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The Asset Allocation Framework for *Structured Notes*

Key Takeaways

- We believe accessing new asset allocation strategies can be the most direct way to improve investment portfolios and the efficient frontier.
- Structured Notes are gaining popularity for their ability to add a measure of downside protection, access differentiated exposures, and identify truly uncorrelated, complementary sources of return — the Z-shift framework is introduced.
- By helping create a smoother ride for investors, Structured Notes have the potential to help reduce the likelihood of poorly timed exits from underperforming active strategies.
- A comprehensive use case helps illustrate how Structured Notes can complement common asset allocation strategies while improving the efficient frontier.

Summary

This paper introduces a framework for integrating Structured Notes into investment portfolios to enhance risk-adjusted returns while maintaining straightforward and transparent allocations. It highlights the limitations of traditional 60/40 stock-bond portfolios in today's volatile markets, proposing Structured Notes as a versatile tool for downside protection, diversified exposures, and tailored risk-return profiles. Through a three-step process—identifying portfolio challenges, aligning note features with investment objectives, and determining funding strategies—the framework complements existing allocations. A case study demonstrates how Structured Notes can improve portfolio efficiency by reducing downside risk and enhancing returns, using Monte Carlo simulations to compare scenarios involving growth and income notes. The paper emphasizes the "protect and participate" philosophy, leveraging platforms like Halo's Aura to help advisors customize portfolios for diverse client needs without relying on complex or illiquid alternatives.

Defining a Structured Notes' *Role in a Portfolio*

The investment landscape has changed over just the past handful of years. Advisors and their clients have been reminded of risks that, while not new, were underappreciated for several market cycles. We are now at a crossroads.

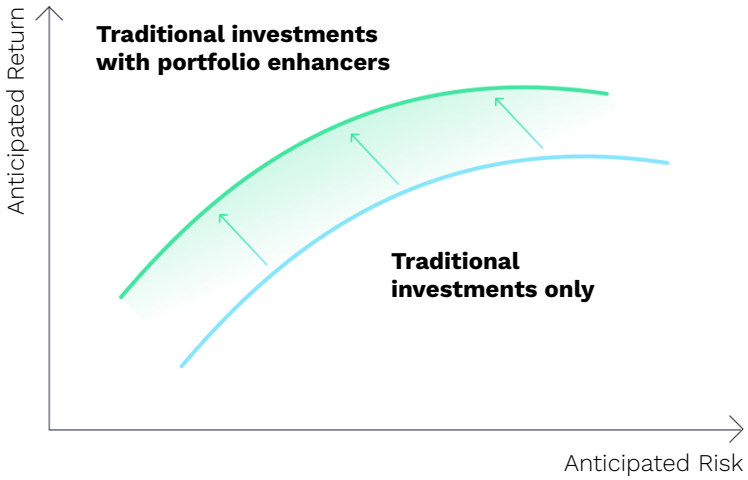
Traditional portfolio construction, long anchored by stocks, bonds, mutual funds, and ETFs, remains popular, but is not the only choice. In the coming sections, we'll call out that it also has flaws that remain, even years removed from the bond bear market of 2022. Investors are more sophisticated. Financial technology delivers valuable results. The macro, meanwhile, feels less certain than ever. Those factors — that mix — has industry titans pointing to possibly subdued returns in U.S. large-cap equities in the years and decades ahead.

Advisors now face a challenge: how to deliver adequate risk-adjusted returns without resorting to overly complex or illiquid alternative investments. Structured Notes may offer a compelling solution — a versatile, customizable tool that may enhance traditional portfolios while aligning with clients' unique goals and risk tolerances. We'll introduce a practical framework for integrating Structured Notes into client allocations, helping to enable retail investors—not only institutions and the ultra-wealthy —to help achieve their goals with greater confidence and some peace of mind. We'll start with why typical model portfolios are suboptimal — and even risky.

The basic approach to portfolio construction uses equities to produce returns for excepting risk and, bonds are used for protection. This simplified approach, such as the "60/40 stock-bond" portfolio, has worked well for many years. However, a growing consensus sees market portfolios delivering returns far below both historical levels and investor targets.

For example, numerous Wall Street heavy hitters have come out recently projecting the "60/40" portfolio, as well as equities in general, to deliver more modest returns looking ahead.[1]

Figure 1



Source: Halo Investing. For illustrative purposes only.

To further enhance the benefits of asset allocation, new sources of return, risk, and diversification have worked their way into portfolios, and today it's common to hear "50/30/20" is the new "60/40."

Overall, this shift has been positive. As the advantages of expanding portfolios to include more alternative assets, including private equity and debt, have generally resulted in better risk-adjusted results and an improvement in the efficient frontier.

However, this process has come at a great cost to investors. As a result, a dynamic interplay of economic conditions, technological advancements, and investor

[1] https://finance.yahoo.com/news/goldman-sachs-predicts-sluggish-p-192356002.html

preferences have left investment portfolios riskier and more complex than ever. For example, Callan's most recent Risky Business update demonstrates by 2025: to hit a 7% nominal return, investors need a portfolio nearly 63% allocated to return-seeking assets and nearly twice the risk as 30 years ago.[2]

This complex construct corners advisors into a tricky spot. Clients require portfolios that not only perform but also feel intuitive and are transparent. So, there's a blend of sorts — a balance that must be achieved to optimize clients' financial outcomes. But the pursuit of diversification often leads to investments that are difficult to explain. Even financial advisors well-versed and certified to discuss asset classes with laypeople commonly feel unqualified to go through the ins and outs of hedge funds, private equity, or other opaque strategies and new niche investable arenas (like art, wine, or farmland). Structured Notes, on the other hand, don't require a Ph.D. to unpack. They harness what advisors already know — stocks and bonds. Sure, a bit of options and derivatives are tossed in, but it's not in the weeds. Notes are understandable, flexible, and becoming more popular with a range of investor types, allowing wealth managers to craft portfolios that are both sophisticated and client-friendly. Think of Structured Notes as an "alternative to alternatives" — a bridge connecting stability with innovation to meet investors risk and return objectives.

