

ZOOP ALPHA ADVISORS · INVESTOR EDUCATION

When the Rare Day Matters Most

A plain-English look at the market's worst days — and how we build portfolios ready for them.

“We plan for the bad days — not just the normal ones.”

— Ron Piccinini, Ph.D., risk scientist



Five ideas, zero jargon

- | | | |
|---|---------------------------------------|---|
| 1 | Why averages lie | The giant, the billionaire and Black Monday |
| 2 | Measuring the bad days | The cliff, the fall and the hole |
| 3 | Building a better mix | Testing 200,000 recipes |
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| 5 | The seatbelt and the gas pedal | Protection with room to grow |

Room 1: The tallest man ever walks in

3,000 American men averaging 68.9 inches.
Then the tallest man ever recorded — 8'11" — joins them.

$$(3,000 \times 68.9" + 107.1") \div 3,001$$

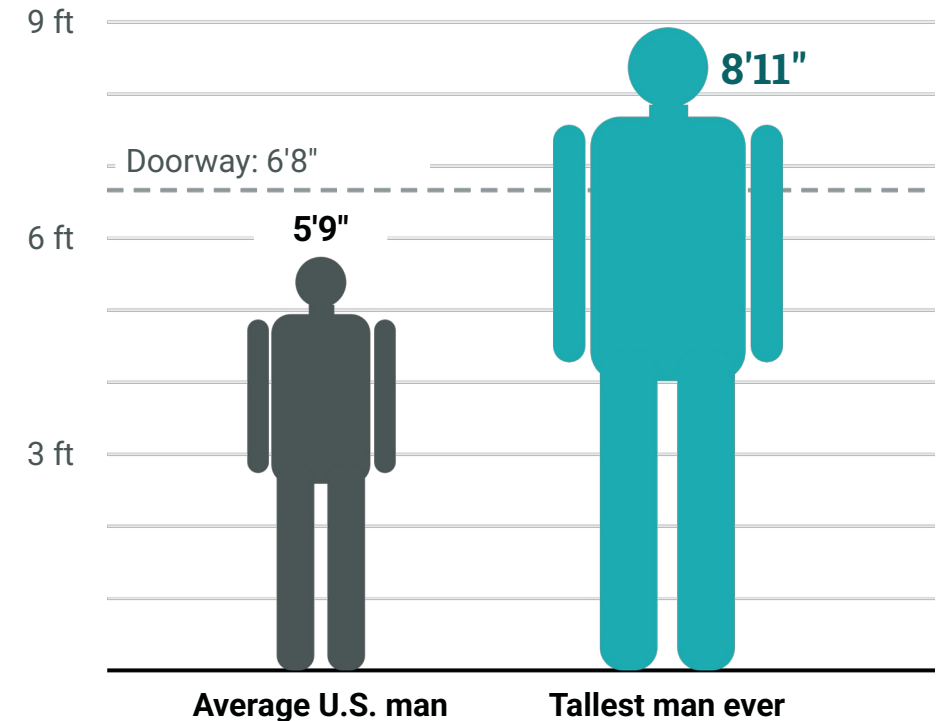
NEW AVERAGE

68.91"

Barely moved: +0.02%

THE POINT

Height has a ceiling. Even the most extreme person on record can't budge the average.



Sources: CDC/NCHS, men 20 and older (2021–2023); Guinness World Records. Figures drawn to scale.

Room 2: The richest man walks in

3,000 American families averaging \$1.24 million in net worth.
Then Elon Musk — worth about \$910 billion — joins them.

