

The 100% Stock / 60% Bond Portfolio: Why Not?

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Most investors recognize that diversified portfolios, such as the traditional 60/40 (equity/bond) allocation, are very likely to underperform all-equity portfolios in the long run. Additionally, the recent bond-market rout starkly illustrates that bonds may not only fail to hedge but can exacerbate portfolio losses. Yet, because of aversion to large equity drawdowns, investors have clung to the 60/40 approach despite the drag on performance. I experienced this firsthand while managing asset allocation at CalPERS where (along with many other pension funds) significant underfunding persisted, despite one of the largest stock-market rallies in history over the past 15 years.

Various investors, notably pension funds, are realizing that their return objectives are unlikely to be achieved based on current capital market assumptions. Consequently, they are actively reconsidering their asset allocation and risk mitigation strategies. One idea is to buy “better” assets, which usually means private equity and debt. The efficacy of that approach, particularly when it is thought to be all that is needed, is a contentious issue which we will not examine here. Beyond this, there exists a misleading dichotomy between (1) investing 100% in equities and (2) employing leverage within a diversified equity/bond portfolio. Arguments for each approach have been made by various academics and practitioners, as we will discuss.

Clearly, investing solely 100% in equities is neither a viable, nor desirable, option for most investors. Imagine being unlucky (or unwise) enough to invest in the S&P 500 index in January 2000, having observed the 19% average annual return in the 1990s. Over the next decade, you would have seen your portfolio drop 45% from 2000 to 2002, recover, and then drop 55% in 2008-2009. If you had managed not to panic and sell at an enormous loss during either of these drawdowns, your cumulative return at the end of the decade would have been a miserable -9%.

The alternative of applying leverage to a diversified equity/bond portfolio is then the focus of this paper.

The Equity Risk Premium and Diversification

First, we will provide an overview on the risk/return characteristics of equities and conventional diversification with bonds. This context is crucial for understanding the rationale behind the leveraged diversified portfolio and evaluating its effectiveness.

Broadly speaking, equities are riskier than bonds and investors expect to and have been compensated with higher average returns over the long run. This dominance of equity returns over bonds is well-recognized and supported both theoretically and empirically.

The equity risk premium is theoretically justified by several contributing factors. Long-term equity returns directly reflect economic growth, while the capital appreciation of a bond is limited to face value. Furthermore, bonds are less risky in that corporate bonds take precedence over equity in the capital structure of a firm, and government bonds are backed by the issuer's ability to tax and print currency. Empirically, over the past century in the United States, the S&P 500 index (and its market-cap weighted equivalent before 1957) had an annual average return above 10% in contrast to an average return of only 5% for a constant-maturity 10-year Treasury bond index.

Nevertheless, most investors diversify their portfolios with bonds (and possibly other alternative investments) to hopefully mitigate large portfolio drawdowns in periods of financial duress when equities decline. A common paradigm for diversification is a combination of 60% equities and 40% bonds, referred to as the 60/40 portfolio. This choice is often justified by Modern Portfolio Theory (MPT) with its emphasis on maximizing risk-adjusted return.

Ease of implementation makes the 60/40 portfolio popular with individual investors. The actual portfolio weights that an investor selects will vary, of course, depending on risk tolerance and investment horizon. The 60/40 paradigm is also widely adopted among institutional investors. This may seem surprising given the wide range of assets, both public and private, that institutional investors employ. Nevertheless, Ennis (2022)ⁱ has shown using return-based style analysis extending back before 2008, that simple benchmark portfolios of public equities and bonds can, with a high degree of statistical significance, explain the variability of returns in U.S. public pension funds and foundations. The pension funds are de facto equity/bond portfolios with effective equity weights ranging roughly from 60% to 80%.

A portfolio with 100% invested in equities has exhibited a higher compound return than the 60/40 portfolio (or any other unleveraged combination). Over the period from January 1973 to February 2024 annual returns for the S&P 500 index and a monthly-rebalanced 60/40 portfolio (S&P 500 index / Bloomberg U.S. Treasury index) were 10.7% and 9.3%, respectively. The annualized volatility of monthly returns was 15.5% for the S&P 500 index and 9.7% for the 60/40 portfolio – so 60/40 had the better risk-adjusted return. However, the all-equity portfolio attained almost twice the terminal wealth as 60/40 over the 50-year period as a result of compounding with a 1.4% annual return difference. To state the obvious, diversification with bonds has made the investor poorer in the long-run despite this better risk-adjusted return.

