DISCIPLINE FUNDS

RESEARCH SUMMARY | ASSET LIABILITY MATCHING

The Price of (Un)Certainty

Every investor faces the same trade off. You can have certainty or you can have upside, but you can't fully have both. This summary looks at what that trade costs today, and why I think the answer depends far more on the investor's balance sheet than on their stomach for volatility.

Discipline Funds · October 2026 · For financial professionals

KEY DATA POINTS

CASH
4.17%
One month T-bill yield. Very attractive today, a problem in the long run. Over 30 years cash lost purchasing power 40% of the time.

BONDS
4.91%
Five year Treasury yield on a modified duration of 4.4 years, so a year's income covers a one point rate rise. At 30 years it covers 0.4.

EQUITIES
39
US cyclically adjusted P/E, September 2026. Only the 1999 to 2000 bubble ran higher on Shiller's 150 year record. The price of equity uncertainty is near its highest ever.

TIPS
3.18%
Thirty year TIPS real yield, the highest in sixteen years. Attractive everywhere on the curve, more probabilistic further out. The 30 year deserves a serious look.

THE ARGUMENT IN BRIEF

- **Households deserve what institutions got.** In 1952 two papers split the investment world. Frank Redington gave insurers and pensions a way to build the portfolio around the liabilities. Harry Markowitz gave everyone else the efficient frontier, which builds a portfolio with no liabilities in it at all. Institutions took Redington. Retail got Markowitz, largely because a risk questionnaire scales and a liability schedule doesn't. We think households deserve the same liability first process institutions have used for more than seventy years.
- **There are three ways to do asset liability matching (ALM): contractual, statistical and blended.** You can lock it in with a contract, like a bond held to maturity that pays a known amount on a known date. You can match it statistically with stocks and blends, accepting a range of outcomes because you have enough time for that range to work in your favor. Or you can blend the two. These aren't competing camps, and every good plan uses both.
- **Risk capacity decides the mix.** If a household's assets barely cover what it needs to spend, it can't afford a bad outcome, so it should lean on contracts. If it has plenty of surplus, those extra dollars have no due date, and they can afford to ride out the swings.
- **Contracts are better paid today than they've been in sixteen years.** The 30 year TIPS yields 3.18% real. From 2010 to 2021 it averaged 0.85%. Meanwhile US stocks trade near a CAPE of 39. So I think the case for locking in further out the curve is stronger than it's been in a long time. That doesn't make stocks the wrong answer for money a household can truly spare.

This is a summary of our full research paper, The Price of (Un)Certainty, October 2026, which sets out the data, methodology, robustness tests and sources behind every figure here. All return figures are inflation adjusted and derived from a GDP weighted index of 16 developed markets covering 1872 through 2025. **All results shown are hypothetical.** See Important disclosures at the end of this summary.

1 Two ways to match a liability

Contractual and statistical matching are complements, sorted by horizon

Matching assets to liabilities is easy when the bill is close and known. If you owe $50,000 in 18 months, you buy an 18 month Treasury and you're done. No forecast, no guesswork. The hard part is the liability 10, 20 or 30 years out, when you don't know exactly what you'll need and you don't know what markets will do either.

Corey Hoffstein drew a distinction here that I've found really useful, and I've borrowed his framework with my own labels. **Contractual** matching puts a known amount in your hands on a known date. Bills, notes and TIPS held to maturity do that. Nothing else does. **Statistical** matching gives you a range of outcomes instead. The middle of that range has historically been well above the contract, and over long periods even the bottom has landed fairly close to it.

I don't think either one is better. They're tools for different jobs. Every horizon in a plan is some blend of the two, and the blend tilts toward the statistical side as the horizon gets longer. Advisors would call these horizons buckets. We don't, because here they come out of the liability schedule instead of going in as an assumption. Exhibit 1 shows how we set it up by default. The front horizon is all contract and the back horizon is all stocks. The middle horizons are mixes, sized so that each one could recover from a bad drawdown before the money in it is needed. We call that recovery time defined duration.