$$(3,000 \times \$1.24\text{M} + \$910\text{B}) \div 3,001$$

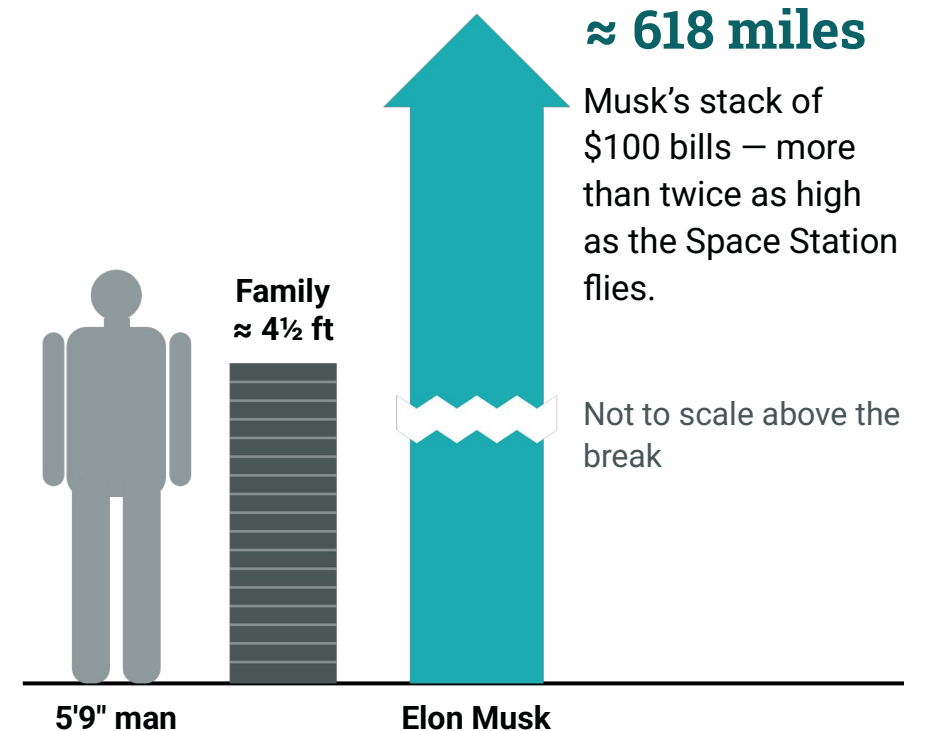
NEW AVERAGE

\$304,471,843

Jumped **+24,454%** — about 245 times higher

THE POINT

Wealth has no ceiling. The stock market behaves a lot more like this room.



Sources: Federal Reserve 2025 SCF (mean family net worth); Forbes Real-Time Billionaires, Oct. 23, 2026.

Thin tails vs. heavy tails

The “tails” are the far ends of the chart — the rarest, most extreme outcomes.

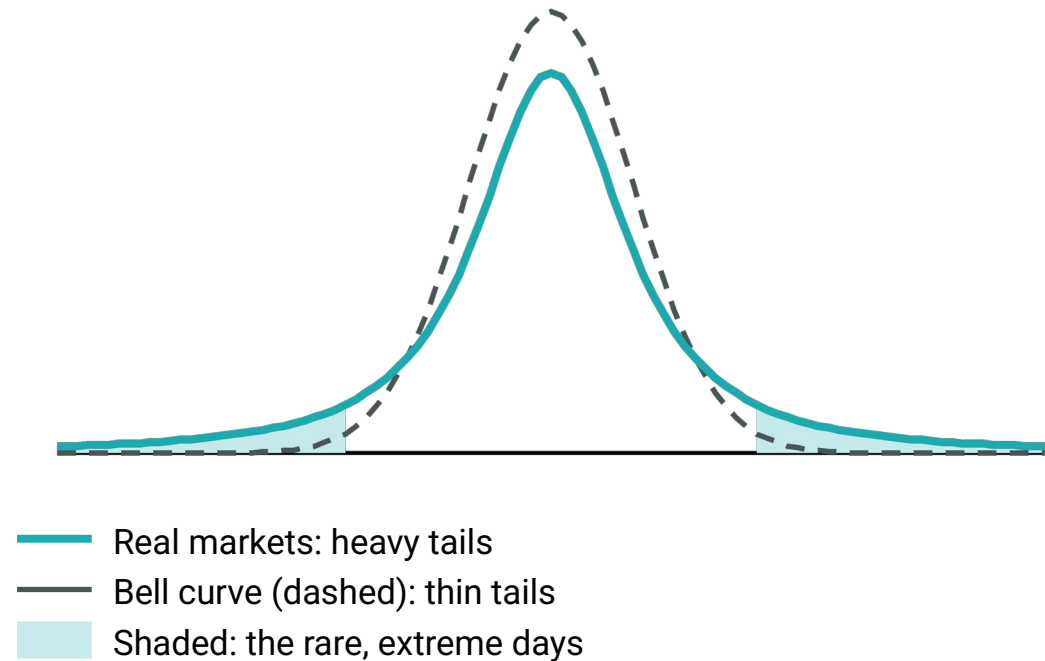
THIN-TAIL WORLD

Height, shoe size, test scores. Extremes are small and rare — one giant can’t change the class photo.

