

MAXIFI®

Using Economics-Based Planning to Optimize Client Portfolio Choices



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AGENDA

1. Consumption smoothing & financial economics
2. Illustrating living standard (LS) risk
3. Illustrate how diversification limits LS risk
4. Illustrate how cautious spending limits LS risk
5. Basing portfolio/spending on expected utility
6. Case study

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Economics' Life Cycle Theory is a Century Old

- All modern finance is based on the life-cycle theory
- Theory's key prediction -- consumption smoothing
- Consumption smoothing's goal -- a stable living standard
- A stable living standard over time and times, good & bad

The Life Cycle Model's Impact on History of Financial Thought

Multiple Nobel Prizes in Finance Based in Part/Full on Life Cycle Model

- Franco Modigliani used the life cycle model to explain national saving and growth. He won the Nobel Prize in Economics
- Bill Sharpe, Harry Markowitz, and James Tobin used the Life Cycle Model to develop or extend the Capital Asset Pricing Model. Each won the Nobel Prize in Economics.
- Menachem Yaari used Life Cycle Model to explain and integrate life insurance and annuity insurance. He should win the Nobel Prize.
- Robert Merton used the Life Cycle Model to write *Continuous Time Finance*. He won the Nobel Prize in Economics.
- Many other economists, including Milton Friedman, have received the Nobel Prize for work in whole or in part based on the Life Cycle Model

Consumption Smoothing

Consumption Smoothing Reflects Satiation

- Eating 1st cupcake feels better than eating 20th at same sitting
- Hence, consumption smoothing is rooted in physiology
- Economists call your satiation speed your degree of risk aversion
- With higher risk aversion, concern about good times is reduced
- With higher risk aversion, concern about bad times is heightened

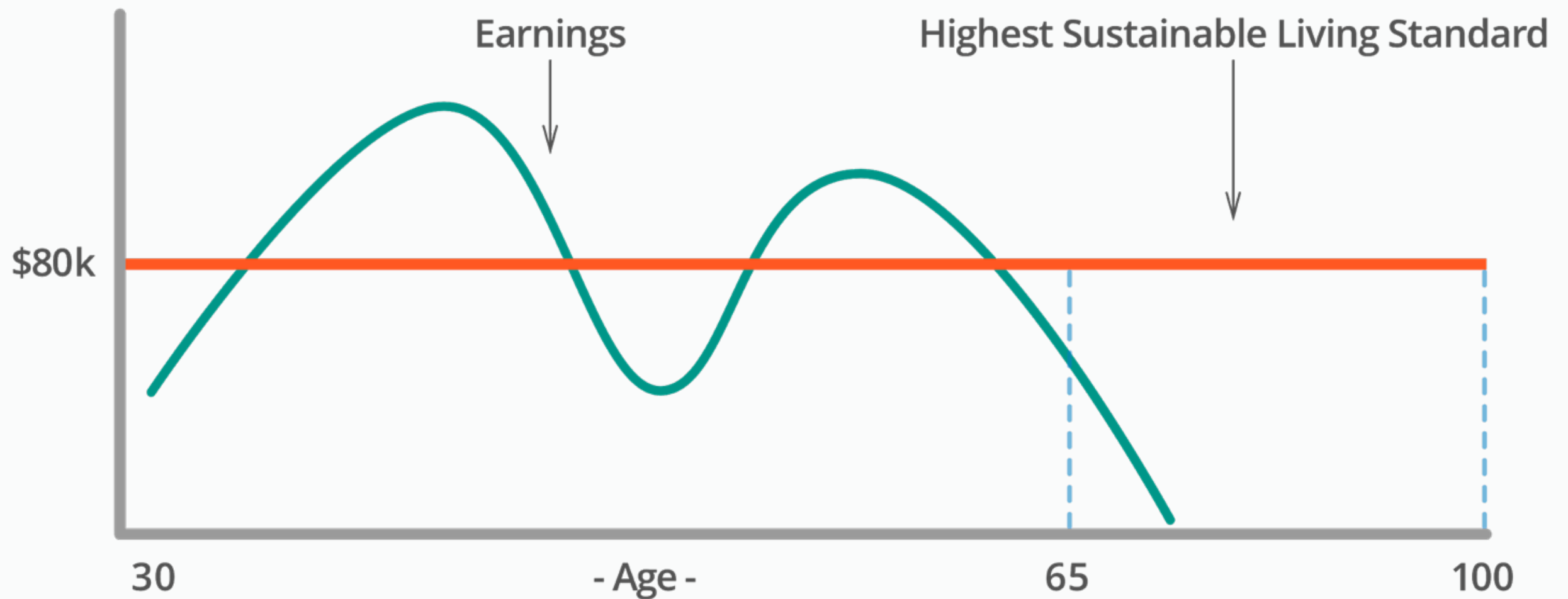
Consumption Smoothing is Why We Save, Insure, & Diversify

