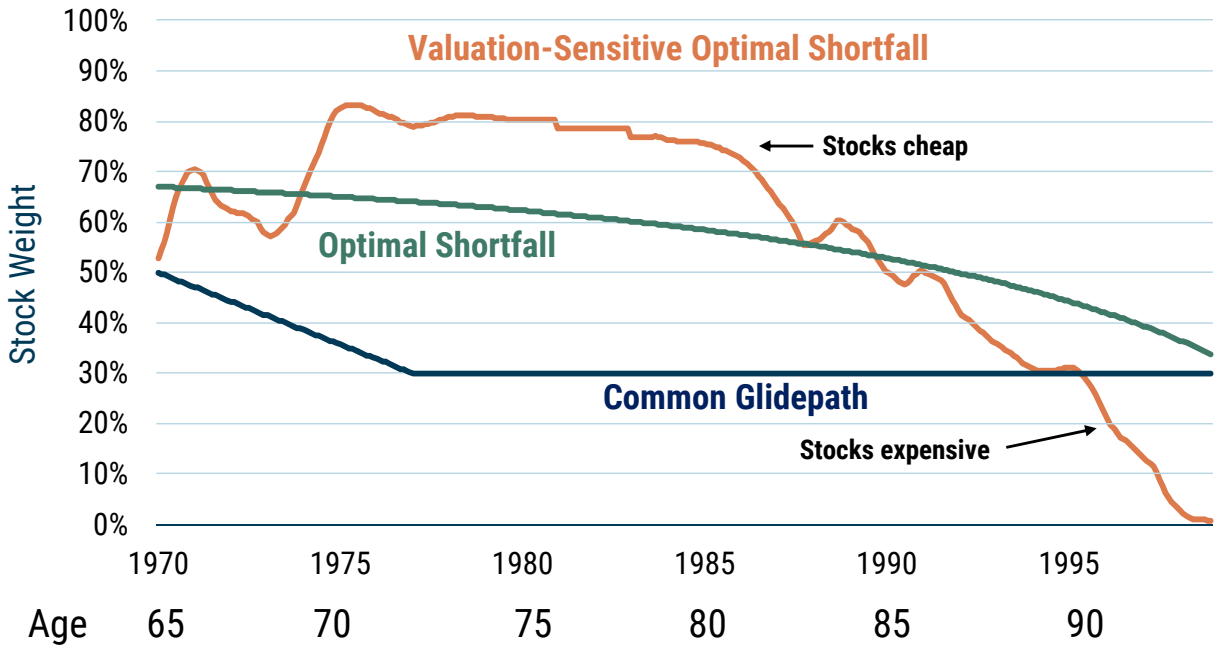
TWO CASE STUDIES

RETIRING IN 1970

Not only bad hair and bad fashion…



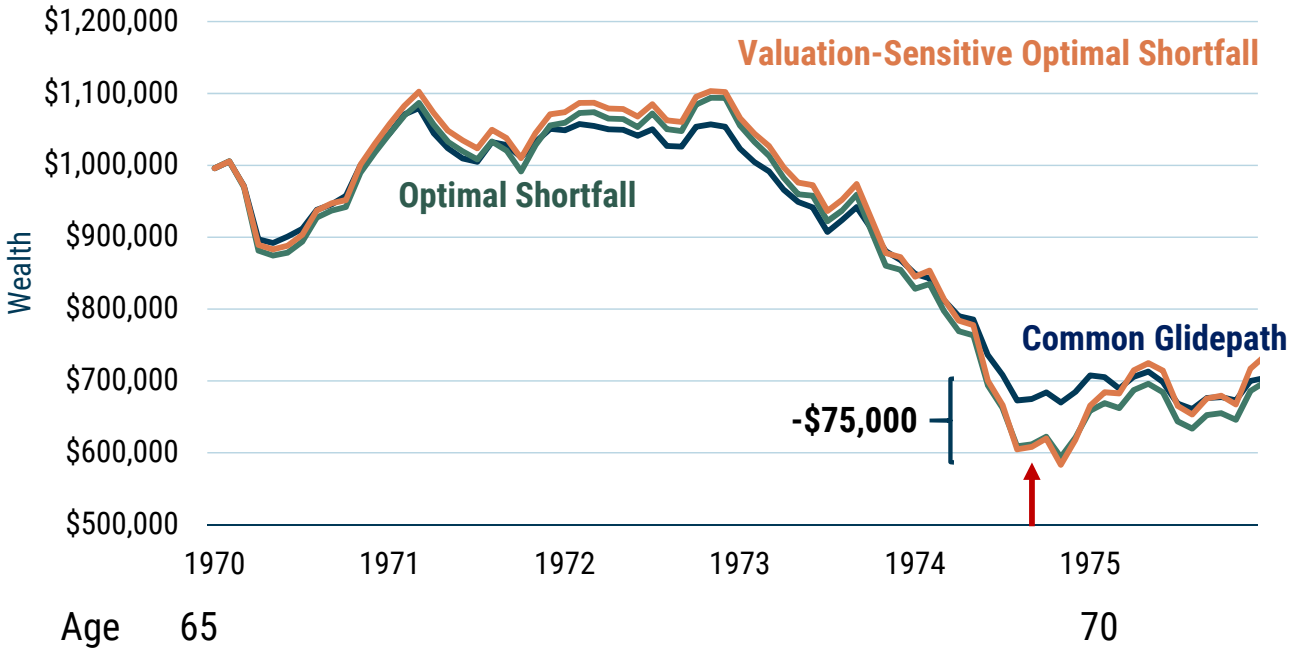
THREE HORSES



JF_JohnHancock_11-19