HEAVY-TAIL WORLD

Wealth, earthquakes, hit songs, stock markets. One extreme event can outweigh thousands of normal ones.

Investing lives here.



A handful of days decide the outcome

\$1,000 IN THE S&P 500

Every day included



GREW TO

\$6,853

PER YEAR

≈ 10.6%

Skip the worst 0.5% of days



\$33,229

≈ 20.1%

Miss the best 0.5% of days



\$1,603

≈ 2.5%

THE CATCH

About double the yearly return became nearly 5× the money — that's compounding. Nobody can pick those two dozen days in advance. We build portfolios to soften them.

Source: Straxen, LLC research (SPY daily returns, Jan. 2006–early 2025). Yearly rates are compound annual growth, calculated by Zoop Alpha. Hypothetical illustration.

From inconceivable to possible

BLACK MONDAY · OCT. 19, 1987

-22.6%

The Dow's drop in a single day.



THE SAME DAY, AT TODAY'S DOW

≈ 11,800

points gone in one day — with the Dow near 52,000.

**BELL CURVE
SAYS**

Once every 10 followed by 42 zeros, times a billion years. In other words: never.

**HEAVY TAIL
SAYS**

Once every **80 years** — about once in a lifetime.

Dow Jones Industrial Average: -22.6% on Oct. 19, 1987; ≈52,000 in late Oct. 2026. Probabilities: Straxen, LLC (S&P 500 one-day move on Black Monday).

The forecast that keeps getting surprised

Picture a weather app that calls a hurricane a once-in-a-million-years storm — and then you live through three. A lot of traditional risk tools run on that same bell-curve math.

Market event	Bell-curve math says it happens...	Heavy-tail math says...
Feb. 2018 — the Dow’s 3-day drop	Once every 4,409 years	Once every 1.4 years
2020 — COVID: a 30% drop in 22 days	Once every 34 million years	Once every 37 years
Oct. 19, 1987 — Black Monday’s one-day crash	Practically never – inconceivable	Once every 80 years

Source: Straxen, LLC research. Bell curve = Gaussian model; heavy tail = Straxen’s heavy-tail model.

WHY IT MATTERS

If the map is wrong, the “best route” can still lead you off a cliff.

Bell-curve models underestimate how often big drops happen, so portfolios tuned to them can carry far more risk than they appear to.

Dr. Ron Piccinini’s rule is simple: **“We plan for the bad days — not just the normal ones.”**

Two ways to measure a bad day

VALUE-AT-RISK (VaR)

The edge of the cliff

Tells you where the drop-off starts.

On 95 of every 100 days, SPY either gains or loses less than 1.82%.

Worst 1 day in 100: the drop *starts* at 3.62%.

EXPECTED TAIL LOSS (ETL)

How far the fall goes

Tells you how bad the bad days really are.

On the worst 5 of every 100 days, SPY's average loss is 3.04%.

Worst 1 day in 100: the *average* loss is 5.37%.

BOTTOM LINE

VaR shows where the cliff's edge is. ETL shows how far the fall goes — and that's the number we watch.

Pick a carnival game

Both give you the same 95-in-100 chance to win \$100. Which one would you rather play?

Game A

95 in 100 plays

Win \$100

5 in 100 plays

Lose \$90

Game B

95 in 100 plays

Win \$100

3 in 100 plays

Lose \$45

2 in 100 plays

Lose \$1,000

The fine print changes everything

What you measure	Game A	Game B
VaR: where the deep end starts	Lose \$90	Lose \$45 — looks safer
ETL: how deep it really goes	Lose \$90	Lose \$427 — almost 5× worse
Average result per play	+\$90.50	+\$73.65

Game B’s ETL = $(3\% \times \$45 + 2\% \times \$1,000) \div 5\% = \$427$

THE PITCH TO WATCH FOR

“Would you risk \$45 to make \$100?” leaves out the \$1,000. When anyone tells you the most you could lose, it’s fair to ask: **“And when it’s worse than that — how much worse?”**

The math of the hole

THE RULE

Lose 50%
need +100%

just to get back to even. Losses grow the hole faster than gains fill it.