We Are All Risk Averse!

- No one wants to splurge today and starve tomorrow
- *Consumption smoothing is why we save for retirement*
- No one wants to splurge now and starve if our house burns
- *Consumption smoothing is why we buy homeowners insurance*
- No one wants to splurge if our stocks soar & starve if they crash
- *Consumption smoothing is why we diversify our investments*

Consumption Smoothing Over Time

Risk Aversion Leads Us to Maintain our Consumption as Income Fluctuates



Consumption Smoothing Over Bad and Good Times

Risk Aversion/Satiation Leads Us to Use Insurance and Diversification to Move Resources from Good to Bad Times

Good Times

We are healthy
We have income
We have a house
Our stocks boom
...

Bad Times

We are sick
We are poor
Our house burns
Our stocks crash
...

Consumption References Your Living Standard

Living standard - discretionary spending per household member

- Discretionary spending -- everything apart from fixed expenses
- Fixed expenses include taxes, housing expenses, alimony, ...
- MaxiFi adjusts living standard for economies in shared living
- MaxiFi adjusts living standard for relative cost of children

What Is Living Standard Risk?

Living Standard Risk References

the Variability of Your Living Standard

Risky Investing

The Riskier your Portfolio, the Larger your Living-standard Risk

Earn high returns this year, you'll naturally raise your living standard

Earn low returns this year, you'll naturally lower your living standard

Larger living standard up/down swings means higher living standard risk

Portfolio Choice Can Reduce Living Standard Risk

Diversifying your Portfolio can Reduce your Living Standard Risk

Holding just stock entails high living standard risk

Holding just short-term bonds entails low living standard risk

Diversifying your portfolio means holding some of both

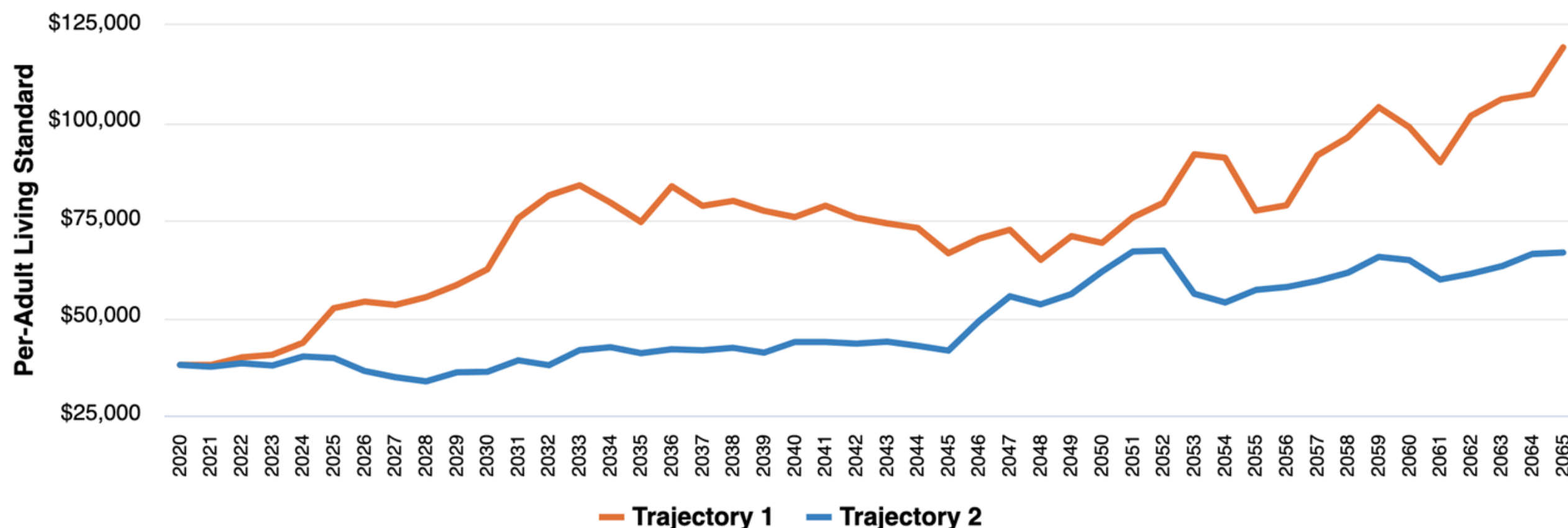
Holding some of both means smaller swings in living standard