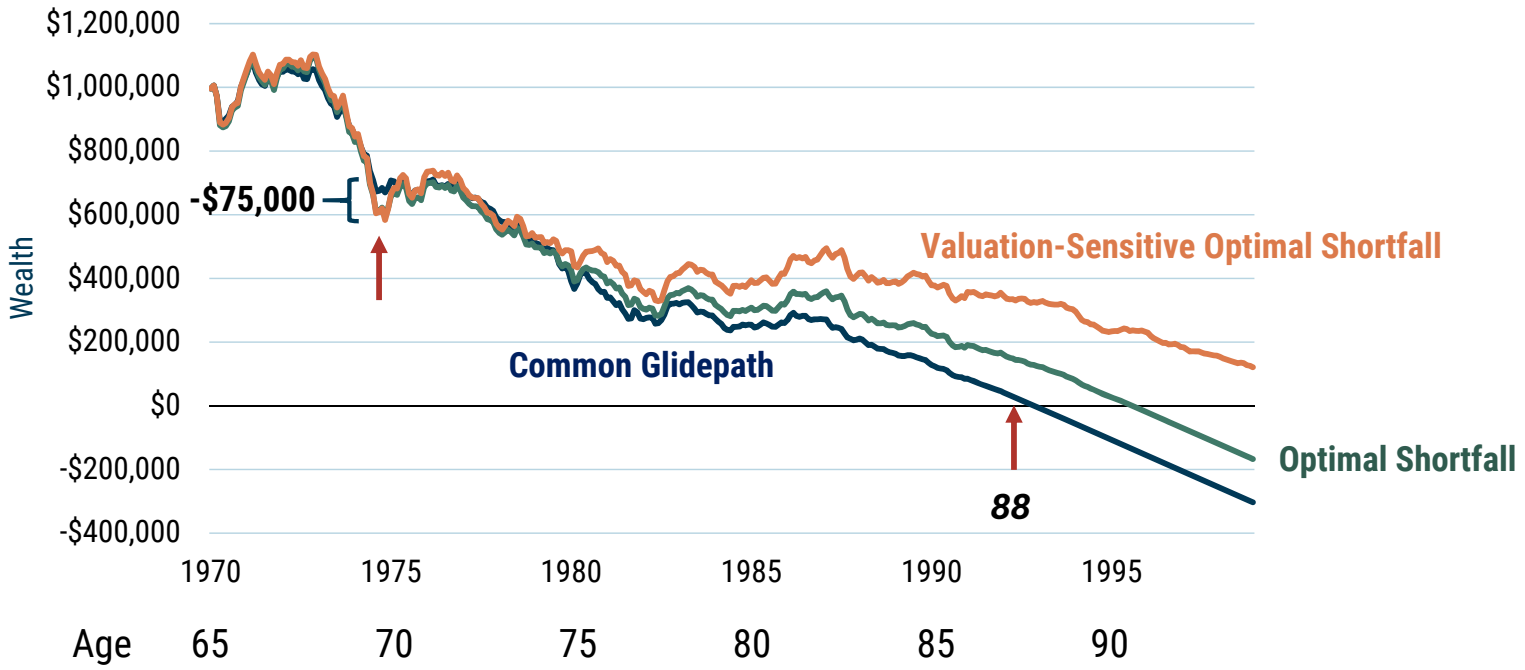
BEGINNING OF THE RACE

Spending = $50,000 per year (adjusted for inflation)

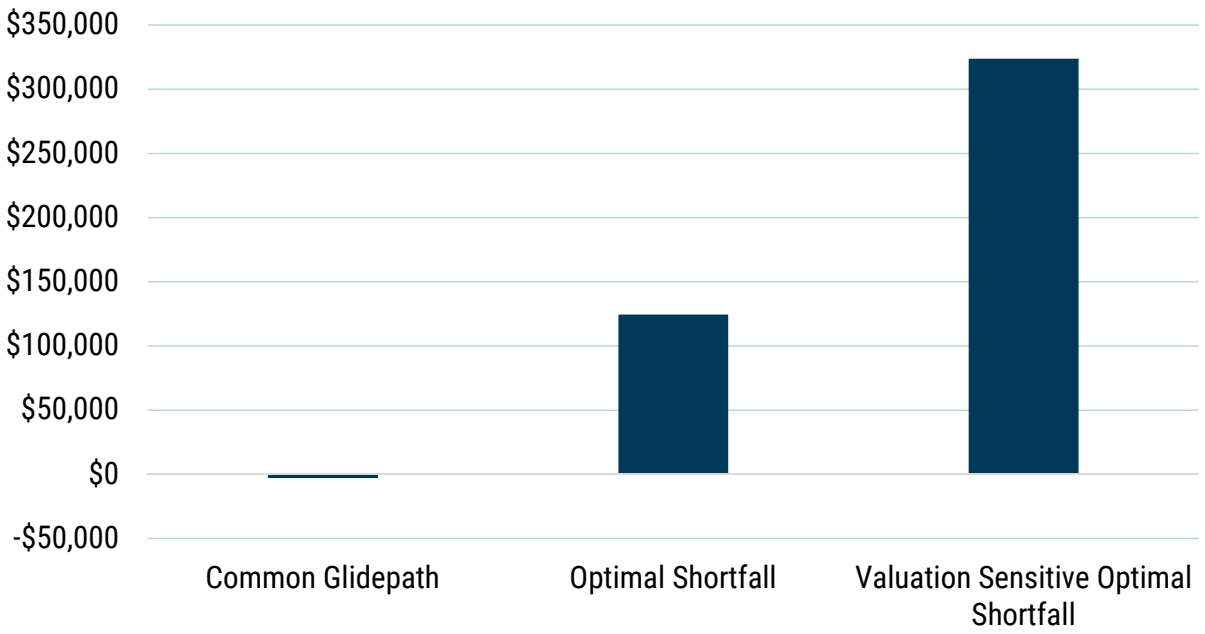


AND THE WINNER IS…

Spending = $50,000 per year (adjusted for inflation)