In our conversations with clients, we find them increasingly uncomfortable recommending portfolios from the lessor of two evils. On the one hand, advisors can stick with the familiar stock-bond (think 60/40) strategy, despite weakening prospects for fixed income to provide either compelling returns or risk diversification. And on the other, conventional allocation strategies can be expanded to include more alternative investments. But this too comes with a host of challenges including illiquidity, greater complexity, and ever more esoteric investment vehicles and asset classes that need to be explained to clients.

[2] https://www.callan.com/blog-archive/risky-business-2025/

***In short,* investors need a new architecture for asset allocation...**

... a fresh approach to portfolio construction that doesn't require blowing up entire processes or piling on ever more exotic investments in the name of greater diversification, a better Sharpe ratio, or chasing the latest investment fad. What might that look like? In this paper, we describe a simple model using structured investments as a way to retain and complement traditional stock and bond asset allocation strategies.

We think significant equity and fixed income allocations will remain portfolio anchors. While we embrace a shift from one-size-fits-all "60/40" allocations to more personalized approaches, we recognize a changing structural relationship between stocks and bonds — particularly during volatile markets — which demands a new approach to portfolio construction.

To this end, we have a strong preference for complementing long-standing asset allocation and portfolio construction techniques, rather than experimenting with more complexity or new, exotic asset classes.

This new architecture embraces a protect and participate mentality, which prioritizes meaningful downside risk protection while retaining the potential for participating in market advances.

In our view, if financial advisors want to adapt client portfolios for unique investors' goals, risk tolerances, or market outlooks, it's easiest to complement existing asset allocation strategies with Structured Notes.

Enhancing Asset Allocation Strategies with *Structured Notes*

Advisors like Structured Notes for many of the same reasons they like alternative investments: new sources of diversification, the potential for alpha generation, and exposure to nontraditional asset classes.

However, the hybrid nature of Structured Notes, often combining features of equities and bonds, allows them to enhance an allocation in ways few other financial products can. For instance, Structured Notes can uniquely prioritize investment goals for both investors and financial advisors simultaneously.

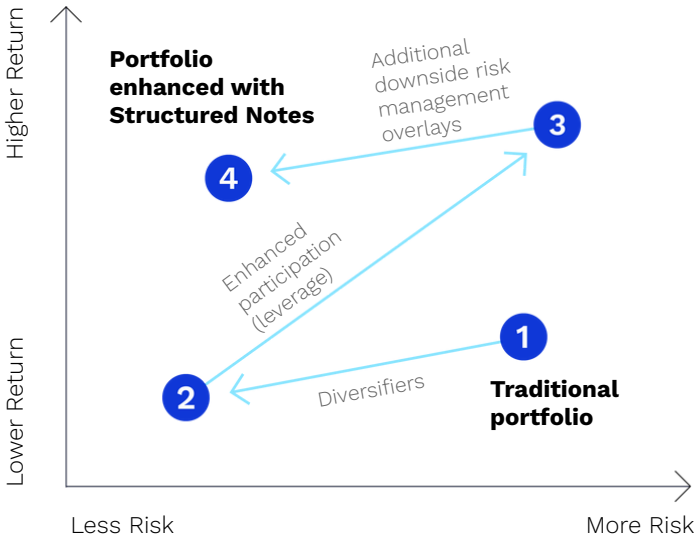
For example, because Structured Notes can be designed or "structured" in nearly countless ways, investors can prioritize for a specific investment objective, such as investment income or growth (capital appreciation). Furthermore, specific levels of downside protection can be targeted for unique investor risk capacities or preferences. Specific to financial advisors and investment professionals, Structured Notes have the advantage of being designed to target specific payoff profiles or investment outlooks. For instance, Notes targeting a bearish or bullish outlook can easily be structured. Notes that outperform in sideways markets can also be easily assembled — such strategies can often be implemented cheaper and more quickly with a Structured Note than with traditional absolute return vehicles such as hedge funds or other specialized investment approaches.

When complementing existing asset allocation frameworks, Structured Notes make it possible to build portfolios using tried-and-tested risk management techniques with similar risk characteristics to traditional portfolios, but with the potential for improved returns. More specifically, Structured Notes can position the efficient frontier for a "Z-shift." Named after the figure drawn in the familiar risk-return space, the technique makes use of enhanced diversification, capital efficiency, and downside risk management overlays.

For example, because Structured Notes get their downside protection contractually, they do not rely on cross-asset correlation to dampen portfolio volatility. This can be a more direct way to shift a portfolio from point 1 to point 2. Many "Growth" Notes can include enhanced upside features, which otherwise represent leverage. This can be a capital-efficient way to move a portfolio from point 2 to point 3. Lastly, for investors seeking an enhanced risk management profile, Note attributes such as coupon memory, full principal protection, and other features can move a portfolio from point 3 to 4 (Figure 2).

Figure 2

Z-Shift for Portfolio Enhancement



Source: Halo Investing. For illustrative purposes only.

While the Z-shift framework is illustrative, we begin to see how Structured Notes have the potential to enhance asset allocation strategies in a number of ways. Most notably, improved diversification, capital efficiency, and enhanced risk management can be used to enhance returns while reducing downside risk. With markets becoming increasingly difficult to predict, this approach also has the potential to help investors navigate uncertainty.

Notes can tilt investment outcomes in your favor

A hallmark feature of Structured Notes is their ability to help investors dial in a desired risk-return profile. Figure 3 helps illustrate this.