Visualizing Living Standard Risk

Understanding Your Living Standard Risk Requires Actually Seeing Where Your Living Standard May End Up

- This requires generating living standard trajectories
- Each trajectory shows one path your annual living standard may take
- Annual returns determine annual ups/downs in your living standard
- Conventional planning: no spending adjustment to realized returns

Illustrating Two Monte Carlo Living Standard Trajectories



Sequence of return risk.

Doing well on average doesn't mean doing well every year.

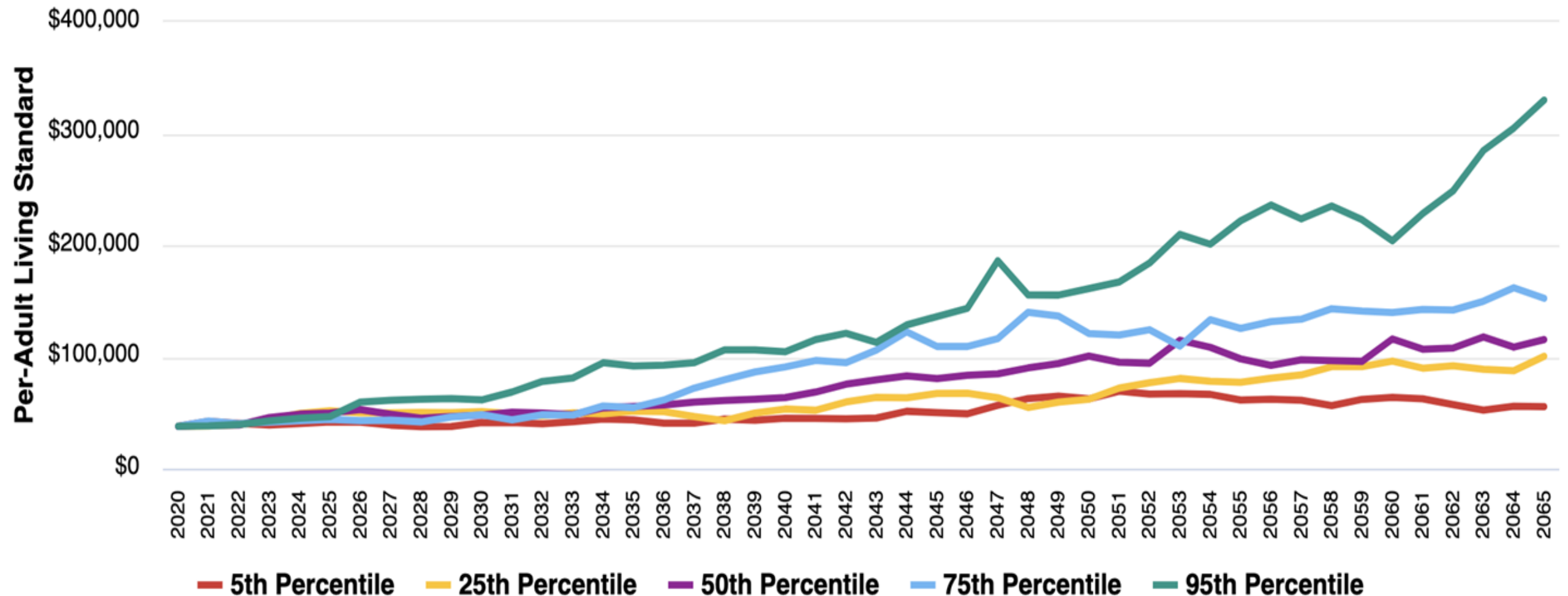
Case Study

Meet Martha, age 54, and Sam, age 55, who live in MA