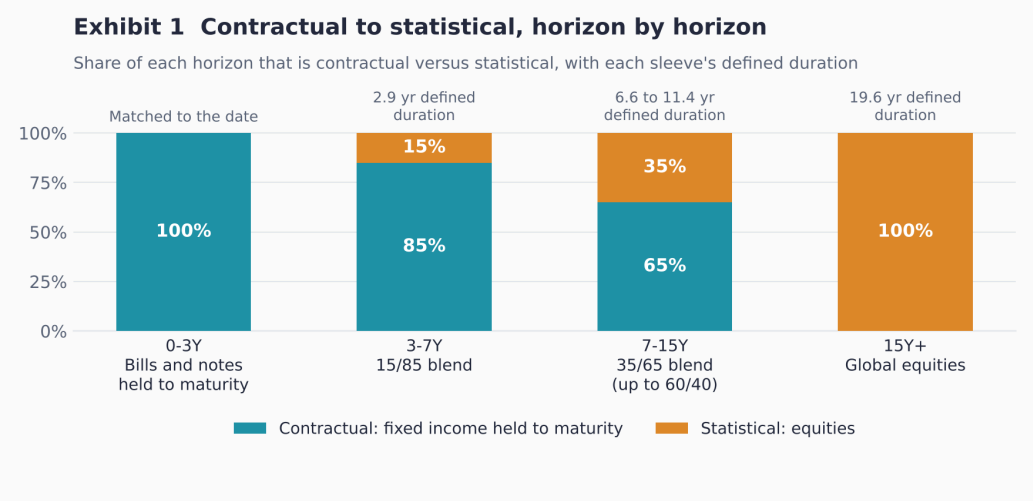


Exhibit 1. Default horizon settings. The fixed income share counts as contractual only when it is held to maturity, as a bill or TIPS ladder. Defined duration assumes a 50% maximum real equity drawdown at September 30, 2026 valuations. Source: Discipline Funds calculations.

Exhibit 2 shows the trade at its most extreme. A 30 year TIPS bought today turns $10,000 into a guaranteed $25,578 of purchasing power. Global stocks, over every thirty year stretch since 1872, turned it into anything from $15,875 to $130,141, with a median of $46,841. The contract sits inside the distribution, above the floor and well short of the middle. That is the whole trade in one picture.

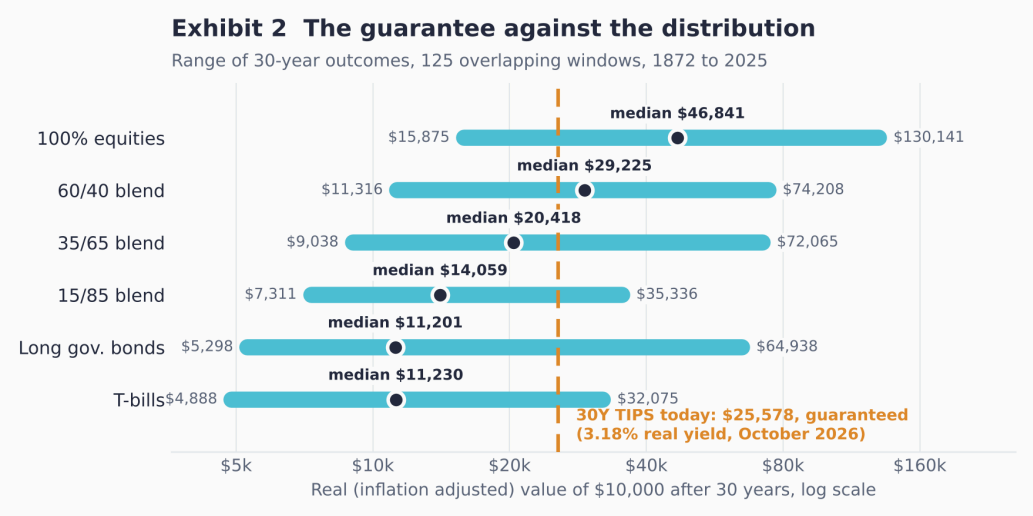


Exhibit 2. Real value of $10,000 after 30 years across all 125 overlapping windows, 1872 to 2025, GDP weighted across 16 developed markets. Bars span the worst and best outcome and the dot marks the median. The dashed line is the 30 year TIPS at its October 15, 2026 real yield. Sources: Jorda Schularick Taylor, US Treasury.

Those are starting points, not rules. Two things should move them. One is what certainty costs on the day you're making the decision. The other is how much risk the client can actually afford to take. The rest of this summary walks through both.

2 Certainty is better paid today than in years

The case for longer dated contractual matching has strengthened

For most of the last fifteen years, locking in a real return past the front of the curve was a pretty bad deal. The 30 year TIPS averaged 0.85% from 2010 to 2021 and spent much of 2020 and 2021 below zero. Buy one in November 2021 and $10,000 locked in just $8,761 of purchasing power. On October 15, 2026 the same bond locks in $25,578.