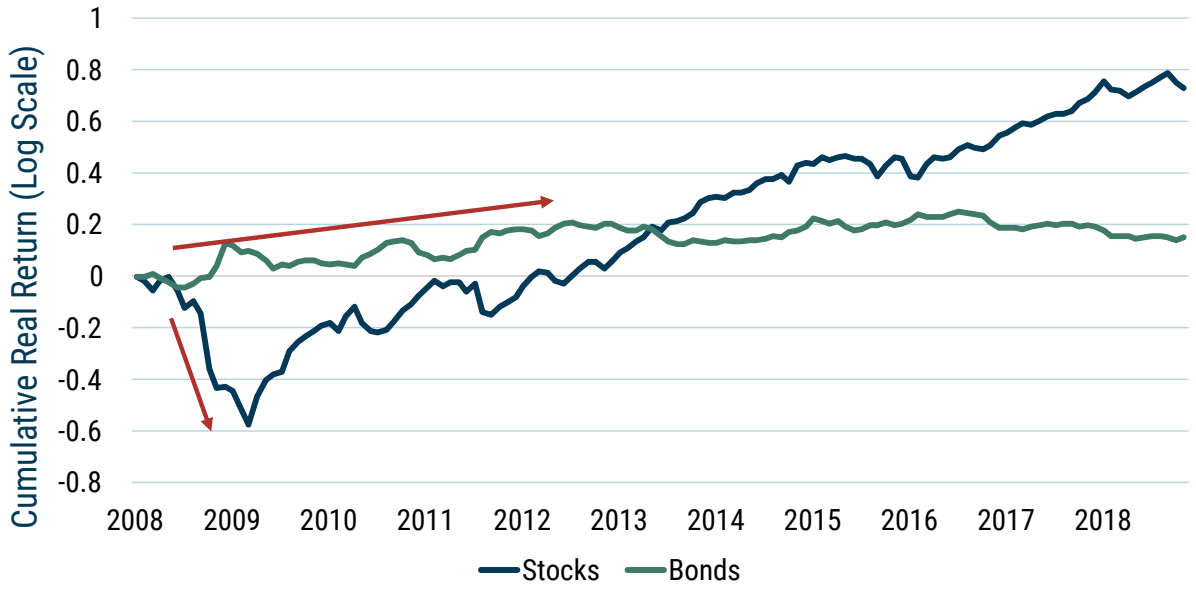


WEALTH AT AGE 88



RETIRING IN 2008

GFC



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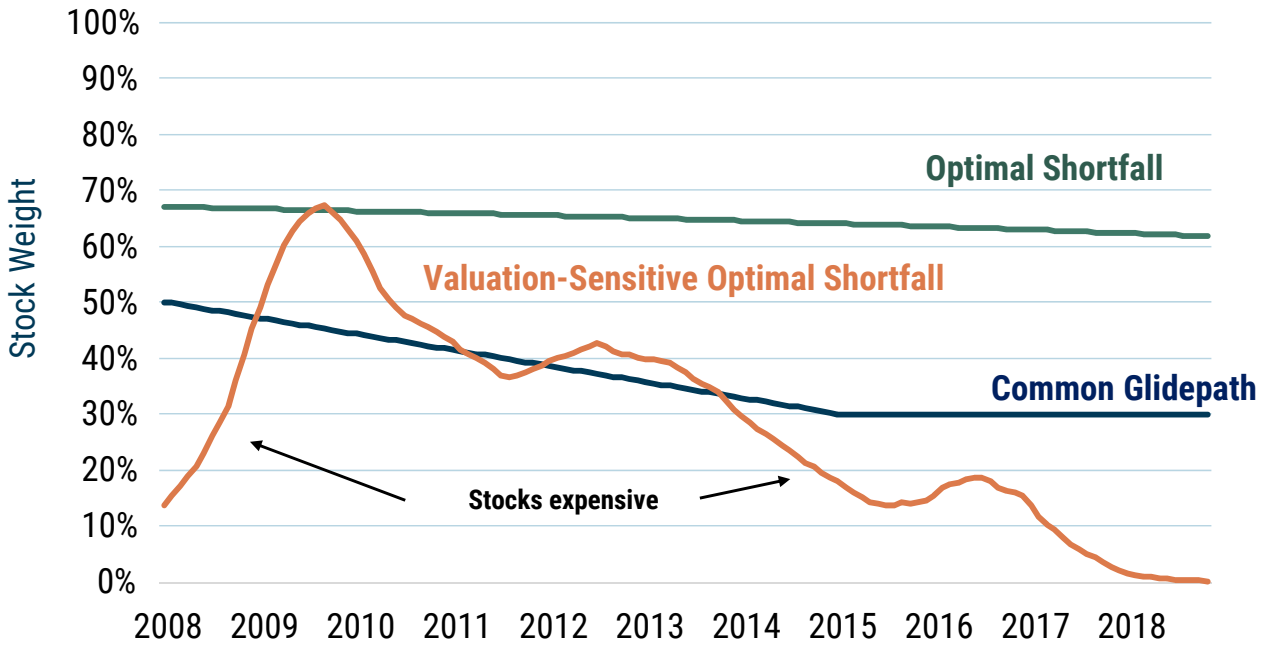

THE RACE SO FAR…

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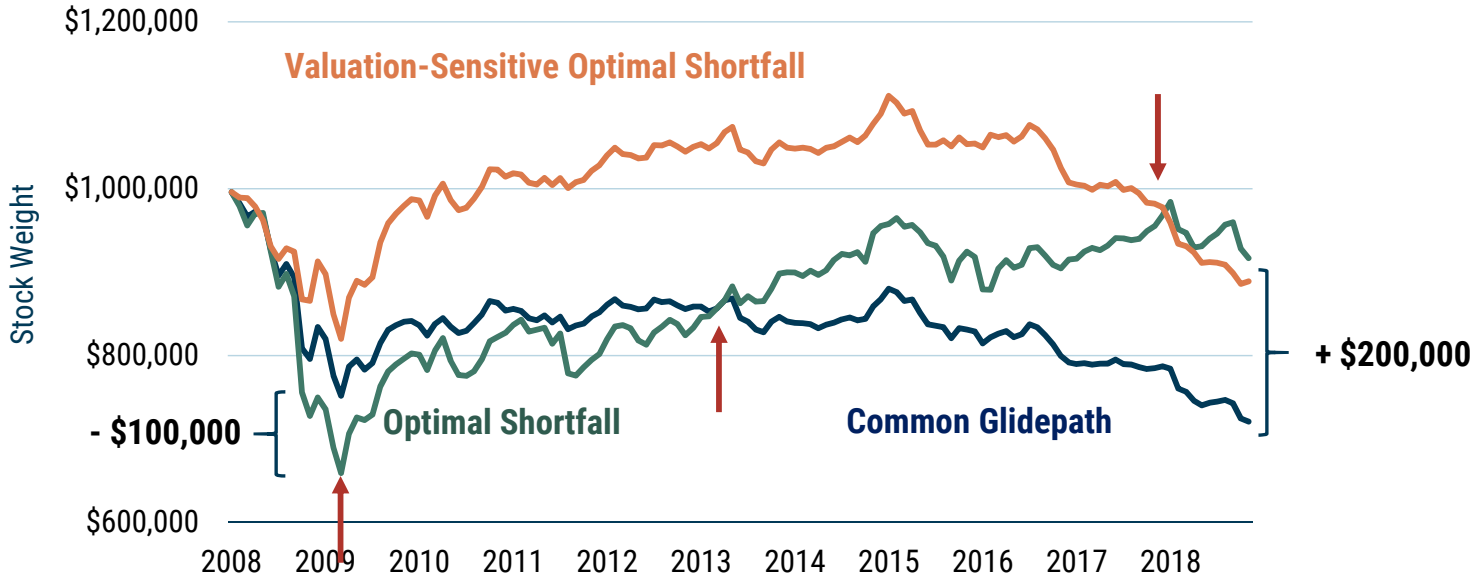