- Martha earns \$200,000 per year, Sam \$50,000.
- Both will retire at 62.
- They have \$1 million in retirement accounts
- They have \$400 in regular assets
- They have a \$1 mil house with a \$.5 mil mortgage
- They want to compare three investment strategies
- 50-50, 20-80, and 80-20 stock-bonds
- They call these their base, safe, and risk strategies

Mary and Sam's Base 50-50, Strategy

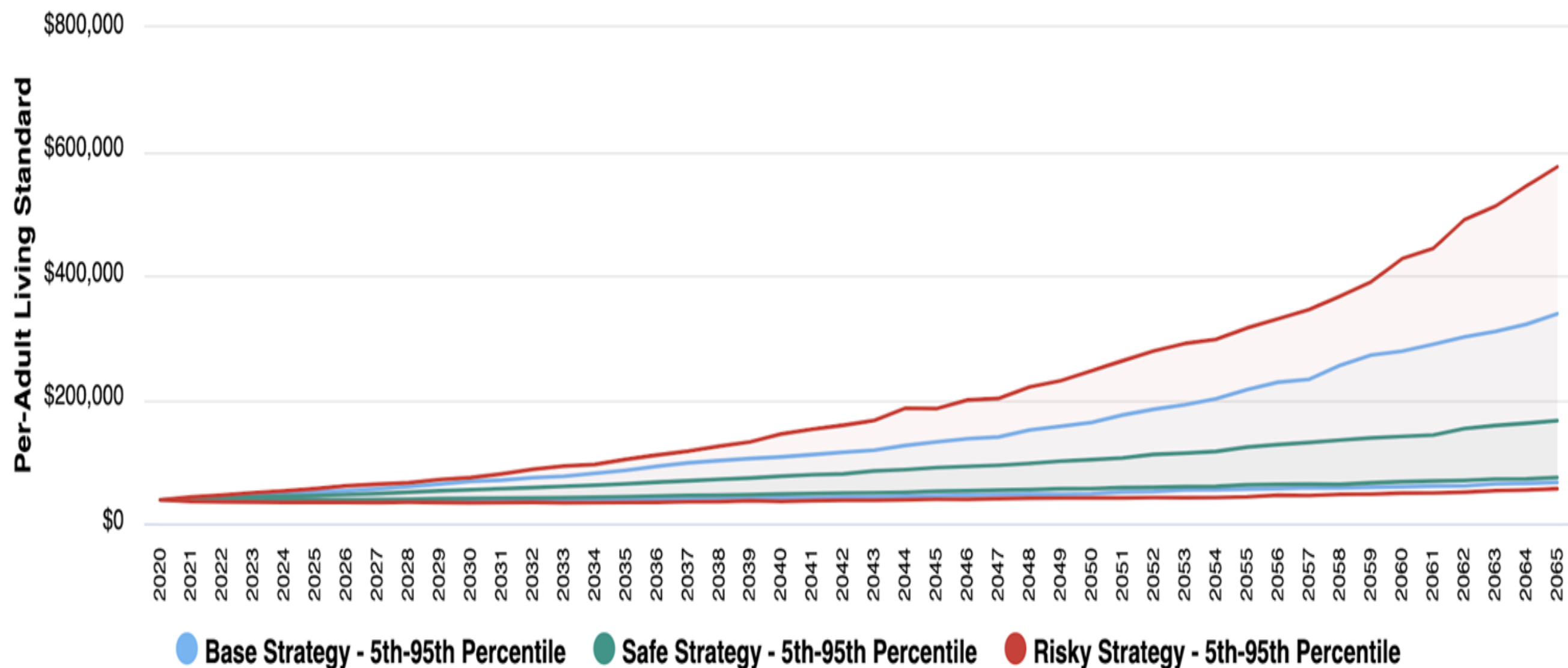
Percentile Trajectory Values



MaxiFi runs 500 trajectories for the Base Strategy. The green curve has the 95th highest living standard averaged over all future years. The red has the 5th highest average.