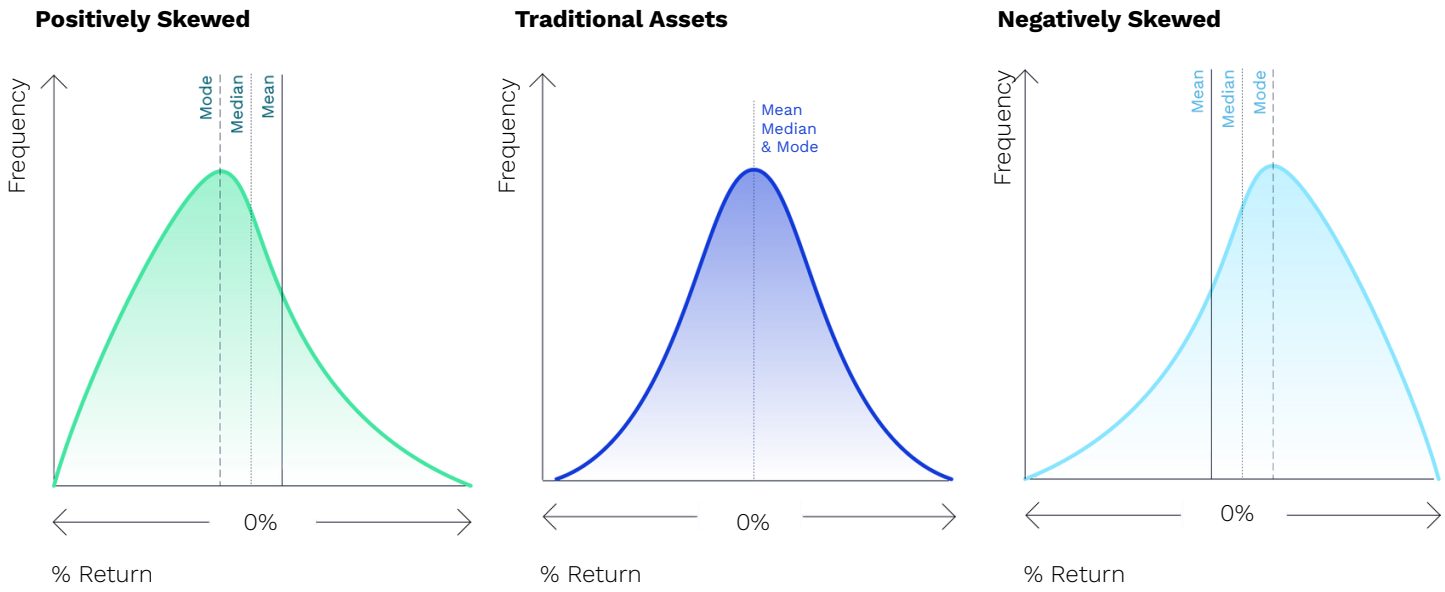
Without getting into the math, we see several possible return distributions. Most readers will be familiar with the traditional distribution, where returns follow a "normal," bell-curved distribution pattern. However, seeing that markets tend to go through periods of bullish and bearish cycles, different return patterns are just as likely. As a result, some investors may be uncomfortable assuming that return distributions are symmetrical, whereby an up market is assumed to be just as likely as a down market.

When considering an aggregate portfolio, tilting it to take advantage of a bullish or bearish point of view (asymmetry) can be challenging, particularly without disrupting policy portfolio positioning or inviting tracking error. Notes, on the other hand, can be efficiently structured to take advantage of unique market outlooks or specific asset class points of view.

For example, a Note can be designed to outperform its underlier if markets trend bearish. Or vice versa if markets have a higher likelihood of ending higher.

By concentrating investment outcomes to their highest probabilities, structured investments can help investors shape a return distribution to their most desired profile. And this is why they're called defined-outcome investments.

Figure 3



Source: Halo Investing. For illustrative purposes only.

HOW IT WORKS:

To add Structured Notes to portfolios, our framework utilizes a three-step process:

01

Investment or portfolio challenges are identified (i.e., what we are solving for).

02

Note features are aligned with investment objective, market outlook, and desired level of protection(s).

03

Implementation or funding process is determined by (a) a layering approach or (b) a replacement strategy.

Implementing a Structured Note *Asset Allocation Framework*

The framework to add Structured Notes to portfolios consists of three steps including identifying the portfolio challenge, aligning objectives, and funding the allocation to Notes. We explore these steps in more detail below.

Step 1: Identify investment or portfolio challenge

Begin by identifying an investment or portfolio challenge. For example, an investment challenge could include inadequate investment income available in conventional fixed income instruments, while a portfolio challenge may include sequence of return risk for an investor nearing retirement or the decumulation phase.

Structured Notes, by their very nature, can be ”structured” to complement a range of asset allocations that clients and advisors are familiar with, but at a lower level of volatility. Opportunities are available as strategic asset allocations (SAA) or tactical asset allocations (TAA).

Hedge equities

- When equity returns lead to lofty valuations or to manage risk due to market/economic conditions
- Retain upside return potential
- Reduce downside risk

Alternative to Alts

- When alternatives in a portfolio aren't performing or are difficult to track and manage
- Add differentiated sources of return
- Add specific risk targets