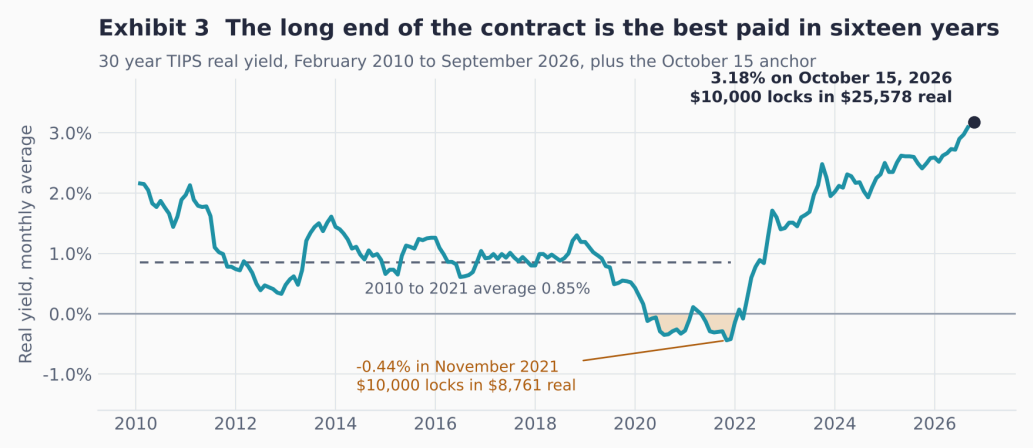


Exhibit 3. Monthly average 30 year TIPS real yield at constant maturity, February 2010 to September 2026, plus the daily reading on October 15, 2026. The shaded area marks negative real yields. Sources: Federal Reserve Board via FRED, series FII30, and US Treasury.

Table 1 shows what that trade has cost at each horizon, using the mix we'd actually hold there. Up front the contract costs nothing. In fact at today's yields it pays you. Further out it gets expensive, at least on history.

Table 1. What certainty costs at each horizon

HORIZON	MATCHING ALLOCATION	CERTAIN OPTION	WORST	MEDIAN	BEST	ANNUAL PRICE
0-3Y, 3 yr	**T-bills and short nominals**	$10,766	$6,514	$10,491	$13,460	-0.88 pp
3-7Y, 5 yr	**15/85 equity and bills**	$11,358	$5,132	$11,359	$14,165	0.00 pp
7-15Y, 10 yr	**35/65 equity and bonds**	$13,155	$4,321	$15,205	$25,187	1.50 pp
15Y+, 30 yr	**100% equity**	**$25,578**	**$15,875**	**$46,841**	**$130,141**	**2.10 pp**

Real value of $10,000 over each horizon's representative horizon. The certain option is a TIPS of that maturity held to maturity at October 15, 2026 real yields. Worst, median and best span every overlapping historical window, 1872 to 2025. Annual price is the allocation's median real return minus the certain real yield. Sources: US Treasury, Jorda Schularick Taylor.

Exhibit 4 shows why history overstates that price today. On history alone, the guarantee cost about 1.5 points a year at ten years and more than 2 points further out. But most of that history started from normal valuations. Adjust for today's prices and the cost drops to roughly zero out to twenty years, and to something like 0.4 to 1.1 points at thirty.

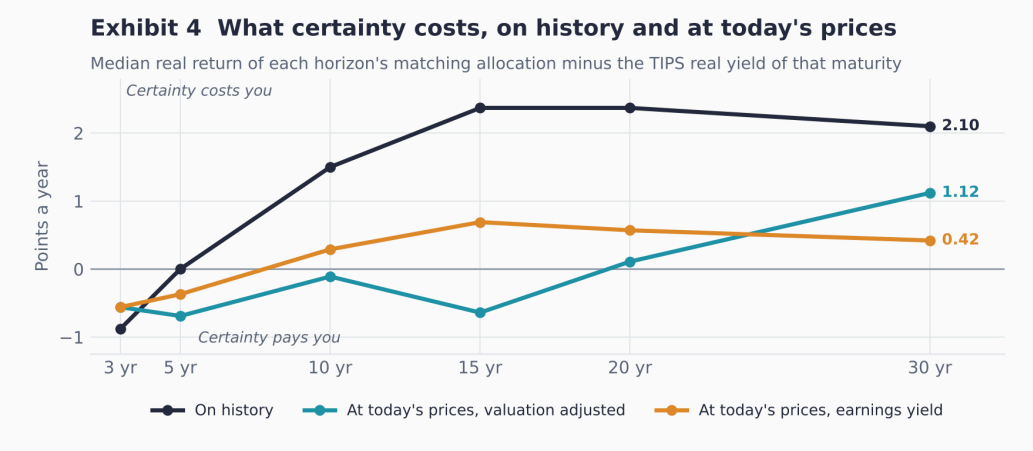


Exhibit 4. Annual price of certainty: the matching allocation's median real return minus the TIPS real yield of that maturity on October 15, 2026. On history uses all overlapping windows from 1872 to 2025. Valuation adjusted subtracts the historical effect of a starting CAPE of 27.8, estimated on Shiller's US data. Earnings yield sets the expected equity return at 1/27.8. Sources: Jorda Schularick Taylor, Robert Shiller, US Treasury, Discipline Funds calculations.

Put simply, stocks are expensive right now and TIPS aren't. That makes contracts worth using out to roughly twenty years, and it makes the 30 year TIPS a much closer call than history suggests.