This chart gives Mary and Sam a clear picture of their living standard risk and reward.

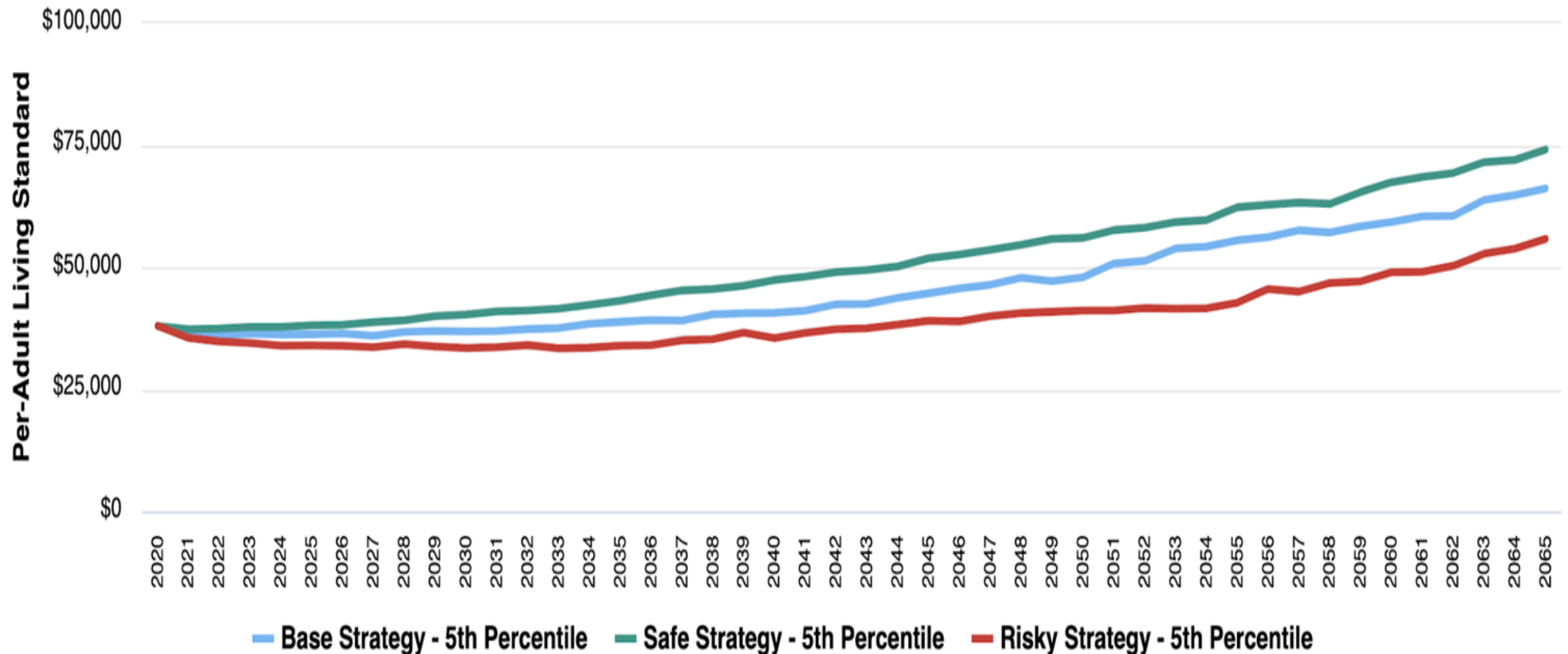
Comparing the Base, Safe, and Risky Investment Strategies



This chart shows the 5th and 95th highest trajectories for all three strategies. The risky strategy has more upside, but also more downside risk. The safe strategy has the smallest upside, but also the smallest downside risk.