Cash off the sidelines

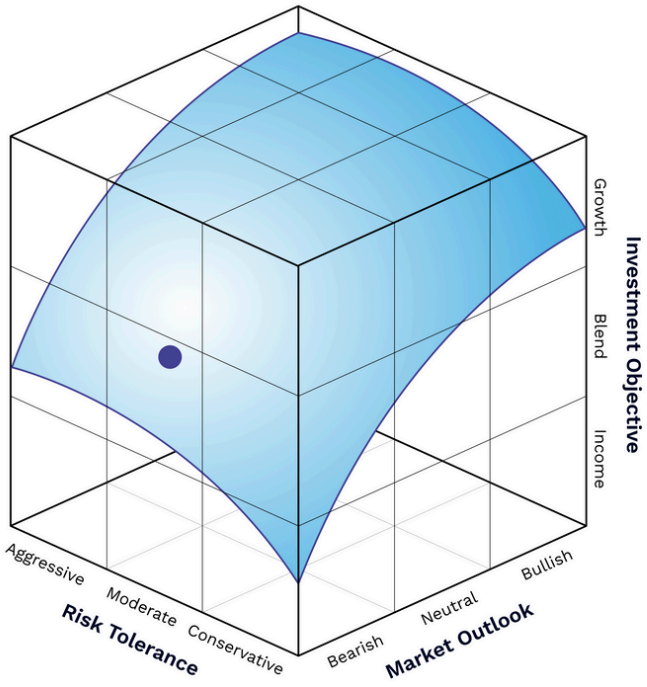
- When idle cash is a drag on the portfolio or low risk tolerance
- Increase cash efficiency
- Add principal protection

Step 2:
Align objective with outlook & protection level

Next, to best align a solution with challenges identified in Step 1, Notes are selected for their unique attributes. These could include an emphasis on above-market yields or a structure that outperforms in flat markets. Or perhaps, additional downside protection is desired.

By taking advantage of the flexibility available in Structured Notes, investors can leverage portfolio construction techniques often unavailable in conventional asset allocation approaches or once limited to high-net-worth and institutional investors.

For a closer look at the Halo Note Allocation Framework, please see the Appendix.



Source: Halo Investing. For illustrative purposes only. There is no guarantee that these objectives will be met.

Step 3:
Funding an allocation to Structured Notes

Funding an allocation for a balanced, multi-asset portfolio is rather straightforward. In this instance, an allocation to Notes can be funded equally from equities and fixed income.

However, specific portfolio objectives requiring a more precise allocation and funding strategy could arise.

For instance, an investor may want to reduce specific risks, such as equity, longevity, or duration.

These risks may be targeted and potentially reduced by selling equities or long-maturity bonds, respectively, and allocating to Structured Notes.

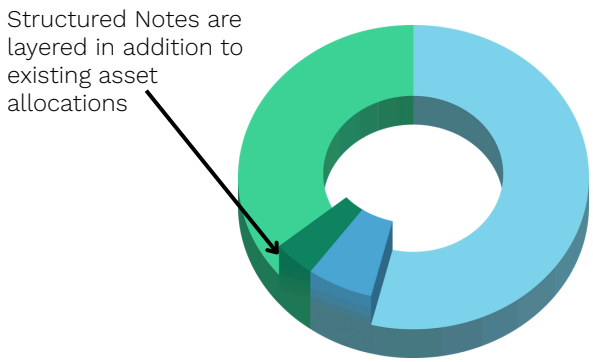
Two methods to funding an allocation to Structured Notes:

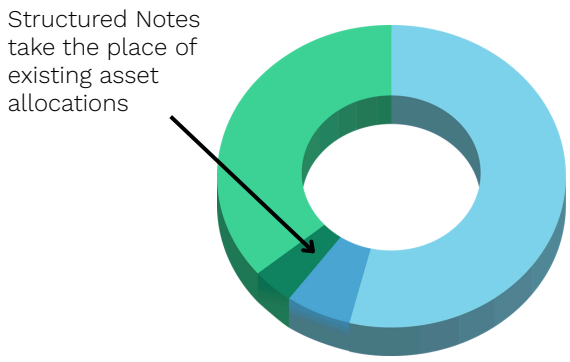
The layered approach:

Structured Notes are layered on top of existing asset allocations. For example, a Note linked to the S&P 500 shouldn't be viewed as a replacement or substitute, but rather, a complementary allocation to an existing exposure. In these instances, to fund an allocation to Notes, a direct holding in an underlier is sold and the Note is purchased and linked to the same underlier. A "layered" approach maintains a similar exposure to a particular asset class before and after an allocation to Notes.

The replacement strategy:

To shift a portfolio's exposure from one asset class to another, a replacement approach is a direct way to fund a new allocation to Structured Notes. For example, a fixed income replacement strategy would require a drawdown in exposure to bonds — raised capital is then allocated to Structured Notes seeking investment income or a target yield.





Source: Halo Investing. For illustrative purposes only.

Case Study

Improving the Risk-Adjusted Returns of the *60/40 Portfolio*

The “60/40” portfolio was the gold standard for balanced investing, offering the most intuitive blend of growth and stability.

It worked when stocks and bonds moved opposite each other during low-inflation regimes. Yes, it was sufficient then, but it is no longer good enough. The macro landscape appears to have shifted. Perhaps more importantly, clients don’t want to settle for a “good enough” strategy, particularly given today’s new risks. They want their money to meet their needs, not be subject to severe market whims that seem to come about faster than ever. Whether it’s protecting a retiree’s nest egg, generating reliable income for a business owner, or hedging risk for wealthy investors, Structured Notes can be used to form an improved asset mix. To underscore how Structured Notes can elevate the classic “60/40” lattice, we designed a case study that resonates with real-world challenges advisors and their clients face. The analysis explores three scenarios, each grounded in the needs of a hypothetical client, demonstrating how Structured Notes may deliver measurable improvements without upending traditional portfolio management techniques

To help illustrate the benefits of Structured Notes, the “60/40” portfolio is a good starting point. According to the principles of modern portfolio theory, the 60/40 portfolio represents the benchmark portfolio for asset allocation-based risk management.

To evaluate the portfolio-enhancing properties of Structured Notes, we performed a Monte Carlo simulation analysis that compares the risk-adjusted results of a portfolio using Structured Notes to one that does not use Structured Notes.