MAIN TAKEAWAYS

1. Sequence of returns “risk" is not a risk you can avoid or embrace.
   a. It's not an asset characteristic, e.g., if you have no cash flows, there is no sequence risk.
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2. To manage for better outcomes (in expectation):
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3. There is an essential tension between short-term safety and long-term compounding of wealth...more to come.

OUR FRAMEWORK

THE CONCEPT

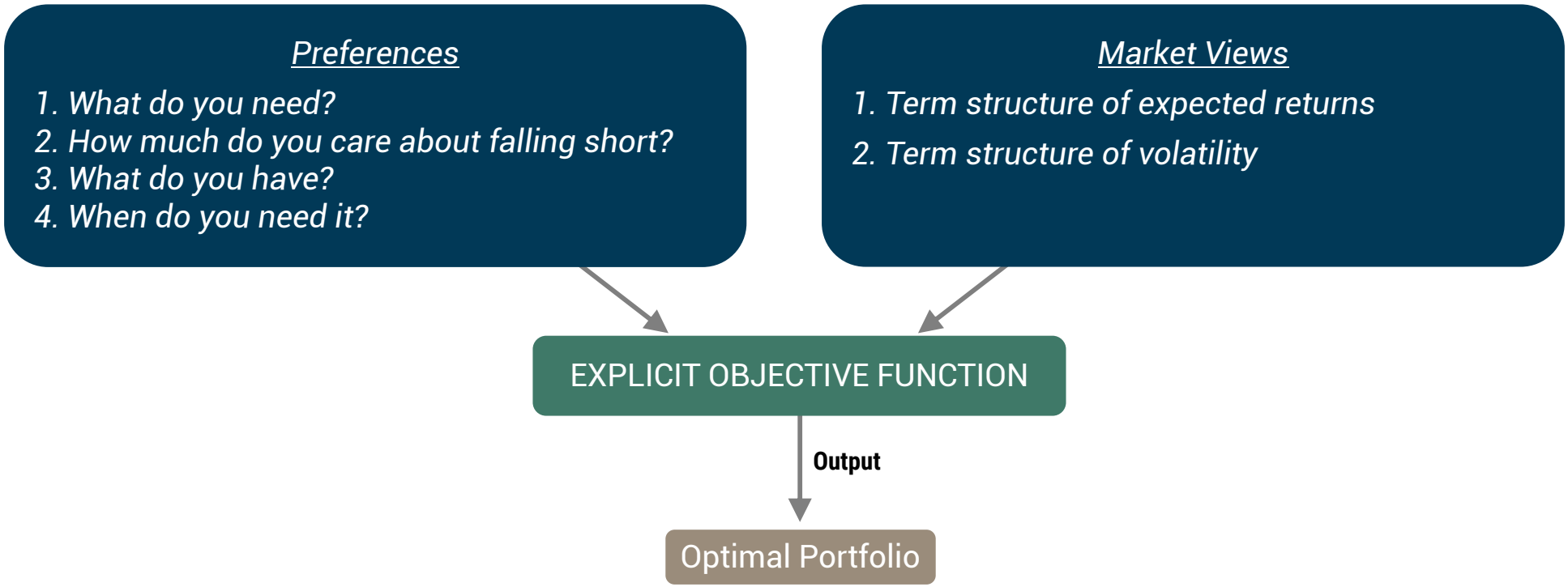
1. Frame the investment problem around a very simple question:

   "What do you need, and when do you need it?"