Base, Safe, and Risky 5th Percentile Trajectories

Downside Analysis

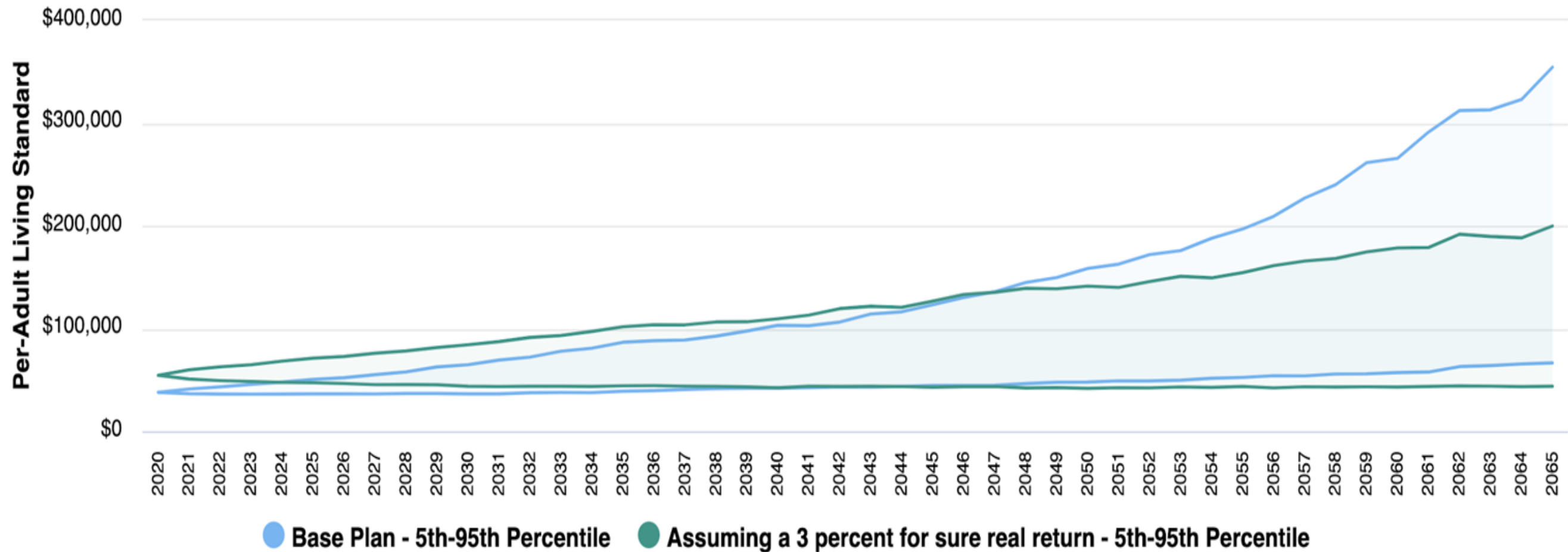


MaxiFi zooms in to compare the downside (5th percentile) of each strategy.

How Does MaxiFi's Make a Living Standard Trajectory?

1. *It calculates Mary and Sam's living standard this year assuming they will earn a specified real return for sure in the future.*
2. *It moves them to next year and takes random draw of returns on their portfolios. It calculates their living standard next year assuming they will earn the same specified real return for sure in the future.*
3. *It repeats the second step for all future years producing a full living standard trajectory.*
4. *It returns to the current year and repeats the first three steps to produce another trajectory.*
5. *It repeats step four 500 times.*