Can the protect and participate properties of Structured Notes enhance the classic “60/40” portfolio without requiring the portfolio to become more complex? (i.e., Can we improve things with core, traditional stock/bond asset classes?)

More specifically:

Can Structured Notes enhance the risk mitigation properties to improve portfolio drawdowns?

Our analysis will focus on two different scenarios:

SCENARIO 01:

Enhanced growth:

Comparing a direct investment in the S&P 500 to a similar investment in a Structured Note.

SCENARIO 02:

Enhanced portfolio:

Enhancing the “60/40” with a “50/30/20” allocation featuring Growth and Income Notes.

Scenario 1: Enhancing the 60% growth & equity hedge

The problem:

In a client meeting, a 55-year-old executive with a sizable allocation to U.S. large caps appears on track to retire comfortably. Still, in previous discussions, she has expressed anxiety about how markets will perform, given what’s happening in the economy. But going to cash or hiding out in high-grade corporate bonds isn’t an option — those returns (after inflation and after taxes) will certainly cause her to fall short of her financial needs in her 60s and beyond.

It’s a common scenario with today’s mass affluent, but effective solutions are not so common. Investors cannot bank on stocks keeping up their 2009-2024 pace. Here, we explore how Structured Notes can refine the equity sleeve of traditional investment mixes, delivering upside participation and downside protection.

To put the framework to the test, we begin with the backbone of most portfolios: equities. For this example, can Structured Notes improve the risk-adjusted results of the 60% capital appreciation component of the “60/40” portfolio?

The framework begins by identifying an investment/portfolio challenge, and in this example, a hypothetical investor wishes to hedge or de-risk some of their core U.S. stock exposure.

Next, the client’s financial advisor selects a Structured Note with features best aligned to the client’s investment goals.

For this example, we’ll assume the advisor is moderately bullish U.S. equities, but after recent strong returns, the advisor believes a pullback is a possibility. A capped Growth Note is selected to align with this point of view.

To simulate the returns of the S&P 500 index, we use PGIM's widely followed forward-looking capital market assumptions for return and volatility projections.

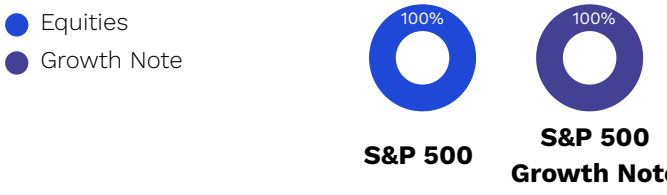
Exhibit 1 provides a detailed look at simulated single-period performance and risk statistics, comparing an investment in the S&P 500 using (1) a traditional direct investment and (2) a Structured Note linked to the S&P 500 index.

We see that the Structured Note provides a similar return profile to an assumed direct investment, but with notable improvements in downside risk management properties. While the Note sacrifices some expected returns, because they de-risk equities by more than their impact on returns, Notes outperform on both Sharpe and Sortino ratios.

A Structured Note linked to the S&P 500 reduces negative return frequency to 15% of simulated periods. This cuts expected return negative frequency by more than half, with a direct investment in the S&P 500 expected to experience a decline nearly 33% of the time.

A common concern with Structured Note investing stems from the uncertainty of how a Note can behave. Exhibit 3 helps illustrate this process. Panel A presents the hypothetical payoff we should recognize from a Note with a similar structure used in this analysis. In short, underlier price returns are enhanced ("levered") up to a cap on the upside, principal is protected down to the barrier level, and losses are 1:1 with the underlier beneath the barrier.

Exhibit 1

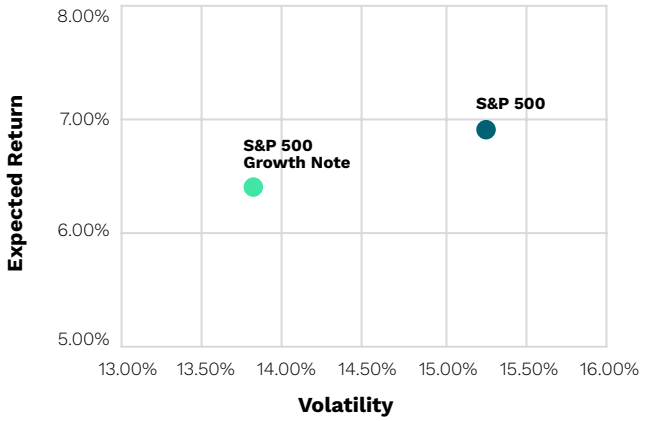


Return Statistics	S&P 500	S&P 500 Growth Note
Expected Return	6.91%	6.42%
Up/Down Capture	100% / 100%	84% / 50%
Risk Statistics		
Negative Return Frequency	32.52%	14.98%
Downside Deviation	8.13%	7.01%
Sharpe Ratio	0.45	0.46
Sortino Ratio	0.85	0.92
Max Drawdown	-57.43%	-58.78%

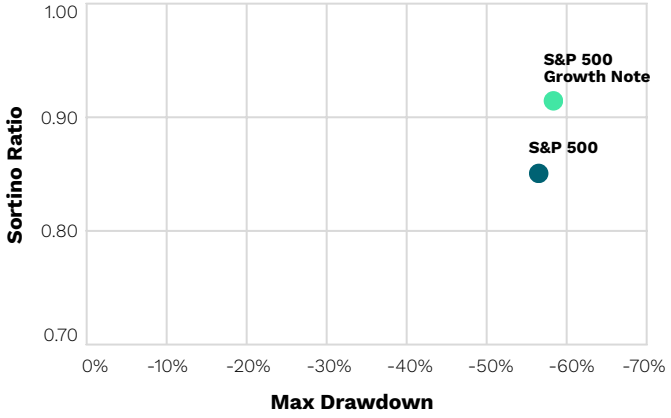
Source: Halo Investing. For illustrative purposes only.