2. Falling short of what you need matters more than having more than you need.

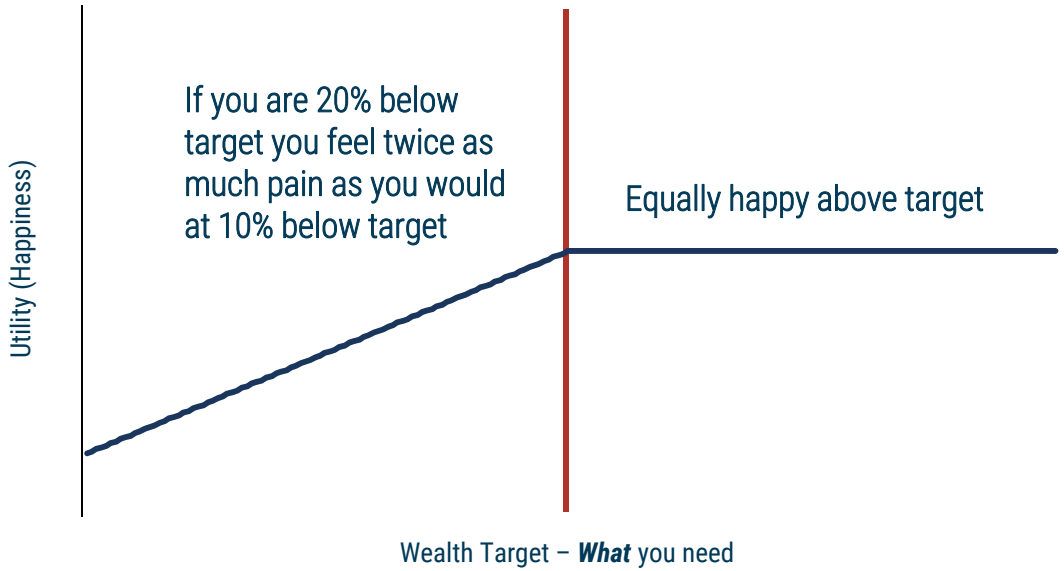
THE HEART OF THE FRAMEWORK

A revolutionary new objective function



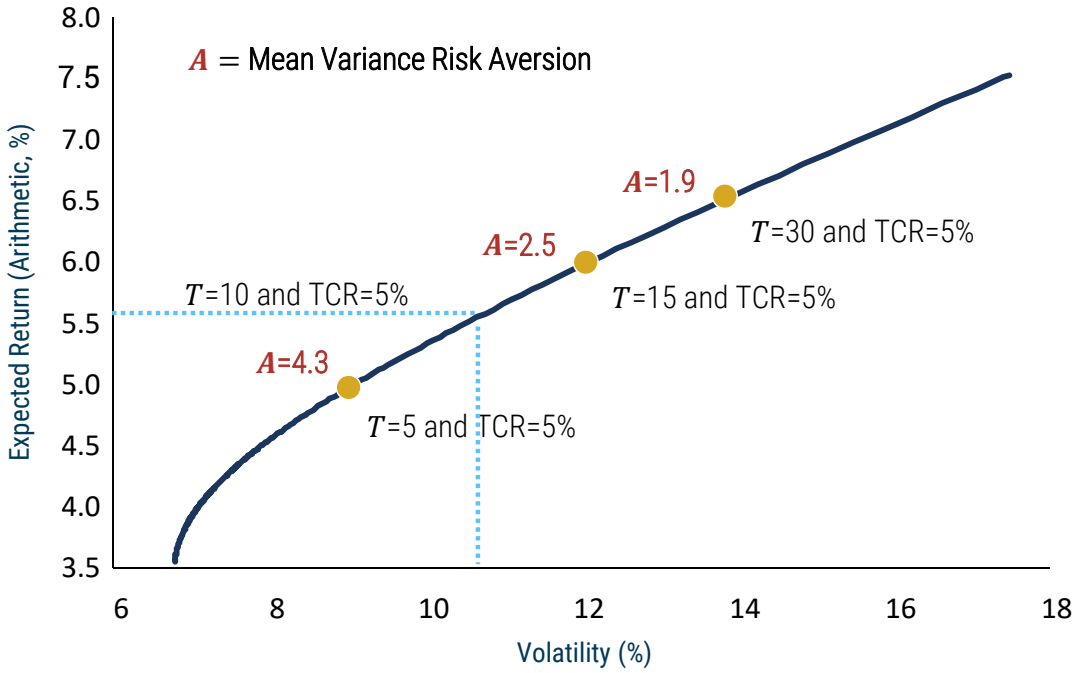
PURE SHORTFALL

What do you need? How much do you care about shortfall vs surplus (asymmetric preferences)?



THE EFFICIENT FRONTIER REVISITED

Horizon and TCR define the appropriate location on the frontier



Efficient frontier generated by a stock-bond portfolio. Expected real returns on stocks and bonds are 6% and 2.5%, and volatilities are 17.5% and 7.8%, with zero correlation. Expected returns are not mean reverting.

WHERE ARE WE GOING?

MAIN TAKEAWAYS

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3. There is an essential tension between short-term safety and long-term compounding of wealth.

We have built a tool (early stage!) to help you understand the tradeoffs, among other things…

OUR PLATFORM

Customized to the advisor and the asset owner

Revolutionary