MAJOR S&P 500 BEAR MARKETS

Years	Drop	Gain to get back	Time to get back
1987	-33.5%	+50%	≈ 2 years
2000–2002	-49.1%	+97%	≈ 7 years
2007–2009	-56.8%	+132%	≈ 5½ years
2020	-33.9%	+51%	≈ 6 months
2022	-25.4%	+34%	≈ 2 years

THREE COSTS

The money you lose, the stress you carry, and the years you spend digging out. Gains take the stairs up and the elevator back down.

S&P 500 price index, peak to low; time measured from the prior peak until it was regained. Gain to get back = $1 \div (1 - \text{drop}) - 1$.

Two steps, one goal

1 BUILD THE MIX · PART 3

Heavy-tail optimization

Test hundreds of thousands of mixes and keep the one with the most return for the tail risk you can live with. Re-checked every month.

2 ADD THE STORM WARNING · PART 4

A tactical overlay: TIX and QIX

A rules-based gauge watches fear across five markets. When it spikes, the mix shifts toward bonds and cash — and back into stocks when it clears.

THE DIFFERENCE

A traditional firm might say, “Let’s maximize return per unit of volatility.”

Dr. Ron Piccinini says, “**Let’s minimize catastrophic loss while keeping competitive return.**”

Every ingredient has its own bad days

Tail risk = the average loss on an investment's very worst days. Think of each one as a player with its own off-nights.



Source: Straxen, LLC research; daily data 2006–2023 (EODHD).

The team is safer than any one player

AVERAGE TAIL RISK OF THE SIX INGREDIENTS

-5.19%

What you'd expect if risk simply averaged out.

TAIL RISK OF AN EQUAL MIX (1/6 EACH)

-3.24%

Lower than every single ingredient except T-bills.

WHY IT WORKS

Their bad days don't all land on the same day — like a team where not every player has an off-night at once. Measuring that takes about a million computer simulations.

Same ingredients, different recipes

Ingredient	Mix 1	Mix 2	Mix 3	Mix 4
T-bills	16.7%	5%	12%	39%
Gold	16.7%	5%	9%	17%
U.S. stocks	16.7%	45%	48%	7%
Long-term Treasuries	16.7%	5%	17%	2%
International stocks	16.7%	20%	3%	15%
Commodities	16.7%	20%	11%	20%
Tail risk	3.24%	5.66%	4.00%	2.78%
Total return	26%	97%	107%	80%

WHAT JUMPS OUT

Mix 3 earned the most (107%) with less tail risk than Mix 2.

Mix 4 had the lowest tail risk (2.78%) — and still earned about three times Mix 1.

The recipe matters as much as the ingredients.

Hypothetical back-tested illustration, Straxen, LLC research; total return over the test period. Not actual results.

Now test 200,000 recipes

1952

The old playbook

Modern Portfolio Theory is born — built around the bell curve and the computers of its day.

1966

4 days

just to load 5 megabytes of data — on 62,500 punch cards.