3 Where contractual matching earns its place

Through the middle of the curve, and in the tail

You can see this most clearly in the middle horizons. Take the same stock weight and change only what you do with the rest. If the rest sits in regular bonds or bills, the worst case in history lost about half its purchasing power at every horizon from five to fifteen years. If the rest sits in a TIPS ladder bought at today's yields and held to maturity, the worst case still ends up above the $10,000 you started with.

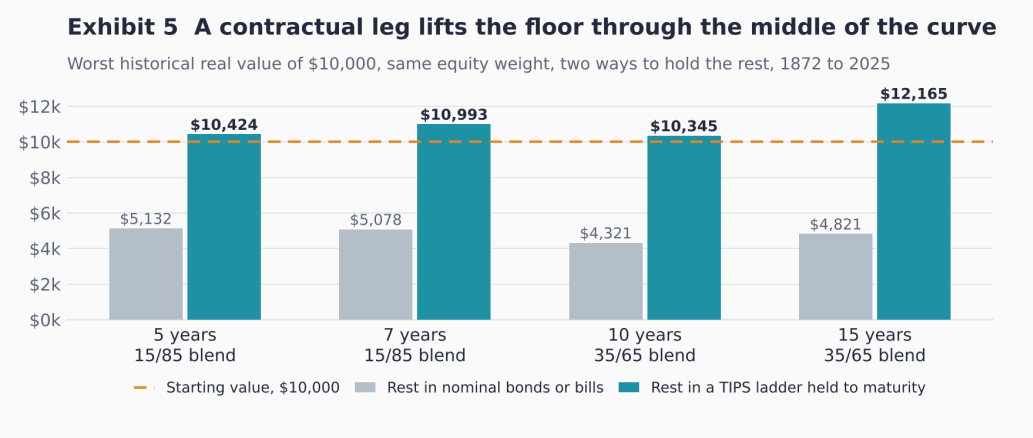


Exhibit 5. Worst real value of $10,000 across all overlapping windows, 1872 to 2025. The 3-7Y horizon uses a 15/85 blend and the 7-15Y horizon a 35/65 blend. The TIPS leg earns the October 15, 2026 real yield of matching maturity, held to maturity, which is a forward looking assumption no historical investor could have bought. Sources: Jorda Schularick Taylor, US Treasury.

We also ran a full plan through every thirty year period in the record. A household starts with $2 million, pays its bills as they come due and keeps 60% in stocks overall. A liability matched ladder beat a plain 60/40, but most of that came from the way its stock weight drifted up over time. A single portfolio that followed the same drift did just as well. What really made a difference in the worst periods was holding the middle reserves in real terms, so inflation couldn't eat them.

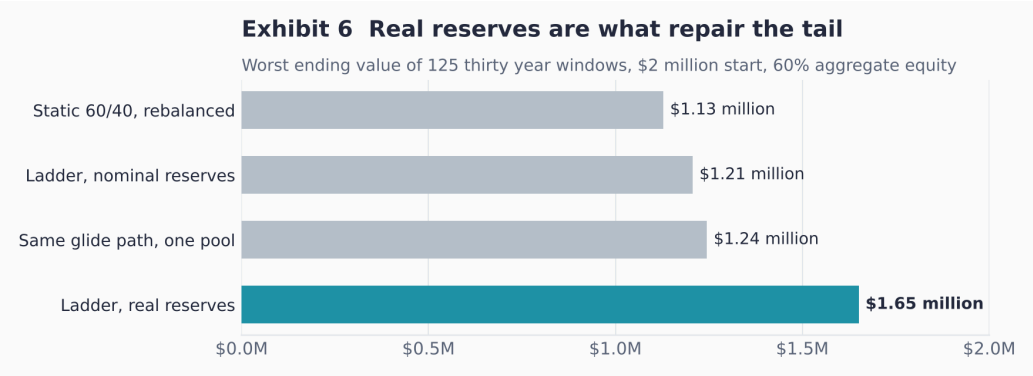


Exhibit 6. Hypothetical backtest of the full paper's Table 9. Worst ending real value across 125 thirty year windows, 1872 to 2025. Real reserves assume today's 2.78% ten year real yield. Results do not reflect fees, costs or taxes. Source: Discipline Funds calculations.

4 Where statistical matching earns its place

At the long end, for dollars that can wait

Stocks need time, and Exhibit 7 shows it about as clearly as anyting I know. Over a year or two, stocks lost purchasing power about as often as cash did. But the longer you hold them, the less often they lose, and from year twenty three on, no period in the record lost purchasing power at all. A 60/40 blend got there by year twenty seven. Cash and long bonds went the other way. Over thirty year stretches, they lost purchasing power 40% and 44% of the time.