Portfolio
Construction

World Class
Asset
Allocation

Better Outcomes

(In Expectation)

WHAT IS UNIQUE?

Main Concepts

- Risk: not having what you need when you need it – horizon matters!
- Asymmetric preferences: having less than you need matters more than having more than you need

Engine

- New objective function that embodies the main concepts
- Needs Based Optimization vs Mean Variance Optimization

Benefits

- Better outcomes (in expectation) – outcomes vs volatility
- Intuitive, easy to understand
- Customizable to the advisory firm and the asset owner

PLATFORM

Better outcomes (in expectation)

Advisor facing tool

- Customize glidepath at the level of the individual
- Glidepath is the benchmark for active management
- Illustrate trade-offs between desire for short-term certainty/ drawdown and long-term wealth and consumption

CIO/PM facing tool

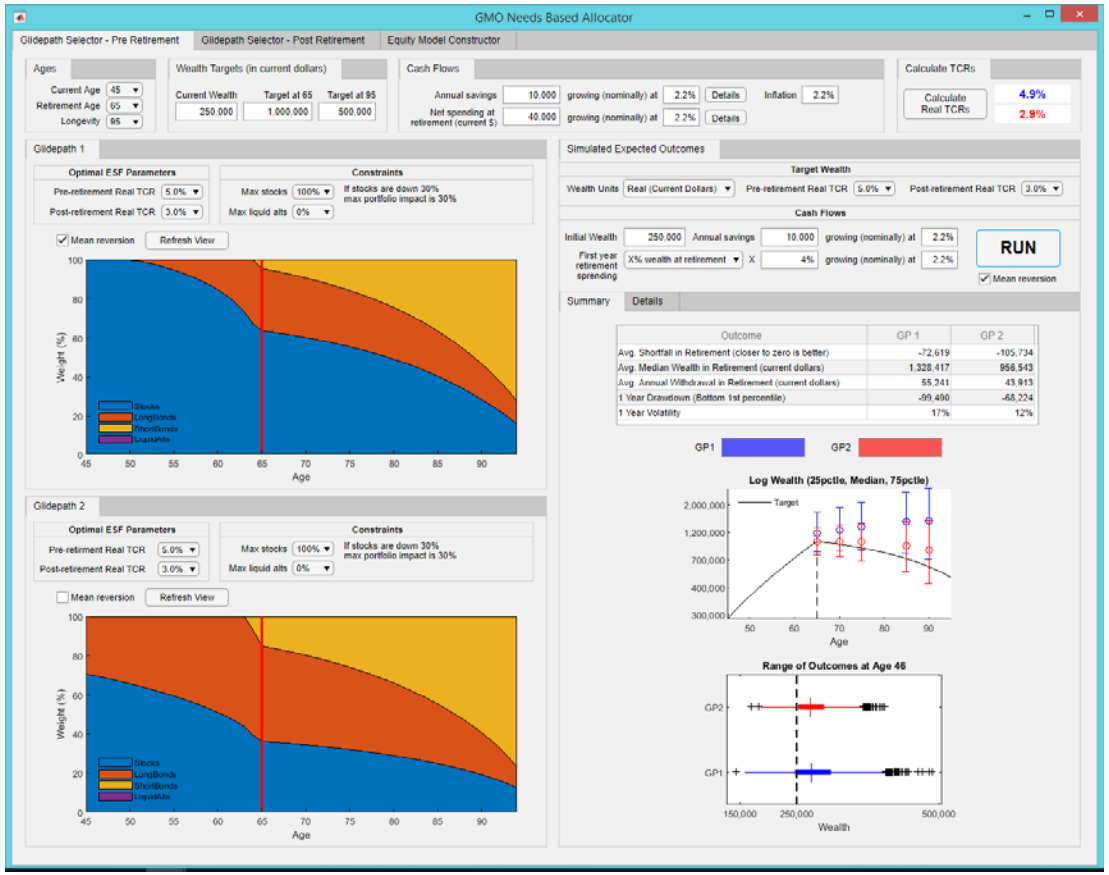
- Create customized, private model portfolios
- Open architecture
- Enhanced-CIO vs Outsourced-CIO