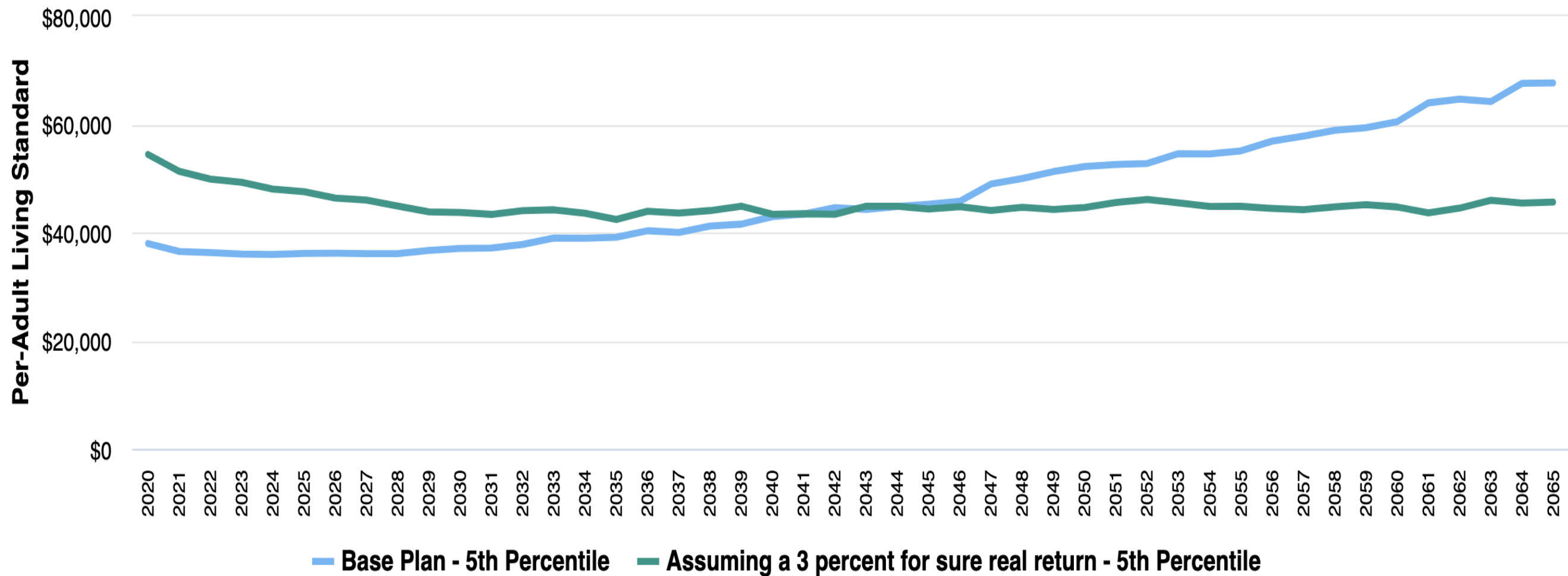
How Aggressively You Spend Along the Way Matters



If you spend as if you'll always earn a higher real return for sure, your living standard will start high, but have less upside and more downside.

Zooming in on Downside with Aggressive Spending

Downside Analysis



Spending more aggressively increases your downside risk later in life.

Lifetime Utility (Happiness) from Consumption

Life Cycle Model Captures Satiation Mathematically

- Happiness in year t is typically expressed as $U_t = C_t^{1-\gamma} / (1-\gamma)$
- Lifetime Happiness is sum of annual happinesses
- U_t stands for happiness (utility) at time t
- C_t stands for consumption at time t
- γ reflects satiation. The bigger is γ , the faster satiation sets in.
- Economists call γ the degree of risk aversion
- People that are very risk averse care much more about the downside (consuming less) than the upside (consuming more)

Using Expected Lifetime Utility to Rank Three Strategies

Index of Expected Lifetime Utility

	HOW MUCH RISK CAN YOU TOLERATE?				
	Almost None	Very Little	Moderate	Some	A Lot
Base Strategy	100	100	✓ 100	✓ 100	100
Safe Strategy	✓ 102	✓ 101	✓ 100	97	90
Risky Strategy	91	94	96	99	✓ 109

MaxiFi compares expected (average) lifetime utility (happiness) from each strategy.

Which is best depends on Mary and Sam's risk aversion. If they can tolerate very little risk, the safe strategy is 2 percent better than the Base strategy and the Risky strategy is 9 percent worse.

What does, for example, 9 percent worse mean? It means the risky strategy generates the same happiness, on average as holding 50-50, but consuming 9 percent less in all future years.

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The image features a laptop screen in the background, displaying a website with the MAXIFI logo and a line graph. The graph compares 'Base Plan Fixed Spending' and 'Maximized Plan Fixed Spending' over time. The MAXIFI logo is prominently displayed in white, bold, sans-serif font across the center of the screen. A registered trademark symbol (®) is located to the upper right of the logo.

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Thank you for participating!