TODAY

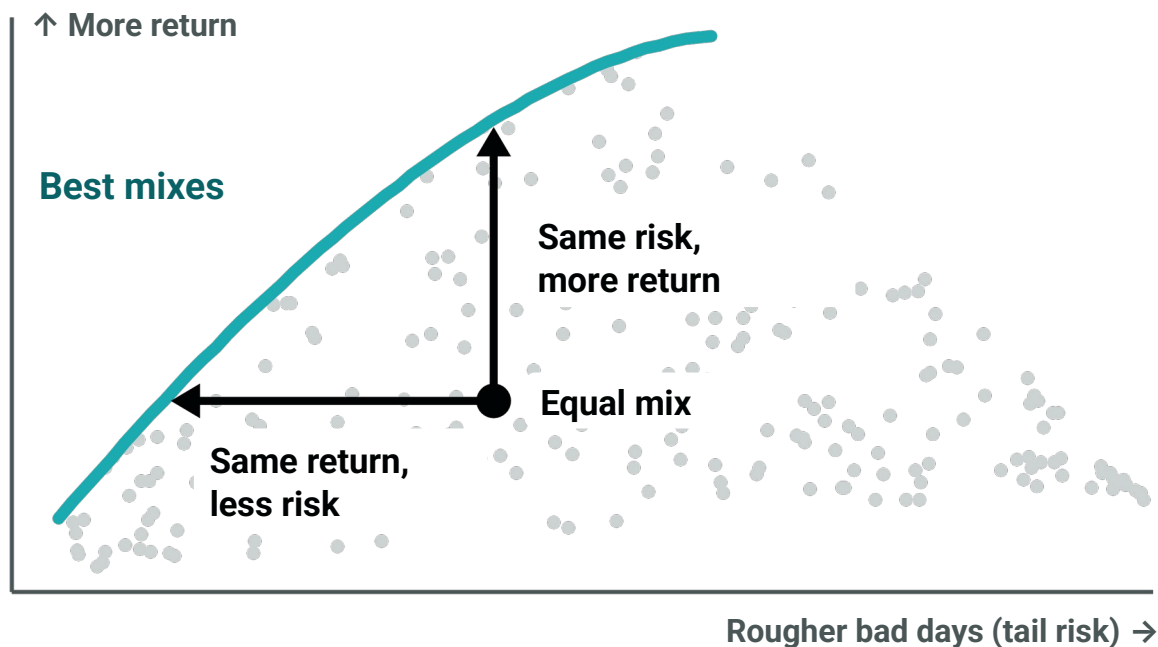
200,000

mixes, tested by 1,000s of computer processors — each scored for tail risk and return in seconds.

THINK OF IT
LIKE

A GPS that checks every possible route, then shows you the fastest ones with the fewest potholes.

The mountain of possibilities



Each dot is one recipe. Farther right = rougher bad days. Higher up = more return.

THE TEAL EDGE

The best mixes: the most return for each level of tail risk.

THE BLACK DOT

An equal mix of everything. Slide left for the same return with less risk — or up for more return with the same risk.

Like car shopping: for the same price, why not get more safety features?

Illustration based on Straxen, LLC research (portfolio map, Dec. 2024).

Pick your spot on the edge

Every spot sits on the teal edge — the most return the math found for that much tail risk.
Where you belong depends on you: your goals, your timeline, and how you'd feel on a bad day.

CONSERVATIVE

Smallest dips. Slow, steady growth.

MODERATE CONSERVATIVE

A bit more growth, still gentle dips.

BALANCED

The middle of the road.

MODERATE GROWTH

More growth, bigger swings.

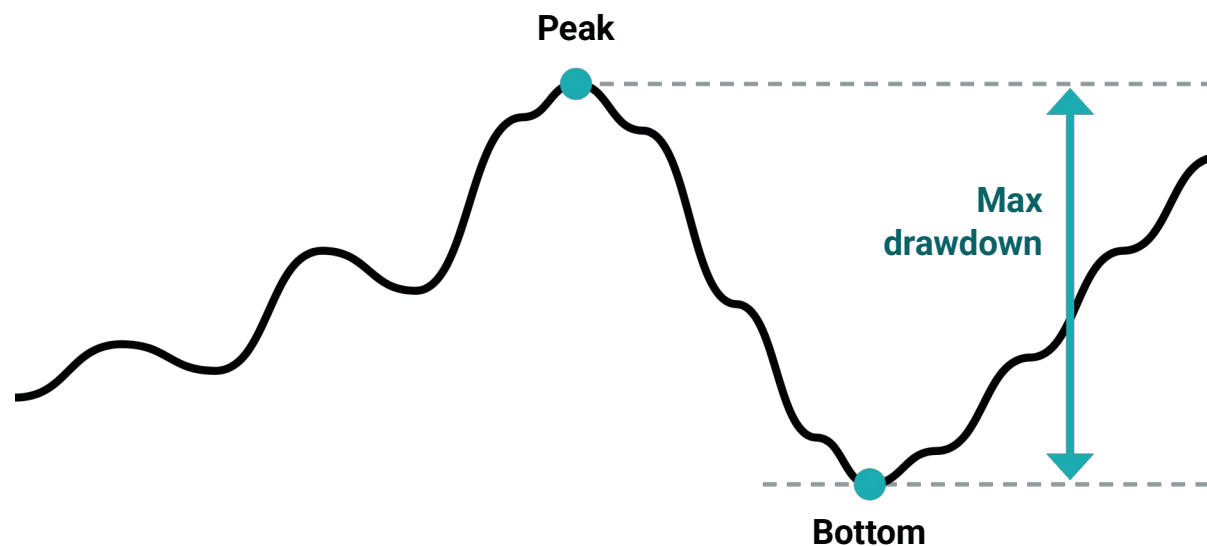
GROWTH

Most growth, deepest dips.