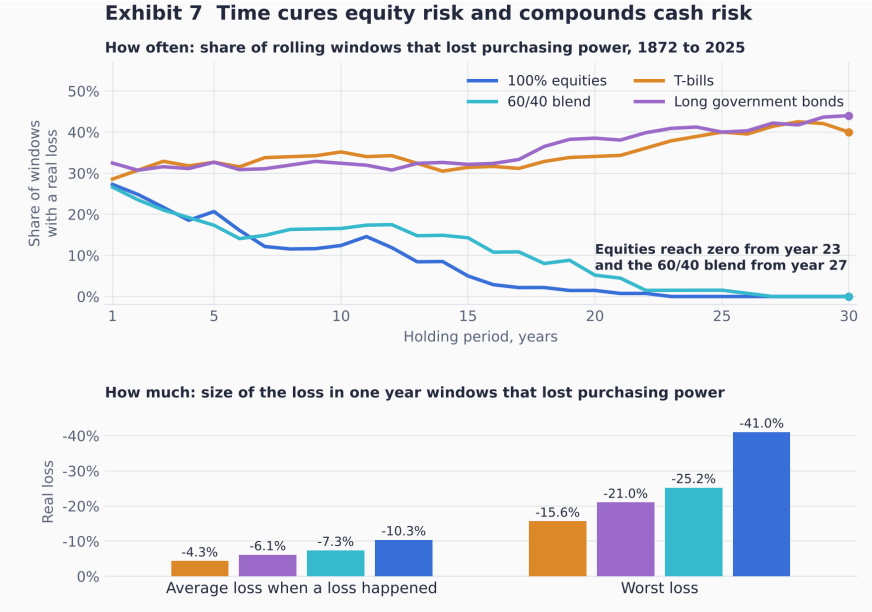


Exhibit 7. The top panel shows the share of overlapping windows at each holding period in which each allocation lost purchasing power. The bottom panel shows the average and worst real loss in the one year windows that lost. GDP weighted across 16 developed markets, 1872 to 2025. The 60/40 blend pairs stocks with the long government bond. Sources: Jorda Schularick Taylor, MSCI, Discipline Funds calculations.

How often is only half of it, though. Over one year cash and stocks lost purchasing power about equally often, but not by the same amount. When cash lost, it lost 4.3% on average and 15.6% at worst. When stocks lost, it was 10.3% on average and 41.0% at worst. That's the pain people remember, and it's why cash belongs in front of near term bills. Give it time and the story reverses. By ten years the average losing stretch cost cash more than stocks, 22.7% against 19.0%.

The 60/40 takes longer than stocks to get to zero because it gets hit twice. It still takes most of every stock market decline, and its bond side takes the inflation shocks that stocks eventually outrun. Every 60/40 stretch that lost money over 23 to 26 years ended in 1920 or 1921, after the First World War inflation, and stocks were up in all of them. Still, the blend protects you better where most people feel risk. Over one year its average loss was 7.3% against 10.3% for stocks, and its worst was 25.2% against 41.0%.

High valuations don't change that pattern. They just stretch it out. We measure this with defined duration, which asks how long a portfolio needs to recover from a 50% real drawdown at today's earnings yield. Right now a global stock portfolio needs about twenty years, a US one nearly twenty eight and markets outside the US about sixteen. So when stocks are expensive, the answer isn't to sell them. It's to give them a longer runway and own a cheaper mix of markets. Even today, the global earnings yield of 3.60% is still above what the 30 year TIPS pays.

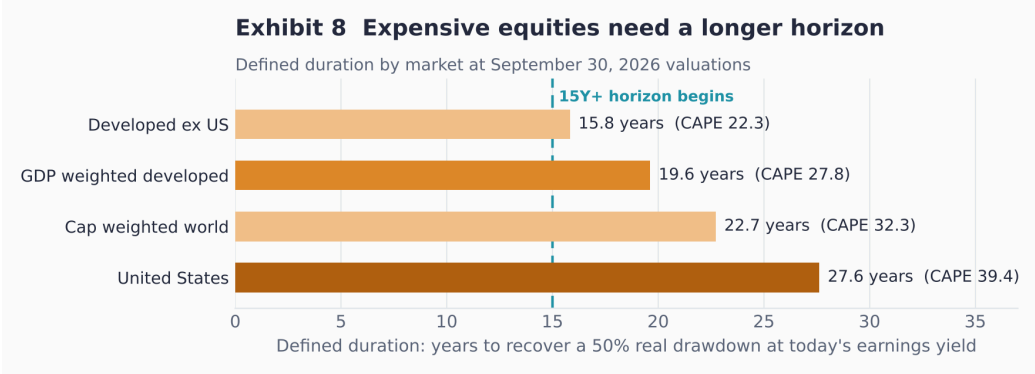


Exhibit 8. Defined duration is the compound time needed to recover a 50% real drawdown at an expected real return equal to the earnings yield, the inverse of the cyclically adjusted P/E. CAPE readings at September 30, 2026. Sources: Barclays, Discipline Funds calculations.