Exhibit 2

Simulated Risk & Return for S&P 500



Simulated Sortino Ratio vs. Maximum Drawdown



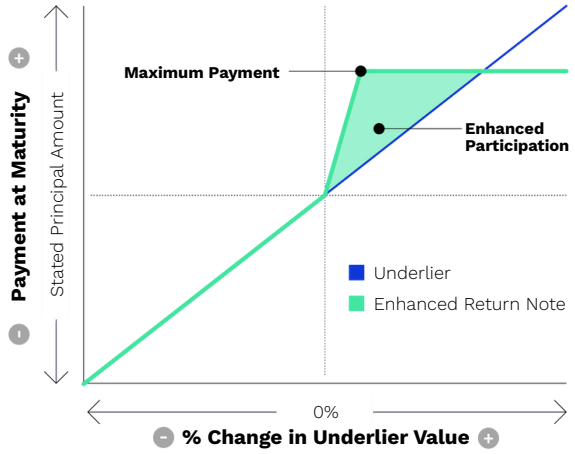
Source: Halo Investing. For illustrative purposes only.

We see from Panel B of Exhibit 3 the actual results for each trial from the simulation. As expected, the Note demonstrates its potential in delivering a favorable convex (or asymmetric) return profile: As the S&P 500 appreciates, the Note's delta rises at an increasing rate, allowing for enhanced upside participation, up to the cap (25.25%). Whereas to the downside, during periods of drawdown, the Note delta remains flat, delivering 0.0% returns down to the barrier level (-10%), and then performing 1:1 with the underlier. This is why investors like the upside/downside capture potential in Structured Notes. In this example, our simulation sees an S&P 500-linked note capturing 84% of the upside of the S&P 500 during advances, with only 50% of the downside during declines.

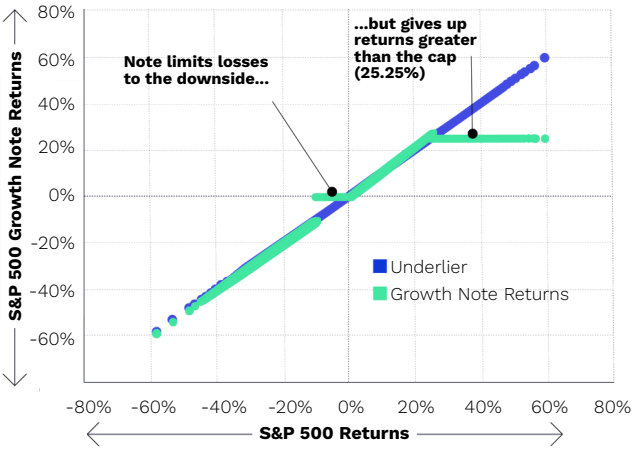
Overall, we see Structured Notes having the potential to enhance the risk-adjusted portion of a portfolio's equity sleeve.

Exhibit 3

Panel A: **Hypothetical Payoff Profile**



Panel B: **Actual Simulated Payoff**



Source: Halo Investing. For illustrative purposes only.

Scenario 2:
Enhancing the 60/40 portfolio with Structured Notes

The problem:

Next, let's profile a different client: a 45-year-old business owner who has more of a growth bent than the previous two archetypes. Her advisor knows the "60/40" portfolio simply has too high a probability of failure based on return-and-risk objectives. Monte Carlo simulations reveal that higher stock-bond correlations result in higher portfolio volatility and weaker returns compared to performance history going back to the early 1980s.

Times are indeed different, but that's not an entirely bad thing. In fact, technology offers new solutions. Structured Notes, including Growth Notes, with higher return potential, can be layered into an allocation to boost its resilience and be more dynamic when market volatility jumps. This last scenario showcases how Structured Notes can tweak the 60/40 framework, offering advisors a blueprint for modernizing client investment plans.

To evaluate the portfolio enhancement potential of structured investments, we propose that investors should consider building on the traditional "60/40" allocation by shifting to an "enhanced" "60/40" allocation featuring Structured Notes. In our model, rather than dipping into the uncertainties of private and alternative asset classes to improve the portfolio, our analysis retains core exposure to stocks and bonds. And, 10% of the equity sleeve is reallocated to the same Growth Note, while 10% of fixed income is reallocated to an Income Note.

Exhibit 4 presents performance and risk statistics for a "60/40" portfolio with and without Structured Notes. We see Structured Notes improve the classic "60/40" portfolio on a risk-adjusted basis when considering both Sharpe and Sortino ratios.

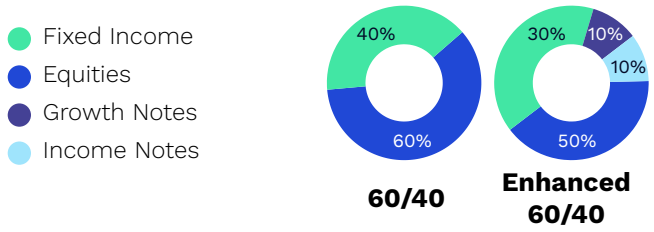
Overall, as expected, the portfolio enhanced with Structured Notes behaves similarly to the classic "60/40" portfolio. For example, both portfolios share similar projected max drawdowns, negative return frequencies, and outcome ranges (as evidenced by expected return at the 25th and 75th percentiles).

The diversification benefits are most obvious when looking at up/down capture: The portfolio enhanced with Notes is projected to capture 118% of the classic "60/40" upside but only 14% of its downside.

This effect is more obvious in Exhibit 5, where we see Notes improving the efficient frontier by moving it up and to the left. With returns and risk lining up almost linearly for the classic "60/40," defined-outcome strategies provide investors with a vehicle to fine-tune to a desired risk-and-return profile in terms of market exposure with higher risk-adjusted returns than in a traditional portfolio with no structured investments.