Embeds sophisticated models that capture key elements of return, risk, and ***horizon***

- Optimization
- Monte Carlo

DEMO – GLIDEPATH SELECTOR

Glidepath choices



Asset owner needs and circumstances

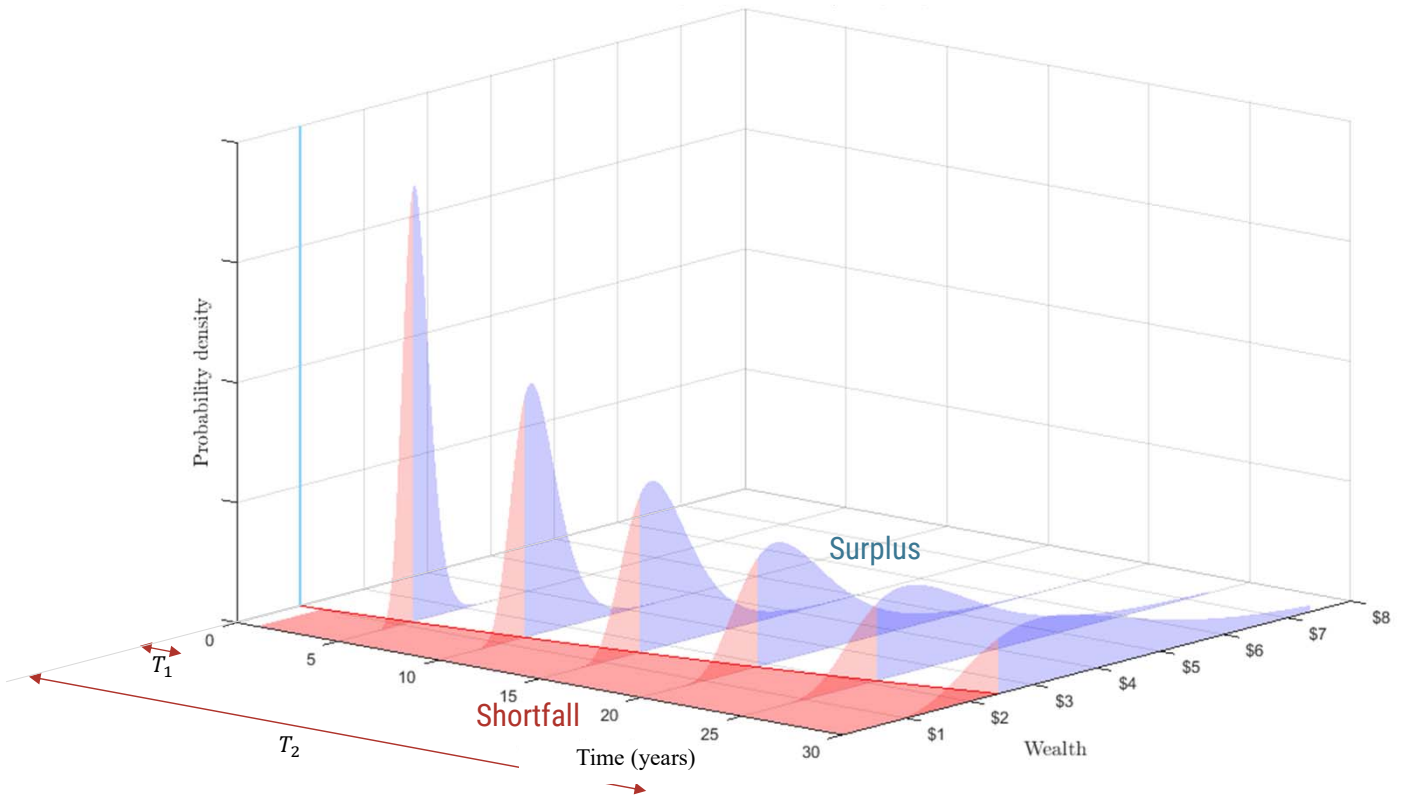
Monte Carlo simulations

JF_JohnHancock_11-19

APPENDIX

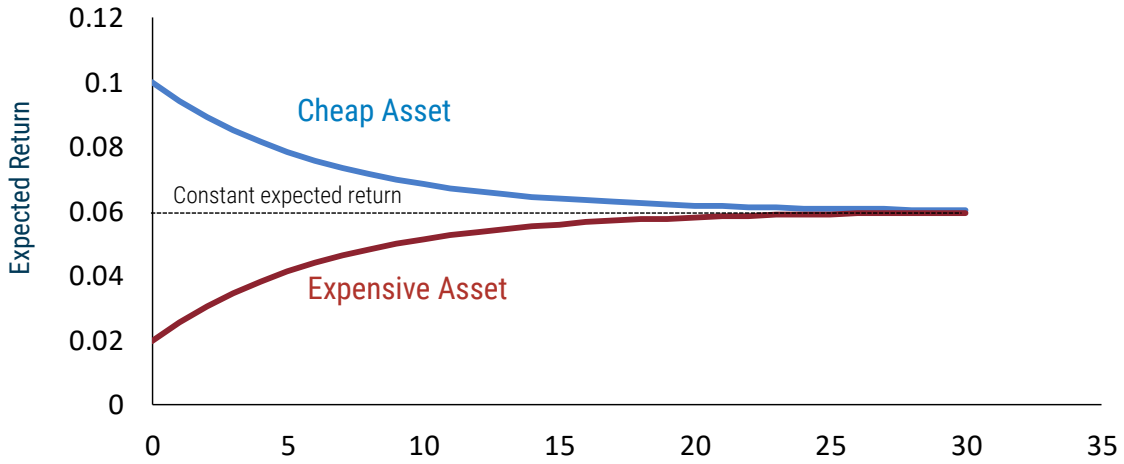
WHEN DO YOU NEED IT?

What is your total horizon? When do you start caring about shortfall?



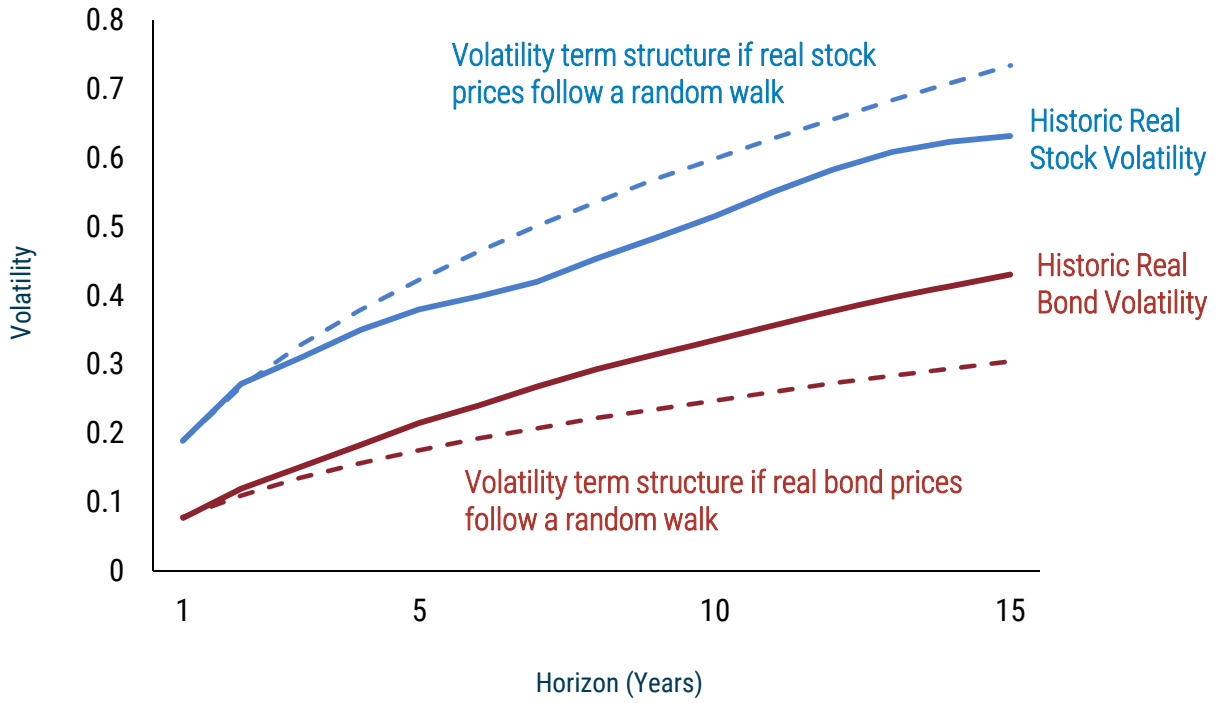
EXPECTED RETURNS

- Constant expected returns means flat term structures.
- Time varying expected returns means term structures have shape.