← Gentler bad days

Rougher bad days →

Bad days predict deep dips



MAX DRAWDOWN

The biggest drop from a peak to the bottom before it climbs back — the deepest plunge on the roller coaster.

WHAT THE RESEARCH FOUND

Across about two dozen funds, the ones with the worst bad days also had the deepest drops.

Measure the bad days, and you get a good read on how deep the next dip could go.

Source: Straxen, LLC research (tail risk vs. maximum drawdown across ETFs).

2022: The year the seesaw broke

Stocks and bonds usually act like a seesaw: when one drops, the other tends to hold up. In 2022, as the Fed raised rates at the fastest pace in decades, **both ends hit the ground.**

U.S. STOCKS (VTI)

-20.0%

NASDAQ-100 (QQQ)

-33.2%

INTERNATIONAL STOCKS
(EFA)

-14.9%

BONDS (AGG)

-12.2%

LONG-TERM TREASURIES
(TLT)

-29.6%

INFLATION-PROTECTED (TIP)

-11.8%

GOLD (GLD) · HELD UP

+0.8%

BITCOIN (BTC)

-65.0%

Source: Straxen, LLC research; 2022 calendar-year returns.

Insurance that never sleeps gets expensive

ALWAYS INSURED

Hurricane shutters up all year

In one study of 1996–2021, an S&P 500 portfolio that kept buying standard “put” insurance ended with roughly 40% less money than the same portfolio with none.

THE BETTER IDEA

Shutters up when a storm is coming

Skip paying for protection in calm weather. Watch for the warning signs, and get defensive only when they flash.

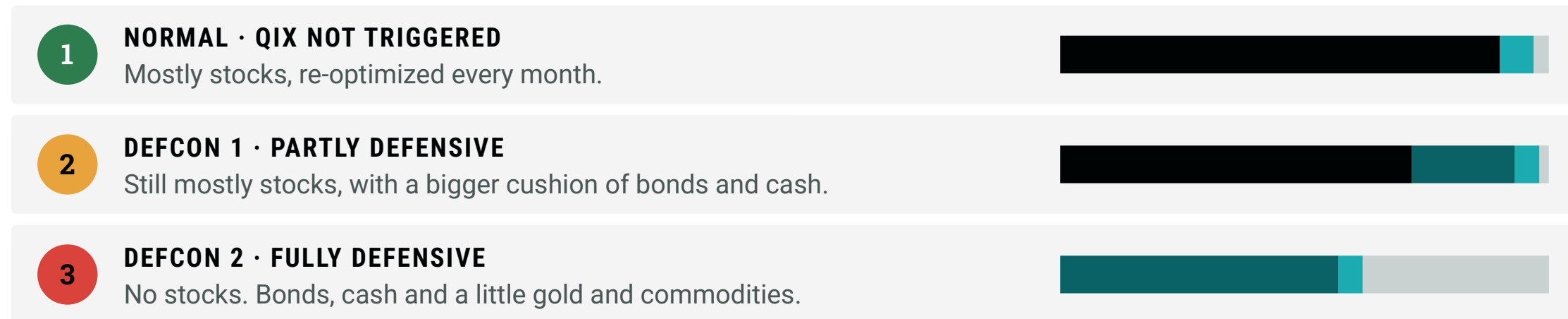
Source: Poh Ling Neo & Chyng Wen Tee, “Tail Risk Hedging: The Search for Cheap Options,” March 2023 (S&P 500, 1996–2021). Figure approximate.

The fear gauge: TIX and QIX

When traders get nervous, they pay more to insure their investments. **TIX** is Straxen's proprietary index of that "insurance price." **QIX** — the Q Implied Volatility Index — rolls it into one daily reading across five markets.



Three levels: Normal, DEFCON 1, DEFCON 2



Illustrative mix: ■ Stocks ■ Bonds ■ Gold & commodities ■ Cash

RULES, NOT GUT FEEL

Checked daily, so a shift can happen mid-month. Built-in wiggle room keeps it from flip-flopping on every twitch — what traders call “whipsaw.”