This could be particularly attractive should the efficient frontier continue to flatten for traditional asset classes and the stock-bond correlation continue to go through structural changes.

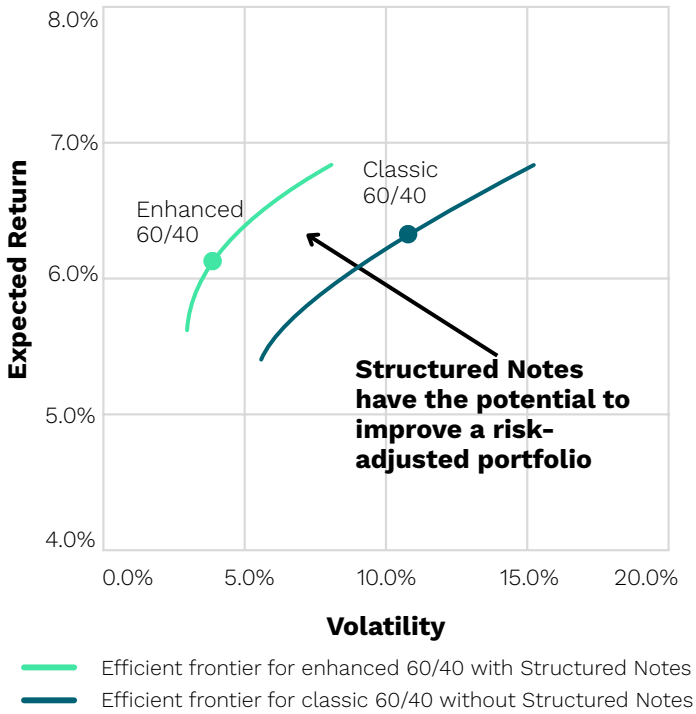
Exhibit 4



	60/40	Enhanced 60/40
Return Statistics		
Expected Return	6.30%	6.05%
Up/Down Capture	100% / 100%	118% / 14%
Risk Statistics		
Negative Return Frequency	24.95%	22.39%
Downside Deviation	5.48%	3.63%
Sharpe Ratio	0.60	0.85
Sortino Ratio	1.15	1.67
Max Drawdown	-31.40%	-31.67%

Source: Halo Investing. For illustrative purposes only.

Exhibit 5



Source: Halo Investing. For illustrative purposes only.

Contextualize portfolio fit with *Aura by Halo Investing*

Aura helps advisors quantify structured note allocations, visualize their potential impact, and better communicate investment opportunities.

Visit notes.haloinvesting.com/aura

Conclusion

Uncertainty runs high across markets. It has for years, since the era of falling interest rates came to a screeching halt after the pandemic. Client expectations remain high, though, creating a challenge for today's advisors. Enter Structured Notes.

This paper has outlined an intuitive yet powerful approach to integrating Structured Notes into client portfolios, offering a path to enhance risk-adjusted returns without giving up client-friendly simplicity and transparent traditional asset allocation approaches. Embracing the protect and participate philosophy means crafting allocations that can be resilient and responsive to market goals and changing market conditions — whether it's hedging equity exposure, boosting income, or navigating uncertain stock and bond markets.

In this paper, we introduced a simple-yet-powerful framework for systematically introducing Structured Notes to portfolios.

Our goal, among others, is to create a basic framework allowing all investors to begin to better appreciate some of the trade-offs between return, liquidity, risk, and inflation protection and where structured investments have the potential to help.

This analysis is not meant to be prescriptive. Rather, it offers an example of what is possible with a little creativity. Investors are no longer compelled to seek returns by simply climbing the equity risk curve, since they are freed to increase risk elsewhere, when adding a level of downside protection available through a Structured Note.

While such an approach has historically been out of reach for most investors, new platforms such as Halo's and those aided with the portfolio and risk capabilities of Aura are enabling forward-thinking advisors to explore new asset allocation strategies that can help meet investment objectives with greater confidence.

Appendix

To help illustrate what the Halo Note Allocation Framework can look like, we've provided the sample notes below. Similar to the Morningstar™ Style Box, our framework is intended to be a "building block" system that links what are often treated as three separate processes:

1. Satisfying client-directed objectives
2. Subject to client-specific risk tolerances
3. While integrating an advisor's market outlook.

It's our belief that a shared analytical framework will lead to improved portfolio construction and a better level of client understanding.

Risk Tolerance: Aggressive

		Bullish	Neutral	Bearish
Income	**Note Payoff Type**	Income, 13 Month Digital, Snowball	Income, 13 Month Digital, Snowball	Income, 13 Month Digital
	Underlying	Major Indices, Sectors, Single Stocks (3 Worst Of)	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors, Single Stock (3 W/O)
	Protection Type	Soft 10-15% Principal / 0-10% Coupon	Soft 15-20%, Hard 5-10% Principal / 10-20% Coupon	Soft 20-30%, Hard 10-15% / 20-40% Coupon
	Note Features	Contingent Coupon, Autocall	Contingent Coupon, Autocall	Fixed Coupon, Step Down Autocall, Memory
Blend	**Note Payoff Type**	Catapult, Call Premium, Digital Plus	Digital, Call Premium, Digital Plus	Bearish Sharkfin
	Underlying	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors, Single Stock (3 W/O)
	Protection Type	Soft 0-15%, Hard 0-5% Principal / 0-10% Coupon	Soft 15-20%, Hard 5-10% Principal / 10-20% Coupon	Full Principal Protection
	Note Features	Contingent Coupon, Gearing (if Hard Protection)	Contingent Coupon, Autocall, Gearing (if Hard Protection)	Autocall, Minimum Return
Growth	**Note Payoff Type**	Growth, First Loss	Absolute	Bearish Sharkfin
	Underlying	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors, Single Stock (3 W/O)
	Protection Type	Soft 0-15%, Hard 0-5%, 10% First Loss Principal	Soft 15-20%, Hard 5-10% Principal	Full Principal Protection
	Note Features	Gearing (if Hard Protection)	Gearing (if Hard Protection)	Autocall, Upside Participation Rate