5 Risk capacity decides the mix

The same client, five balance sheets, five answers

This is the part I think most of the industry gets wrong. The choice between contracts and stocks shouldn't come down to how someone answers a risk questionnaire. It should come down to their capacity, meaning how big their balance sheet is compared to what it needs to fund. In Exhibit 9 everything else stays the same. It's a 65 year old who needs $40,000 a year for thirty years, priced off today's yield curve. Funding that with certainty costs $791,821. Anything above that is surplus with no due date, so it goes to the long end.

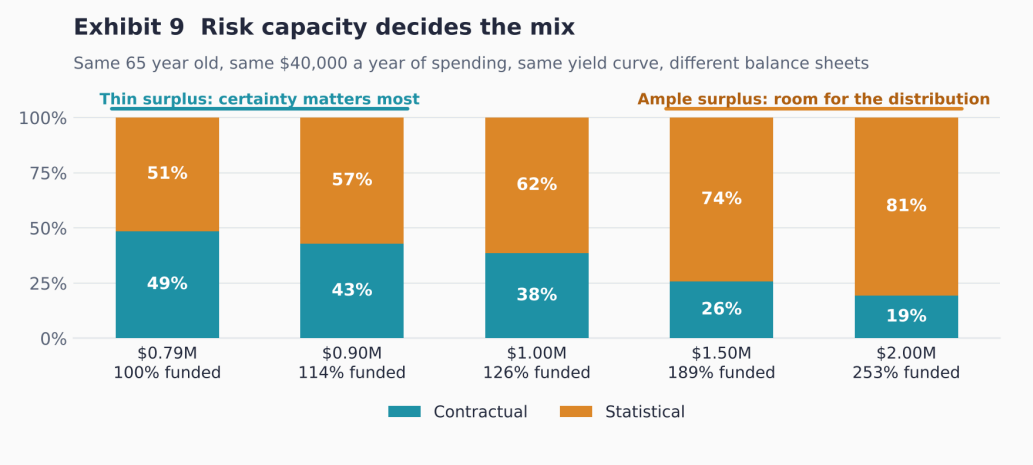


Exhibit 9. Present value of $40,000 a year of real spending for thirty years, discounted at October 15, 2026 TIPS real yields, with any surplus placed in the 15Y+ horizon. Contractual is fixed income held to maturity and statistical is equities. Illustrative and pre tax. Source: Discipline Funds calculations.

The stock allocation goes from 51% to 81% and the only thing that changed was the size of the balance sheet. Nobody picked those numbers. They just fall out of the math. There are really three different situations here.

- **Thin surplus, roughly 100% to 115% funded.** The plan works, but there's no room for error. This is where contracts earn their keep, and at today's yields I'd lean on TIPS ladders well into the middle of the curve.
- **Plenty of surplus.** The extra dollars can carry the stock risk. A guarantee would cap their upside just as surely as it protects their downside, so this client can keep the spare money in stocks and still lock in the bills they know are coming.
- **Underfunded.** No portfolio fixes this. Buying a guarantee just locks in the shortfall, and swinging for the fences is the same mistake in the other direction. The real fix is on the spending side: spend less, work longer or buy longevity insurance.

> **WHO NEEDS CERTAINTY MOST**
>
> It's not the most nervous client. It's the one who can just barely afford the plan. Clients with plenty of surplus need it less, and clients who can't afford the plan at all can't be fixed with it.

6 What this means today

- **Lock in the near term.** Inside three years, Treasuries held to maturity beat what bills have historically delivered, so you're getting paid to take certainty. In a high tax state, owning them directly instead of using a savings account is worth about 2.4 points a year in a taxable account.

- **Reach further out with contracts than you would have a few years ago.** At today's real yields a TIPS ladder is a strong fit for known bills out to about twenty years.
- **Take the 30 year TIPS seriously, especially for clients without much cushion.** At 3.18% real it's the best long term guarantee in sixteen years, and for a liability that has to be met it deserves real consideration.
- **Use blends where certainty is still valued, but the liabilities begin to get blurry.** Multi asset blends of stocks and bonds aren't just diversifiers. For an investor with higher risk capacity they add the equity risk premium in the middle and long end of the curve, which is exactly where liabilities get harder to pin down and a precise contract ends up matching an imprecise bill. That brings diversification and rebalancing optionality that a bond only strategy can't, at the cost of giving up the guarantee.
- **Keep stocks for the money you can truly spare.** Expensive markets are a reason to stretch the horizon and diversify globally. They're not a reason to abandon stocks where the balance sheet can handle them.
- **Let the balance sheet decide, not age or gut feel.** The funded ratio tells you what a questionnaire can't.