Telling burnt toast from a house fire

In August 2024, a sudden sell-off — likely a big investor in Japan unwinding trades — sent stock-market fear soaring. But the other markets stayed calm.

STOCKS

Fear spiked

BONDS

Calm

GOLD

Calm

OIL

Calm

THE STORM
WARNING

Rose, but stayed at Normal — so the strategy stayed invested instead of panicking.

Source: Straxen, LLC TIX research (implied-volatility data, 2023–2024).

How the storm warning held up

FINANCIAL CRISIS, 2008-09

NASDAQ-100

WITH WARNING

-57%

-31%

45% smaller drop

COVID-19 CRASH, 2020

NASDAQ-100

WITH WARNING

-31%

-23%

26% smaller drop

FED TIGHTENING, 2022

NASDAQ-100

WITH WARNING

-38%

-27%

29% smaller drop

THE TRADE-OFF

Like an airbag, it softens the crash — it doesn't prevent it. And when the warning goes up but the storm passes, as in early 2023, it can trail a bit.

Hypothetical TIX back-test by Straxen, LLC: switching between the Nasdaq-100 (QQQ) and short-term Treasuries (SHY) by storm score. Not actual client results.

The hardest part is getting back in

MARCH 2009

+21.6%

S&P 500 gain in the 10 trading days after its March 9 low — while the headlines still screamed crisis.

GUT FEEL

Sell after the drop. Wait until it “feels safe.” Buy back after the rally — at higher prices.

RULES

Shift defensive when the gauge says so. Move back in when it clears — however scary the headlines.

THE LESSON

Emotions are good at getting us out and terrible at getting us back in. A rules-based signal doesn't flinch.

S&P 500 closing levels: 676.53 on Mar. 9, 2009 and 822.92 on Mar. 23, 2009.

A smaller hole means a head start

\$100 IN JULY 2007 – WORTH IN MARCH 2010



The S&P 500 still needed **+25%** just to get back to \$100. The tactical portfolio was already **41% ahead**.

Hypothetical back-test, Straxen, LLC TIX research: the tactical portfolio switches between the Nasdaq-100 (QQQ, "NDX") and short-term Treasuries (SHY); S&P 500 = SPY. Not actual results.

NOT EVERY STORM IS 2008

\$100 →	TIX	NDX	S&P
COVID, Jan–Apr 2020	\$95	\$99	\$87
Rate hikes, Oct 2021–Dec 2022	\$85	\$74	\$90

It trailed the Nasdaq-100 in 2020 and the S&P 500 in 2022. An airbag, not a crystal ball.

PART 5 · THE SEATBELT AND THE GAS PEDAL

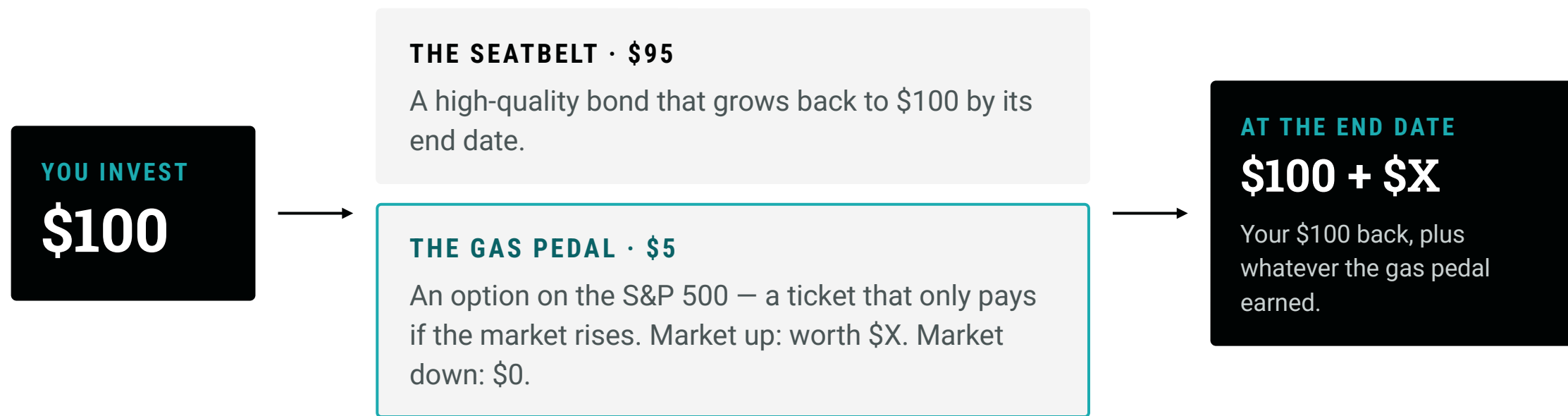
“Rule No. 1: Never lose money.
Rule No. 2: Never forget Rule No. 1.”