Risk Tolerance: Moderate

		Bullish	Neutral	Bearish
Income	**Note Payoff Type**	Income, 13-mo Digital, Snowball	Income, 13-mo Digital, Snowball	Income, 13-mo Digital
	Underlying	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors (2 W/O)
	Protection Type	Soft 15-20% Principal / 10-20% Coupon	Soft 25-35%, Hard 10% Principal / 20-35% Coupon	Soft 35%+, Hard 10-20% Principal / 35%+ Coupon
	Note Features	Contingent Coupon	Contingent Coupon, Autocall	Fixed Coupon, Step-Down Autocall, Memory
Blend	**Note Payoff Type**	Catapult, Call-Premium, Digital Plus	Digital, Call Premium, Digital Plus	Bearish Sharkfin
	Underlying	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors, Single Stock (3 W/O)	Major indices, Sectors (2 W/O)
	Protection Type	Soft 15-20%, Hard 5-15% Principal / 0-20% Coupon	Soft 20-35%, Hard 15%+ Principal / 20-35% Coupon	Full Principal Protection
	Note Features	Contingent Coupon, Gearing (if Hard Protection)	Contingent Coupon, Autocall, Gearing (if Hard Protection)	Autocall, Minimum Return
Growth	**Note Payoff Type**	Growth, First Loss	Absolute	Bearish Sharkfin
	Underlying	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors, Single Stock (3 W/O)	Major Indices, Sectors (2 W/O)
	Protection Type	Soft 15-20%, Hard 5-15%, 5-10% First Loss Principal	Soft 20-35%, Hard 15%+ Principal	Full Principal Protection
	Note Features	Gearing (if Hard Protection)	Gearing (if Hard Protection)	Autocall, Upside Participation Rate

Risk Tolerance: Conservative

		Bullish	Neutral	Bearish
Income	**Note Payoff Type**	Income, 13-mo Digital, Snowball, PPN, MLCD	Income, 13-mo Digital, PPN, MLCD	Income, 13-mo Digital, PPN, MLCD
	Underlying	Major Indices, Sectors, Single Stock (2 W/O)	Major Indices, Sectors (2 W/O)	Major Indices (2 W/O)
	Protection Type	Soft 25-30%, Hard 15%, PPN Principal / 25-30% Coupon	Soft 30-40%, Hard 15%+, PPN Principal / 30%+ Coupon	Full Principal Protection
	Note Features	Contingent Coupon	Contingent Coupon, Memory, Autocall	Fixed Coupon, Step-Down Autocall, Memory, Contingent on PPNs only
Blend	**Note Payoff Type**	Catapult, Call Premium, Digital Plus, PPN, MLCD	Digital, Call Premium, Digital Plus, PPN, MLCD	Bearish Sharkfin
	Underlying	Major Indices, Sectors, Single Stock (2 W/O)	Major Indices, Sectors (2 W/O)	Major Indices (Single)
	Protection Type	Soft 25-30%, Hard 15%, PPN Principal / 25-30% Coupon	Soft 30-40%, Hard 20%+ Principal / 30%+ Coupon	Full Principal Protection
	Note Features	Contingent Coupon	Contingent Coupon, Autocall, Memory	Autocall, Minimum Return
Growth	**Note Payoff Type**	Growth, First Loss, PPN, MLCD	Absolute, PPN, MLCD	Bearish Sharkfin
	Underlying	Major Indices, Sectors, Single Stock (2 W/O)	Major Indices, Sectors (2 W/O)	Major Indices (single)
	Protection Type	Soft 25-30%, Hard 15%, 5% First Loss, PPN Principal	Soft 30-40%, Hard 20%+ Principal	Full Principal Protection
	Note Features	N/A	N/A	Autocall, Upside Participation Rate

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Monte Carlo simulations model future uncertainty. In contrast to tools generating average outcomes, Monte Carlo analyses produce outcome ranges based on probability—thus incorporating future uncertainty.

Material assumptions include:

- Multiple capital market assumptions were used in the analysis to assess the performance of hypothetical products under different market environments.

Material limitations include:

- The analysis relies on assumptions, combined with a return model that generates a wide range of possible return scenarios from these assumptions. Despite our best efforts, there is no certainty that the assumptions and the model will accurately predict asset class return ranges going forward. As a consequence, the results of the analysis should be viewed as approximations, and users should allow a margin for error and not place too much reliance on the apparent precision of the results.
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- The analysis does not use all asset classes. Other asset classes may be similar or superior to those used.
- Not all fees and transaction costs are not taken into account. Outcomes illustrated could differ if fees associated with actual investing were assumed.

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Important Disclosure

Material limitations continued:

- The analysis models asset classes, not investment products. As a result, the actual experience of an investor in a given investment product may differ from the range of projections generated by the simulation, even if the broad asset allocation of the investment product is similar to the one being modeled. Possible reasons for divergence include, but are not limited to, active management by the manager of the investment product. Active management for any particular investment product—the selection of a portfolio of individual securities that differs from the broad asset classes modeled in this analysis—can lead to the investment product having higher or lower returns than the range of projections in this analysis.

Modeling assumptions:

- The primary asset classes used for this analysis are stocks and bonds. An effectively diversified portfolio theoretically involves all investable asset classes including stocks, bonds, real estate, foreign investments, commodities, precious metals, currencies, and others. Since it is unlikely that investors will own all of these assets, we selected the ones we believed to be the most appropriate for long-term investors.
- The analysis includes 10,000 simulated scenarios for each asset class analyzed.
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