> **A WORD OF CAUTION ON TIPS**
>
> A TIPS guarantees a real return based on the government's inflation index, not your actual cost of living. The index is a national average, payments lag it by about three months, the inflation adjustment is taxed every year in a taxable account, and the government can change how it measures inflation. Argentina understated inflation for years starting in 2007 and paid its bondholders on the official number. The long end of the contract carries more risk than the word guarantee suggests.

> **THE BOTTOM LINE**
>
> Contractual and statistical ALM aren't a choice you make once. They're a dial you set horizon by horizon, and risk capacity tells you which way to turn it. An investor with **higher risk capacity** should lean more toward **statistical ALM** the further out they go, because that surplus can wait out the bad stretches and a guarantee would cap its upside. An investor with **lower risk capacity** should lean more toward **contractual ALM**, and carry those contracts further out the curve, because a shortfall is something their plan can't recover from.
>
> - **Inside about five years, match with contracts.** Bills and TIPS held to maturity cost nothing there, and today they pay you.
> - **From about five to twenty years, risk capacity sets the mix.** The more surplus, the more equity in the blend. The thinner the cushion, the more TIPS, and the further out they should go.
> - **Past about twenty years, statistical matching has historically been the better tool.** The equity floor sits above every alternative, and stocks never lost purchasing power over any window of 23 years or more. At today's prices the 30 year TIPS is a closer call than usual, and for a thin cushion it deserves a serious look.

Every dollar should carry only the uncertainty its own due date, and its owner's balance sheet, can handle.

7 Frequently asked questions

Isn't this just bucketing?

No, and the difference matters. Advisors have used time based buckets since Harold Evensky popularized the cash reserve in 1985, and Michael Kitces rightly criticized the generic version in 2014 because the rules for which bucket gets spent were made up. I agree with him. A true ALM strategy establishes the assets based on the financial plan and its

scheduled liabilities. A bucket strategy does no such thing. It is little more than a total return strategy with a cash reserve bolted on. Institutions call it Liability Driven Investing because the liabilities dictate the matched assets. A true ALM strategy should do the same and should not be confused with vague "bucketing" methodologies.

Why not just buy a TIPS ladder for the near term and put everything else in stocks?

That's actually this framework with only two rungs, so you've already agreed with the basic idea. The problem is the middle of the curve. With two rungs every dollar is either fully certain or fully at risk, and nothing sits at 15% or 35% stocks. Those blends matter. At ten years, a 35/65 mix of stocks and bills had a worst outcome of negative 6.06% a year, better than stocks alone at negative 6.47% and bills alone at negative 7.36%. A two rung portfolio can't hold the allocation that beat both of its parts. 60/40 isn't the gold standard portfolio because it is perfect. It is the gold standard because it is neither too long in duration nor too short and what the moderate duration profile does is provide the investor with a more predictable sequence of returns and rebalancing optionality that you cannot get with equities or 10 year bonds over similar time horizons.

Why not just hold a 60/40?

The problem with a 60/40 is that it only has one duration, about eleven years, and it applies that to every dollar. That's too aggressive for next year's bills and too conservative for money with thirty years to run. Over thirty year windows, a 60/40 grew $10,000 to a median of about $29,000, while stocks grew it to about $47,000. The dollars that didn't need protection paid for it anyway. This isn't an argument against 60/40. It is an argument against using one time horizon as a total portfolio solution, when a 60/40 should be held as one part of a broader temporal allocation, serving its own specific purpose inside a broader plan.

Doesn't the cost of insuring against a shortfall rise with the horizon?

Yes. Zvi Bodie showed that in 1995, and we don't dispute it. But an insurance price and a realized shortfall rate measure different things. Option pricing assumes every asset earns the risk free rate, so it assumes away the equity premium before it starts. The historical shortfall rates in this paper are what investors actually experienced when they were paid that premium. We also take Bodie's side where it counts most. We value every liability at the risk free real curve, not at expected returns, because a liability is worth what it costs to secure.

If stocks are this expensive, why own them at all?

Because expensive stocks need more time, not an exit. A high price lowers the expected return, which lengthens how long a portfolio needs to recover from a bad drawdown. At today's prices that's about twenty years for global stocks and nearly twenty eight for the US. So the right response is to give stocks a longer runway and own a cheaper mix of markets. Even now, the global earnings yield of 3.60% is above what the 30 year TIPS pays. For a client with surplus capital, walking away from stocks is a bigger risk than owning them.

How much history is this really based on?

Less than the window counts suggest, and I think it's important to be upfront about that. The record runs 154 years across sixteen markets, but 125 overlapping thirty year windows only add up to about five independent ones. All seven of the thirty year windows that fell short of today's TIPS yield started between 1889 and 1903, so they're really one episode. When we resample the record, the share of thirty year windows that beat today's TIPS yield could plausibly range from about 55% to 100%. So read the long horizon numbers as ranges, not precise figures. The structural results, like stocks needing time and cash losing ground over long periods, hold up much better than any single number.