— *Warren Buffett*

Losses are part of investing. Catastrophic losses don't have to be.



The seatbelt-and-gas-pedal recipe



Simplified illustration. Actual prices depend on interest rates and market conditions. Options involve risk and are not suitable for all investors.

Two flavors: Defend and Buffer

DEFEND

The full-face helmet

Absorbs 100% of S&P 500 losses, if held to the end date.

SHARE OF THE GAINS YOU KEEP

With Treasury bonds

~58%

With higher-yield bonds

Up to 99%

BUFFER

The 20%-drop phone case

Absorbs the first 20% of S&P 500 losses. Anything beyond that is yours.

SHARE OF THE GAINS YOU KEEP

With Treasury bonds

~75%

With higher-yield bonds

Up to 130%

Higher-yield bonds add upside — and the risk that a borrower doesn't pay.

Example terms from Straxen, LLC, priced May 2025 for a December 2026 end date. Terms change with interest rates and markets.

Trading some upside for a softer landing

Approach (about 2¼ years)	Average	Best case	Worst case	Chance of a gain
S&P 500 on its own	21.5%	96.7%	-49.2%	82%
Defend · Treasury bonds	14.9%	56.1%	0%	82%
Defend · 75/25 bond mix	17.2%	71.8%	-7.2%	90%
Buffer 20% · Treasury bonds	18.3%	72.5%	-21.8%	82%
Buffer 20% · 75/25 bond mix	20.4%	86.9%	-25.6%	90%

The S&P 500 alone averaged the most — with a worst case near -50%. **Defend gave up about a third of that average to bring the worst case to zero.**

Hypothetical Monte Carlo simulation by Straxen, LLC: 2.28-year holding period, daily data Jan. 2000–Aug. 2024, before fees. 75/25 = 75% Treasuries, 25% higher-yield bonds. Not a guarantee.

Three things to take home

1

AVERAGES HIDE WHAT MATTERS

A few rare days decide most of the outcome. Plan for them, not just for normal days.

2

THE HOLE IS DEEPER THAN IT LOOKS

Lose 50% and you need +100% back. Smaller drops mean less digging and more compounding.

3

MIX, WATCH, BUCKLE UP

Build a smarter mix, let TIX and QIX move you out — and back in — by rules, and add a seatbelt where it fits.

WHY WE WORK THIS WAY

We believe protecting what you've built comes before chasing what's next. People over products: if it doesn't serve your goals, we don't recommend it. Period.

YOUR NEXT STEP

It seems like the last few years have made “safe” feel like a moving target.

Would it be unreasonable to find out how much tail risk is hiding in your portfolio right now?

A short, no-pressure conversation. “No” is a perfectly good answer.

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ZOOP ALPHA ADVISORS

Disclosures

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SOURCES

Adapted from Straxen, LLC research by Ron Piccinini, Ph.D. (May 2025) and Neo & Tee, "Tail Risk Hedging" (March 2023). Index data from public sources. Third-party data is believed reliable but not guaranteed.

HYPOTHETICAL RESULTS

Back-tested and simulated results were prepared with hindsight, do not reflect actual trading or any client account, and have inherent limitations. Unless noted, they exclude fees, expenses and taxes. Past performance does not guarantee future results.

INVESTMENT RISK

All investing involves risk, including loss of principal. Tactical signals such as TIX and QIX can lag, switch at the wrong time, or miss rebounds. Buffered and option-based strategies may not protect if sold early and limit upside.

OPTIONS DISCLOSURE

Options involve risk and are not suitable for all investors. Before buying or selling an option, a person must receive a copy of *Characteristics and Risks of Standardized Options* (the "ODD"), free from [The Options Clearing Corporation](#).