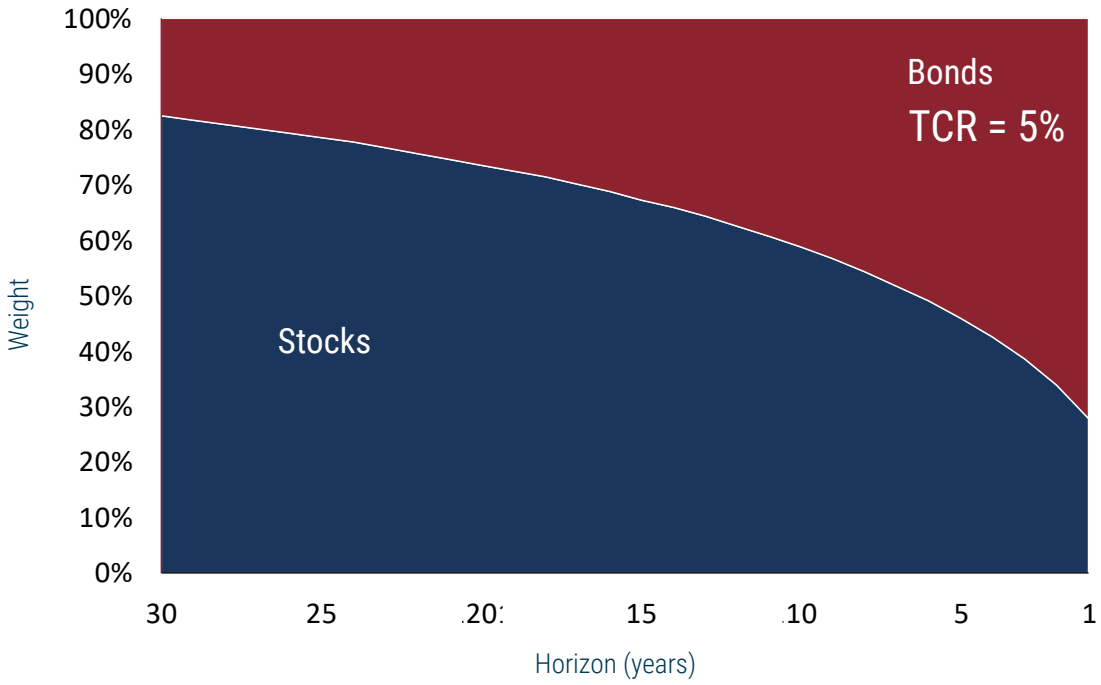
VOLATILITY

Bonds become relatively more "risky" as horizon increases...because of inflation



STOCKS BECOME MORE ATTRACTIVE AS HORIZON INCREASES

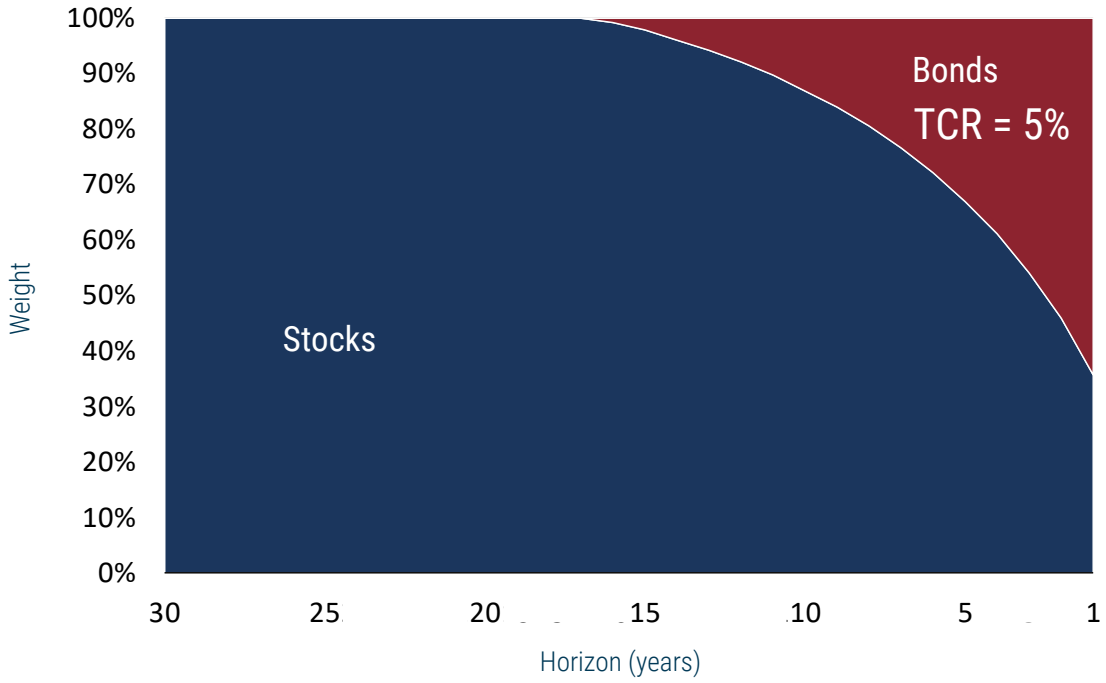
Even if expected returns are constant! And there's no human capital.



Expected real returns on stocks and bonds are 6% and 2.5%, and volatilities are 17.5% and 7.8%, with zero correlation. Expected returns are not mean reverting.

ASSET WEIGHTS WITH MEAN REVERTING EXPECTED RETURNS

Incorporating mean reversion increases attractiveness of stocks



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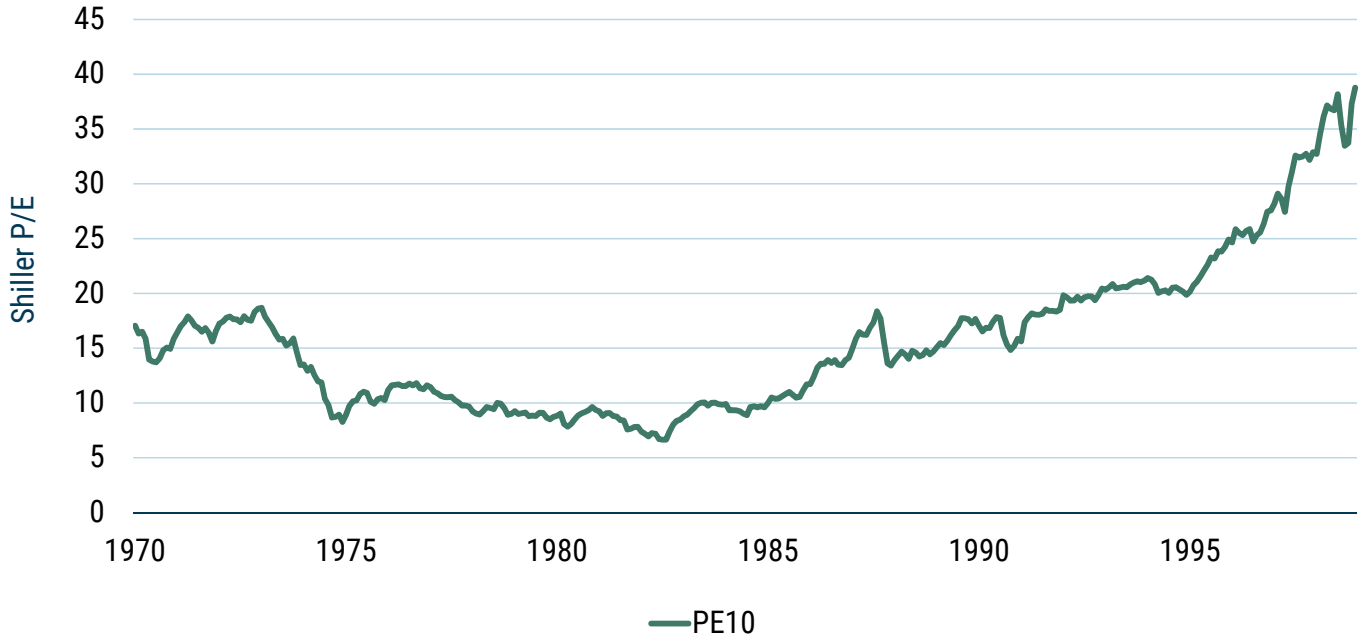
STOCK VALUATION



STOCK VALUATION