How do you rebalance this?

Mostly you don't have to make the decision, because the liability schedule makes it for you. You spend whatever came due, so when the front sleeve's bills mature they pay the bill they were bought for and nothing has to be sold. Every so often you refill the front sleeves from the sleeves behind them, drawing on whichever has done best and avoiding selling stocks after a drawdown. The intermediate holdings should offer optionality, not certainty, although greater certainty than pure equities. In our backtest, refilling anywhere from every year to every five years gave similar results, so the exact timing isn't critical, but a good ALM strategy has to let longer duration equities remain at work to accrue the potential temporal premia they have historically earned. What you shouldn't do is spend from stocks just because they went up or rebalance mechanically like a 60/40 does just because portfolio "risk" shifts from a vague questionnaire's baseline.

Should I use ETFs or individual bonds?

It depends on how far out you're going and your risk capacity. Holding to maturity maters more the longer the bond. At the front of the plan, a T-bill fund and a bill ladder behave almost the same, so a fund is fine. From about five to fifteen years the difference is real. An individual bond held to maturity gives you a known amount on a known date, which no fund can do, and at today's real yields a TIPS ladder meaningfully lifts the worst case. But ladders take real work to run: every client's is different, they can't be rebalanced, and maturities have to be reinvested one by one. For a client who can't afford a shortfall, build the ladder. For most others, low cost funds arranged by horizon capture most of the benefit, and a short maturity TIPS fund is a good middle ground. We typically believe simple is better and so complex individual bond ladders add unnecessary complexity. And long bond funds like bond aggregates and very long duration bonds add various forms of uncertainty without the pull to par that longer duration individual bonds provide. A blended approach with contractual certainty and statistical multi-assets and/or equities can achieve the short-term certainty most investors need with the potential equity risk premia most investors want.

Sources. Jorda Schularick Taylor Macrohistory Database, MSCI, US Treasury, Federal Reserve Board (FII30), Robert Shiller, Barclays historic CAPE, and Corey Hoffstein, post on X, May 17, 2026. Full references and the tables cited in the disclosures below appear in the complete paper.

Important disclosures

General. This paper is for informational and educational purposes for financial professionals. It is not investment, tax or legal advice, and it is not an offer or a recommendation to buy or sell any security or to adopt any strategy. Any allocation decision should be made in light of an individual investor's full financial circumstances, liability schedule and risk capacity.

Conflict of interest. Discipline Funds is an SEC registered investment adviser. Registration does not imply a certain level of skill or training. Discipline Funds manages investment strategies built on the asset liability matching framework described here and therefore has a commercial interest in its adoption. No Discipline Funds product, fund, account or strategy is named, described or shown in this paper. The blends used throughout, such as 15/85 and 35/65, are generic illustrative mixes built from broad index return series and are not intended to represent any fund, account or strategy managed by Discipline Funds.

Disclosure of interest. Discipline Funds manages investment strategies built on the framework described here and therefore has a commercial interest in its adoption. No Discipline Funds product is named or recommended anywhere in this paper, and every allocation shown is constructed from broad index return series rather than from any managed strategy. The sleeve structures discussed are presented as a method, not as a product. Readers should weigh the argument accordingly.

Hypothetical results. Every return, outcome, backtest and allocation result in this paper is hypothetical. None of it reflects actual trading or the performance of any client account, and no investor achieved these results. The figures were constructed with the benefit of hindsight, and some modeling choices, including the refill rule in the Table 9 backtest, were made after reviewing results. They do not reflect advisory fees, fund expenses, transaction costs or taxes, which would lower every figure shown, and they do not reflect the effect of real economic and market conditions on actual decision making. Hypothetical results have inherent limitations and actual results would differ, possibly materially.

Estimates and projections. Defined duration figures, the expected returns behind them and the valuation adjusted figures in Table 1B are estimates based on stated assumptions. They are not forecasts or guarantees, and different reasonable assumptions would produce different figures.

Historical data. Past performance and historical return distributions do not predict or guarantee future results. The historical analysis relies on overlapping windows drawn from a sixteen market composite, which overstates the statistical confidence a reader should place in any single figure, as Table 15 shows. Indices and composites are unmanaged and cannot be invested in directly. Third party data is believed to be reliable but is not guaranteed.

Securities and accounts. Treasury Inflation Protected Securities held to maturity pay a contractual real return backed by the US government. Sold before maturity they can lose value, and inflation accruals may be taxable before they are received. The blends discussed provide no guarantee of any outcome. Diversification does not ensure a profit or protect against loss. Deposit and money market yields shown are as of the dates stated and change often. Bank deposits are insured by the FDIC up to applicable limits. Money market funds are not insured and can lose value. Tax treatment depends on individual circumstances and state law, and readers should consult a tax professional.

All investing involves risk, including the possible loss of principal.