Many investors turn to the 60/40 paradigm simply because of an intolerance for the large drawdowns of all-equity portfolios such as the 55% decline in the S&P 500 index during the

Global Financial Crisis (GFC). During that episode, the 60/40 portfolio had a reduced drawdown of 30%.

There are numerous reasons why investors seek to avoid full equity drawdown. However, at times, the solution is to over-diversify and undermine long-term performance as a consequence of cognitive biases, such as loss aversion. Our contention is that this problem is pervasive even at U.S. public pension funds, which as mentioned above, are on average effectively 70/30 equity/bond portfolios. Consequently, the average funding ratio declined steadily from almost 98% in 2000 to less than 70% in 2020. A huge shortfall of over \$1 trillion in unfunded liabilities developed despite the longest economic expansion in US history from 2009 to 2020 with the S&P 500 realizing a total return of over 500%.

Universa Investments has always stressed the importance of mitigating the largest drawdowns as the most effective way to improve compound returns over time. However, risk mitigation needs to be cost-effective. We have long argued that relying solely on diversifiers like bonds with the primary objective of protecting against equity drawdowns is not efficient. The ability of bonds to hedge equity risk is statistical, rather than mechanical in nature. The hoped-for negative conditional correlation between equities and bonds when equities experience steep declines has not been consistent over time. Notably, bonds provided no hedging benefit at all in 2022.

Historically, most of the protection that bonds provide in a 60/40 (or similar) portfolio comes simply from not owning equities. While a Treasury bond's price may experience a positive change during a crash in the S&P 500, the response is stochastic with an expected change that is effectively linear compared with the highly convex behavior of a deep out-of-the-money index put option. Consequently, the bond allocation needed to meaningfully reduce drawdown is so large that the investors would experience a substantial drag on performance during equity rallies. Even with portfolio rebalancing, unless executed with near-perfect timing and more aggressively than simply returning to target weights, it is improbable for bonds to add significant value over an equity drawdown cycle.

Now we come to the key question. What can be salvaged of the 60/40 paradigm if the investor seeks a higher expected return but is still concerned about risk? If a marginally higher return is required, then the equity allocation could be adjusted slightly higher. But what if the investor has higher return objectives? Of course, simply dialing up the equity allocation towards 100% does not address risk. If the objective is to achieve returns that match or exceed those of the all-equity portfolio while maintaining less or equal volatility, then MPT dictates that the optimal approach is to apply leverage. In fact, it is the only way within the MPT framework.

Rehashing an Old Argument

Anarkulova, Cederburg and O'Doherty (2023)ⁱⁱ make the case for an all-equity strategy over a diversified equity-bond portfolio in the context of lifecycle investing. In essence, they recommend that individual investors should go all in on equities with their retirement savings on the line. The conclusion seems to come from nothing more than the past performance of both domestic and international equities over the past century.

As to be expected, Clifford Asness, Chief Investment Officer of AQR Capital Management, responded critically on the AQR website.ⁱⁱⁱ He refers to Asness (1996)^{iv} where he responded to a similar argument in favor of an all-equity portfolio in Thaler and Williamson (1994).^v In that paper, Asness used the example of a leveraged 60/40 portfolio of equities and bonds as the superior approach supported by the framework of MPT.

In making the case for a leveraged 60/40 portfolio, Asness explains that MPT advocates for a two-step process in portfolio selection. First is the identification of the combination of investable assets that provides the best return-for-risk, and second is levering or de-levering that optimal portfolio with cash to achieve the desired level of risk.

Backtesting Leverage: Not Worth the Risk

In the 1996 paper, Asness supports his claim of the superiority of a leveraged 60/40 portfolio with a backtest. Interestingly, one of Asness’s objections to the pitch for 100% equity by Anarkulova et al. is what he considers as the flawed reasoning of looking at historical results and telling investors to “buy the thing that has gone up the most over the long term.” It seems ironic that Asness is relying on the same historical data, now including bond returns, to support his own assertion. However, debating which set of data is valid and which is not is ultimately futile and we proceed with the data at hand.

We conducted up-to-date backtests of 60/40 portfolios with and without leverage, spanning the period from January 1926 to February 2024. Our aim is simply to assess the advantages and disadvantages of applying leverage to a 60/40 portfolio. We do not speculate on the future evolution of the equity risk premium.

In our backtests, we utilized the S&P 500 index to represent equities. For bonds, we used the Bloomberg U.S. Treasury index from January 1973 through February 2024. Prior to 1973, the bond returns were obtained by constructing a constant-maturity 10-year Treasury total return series using yield-curve data from the Federal Reserve Bank of St. Louis. The 60/40 portfolio returns were based on monthly rebalancing, and the cost of leverage was assumed to be the 1-month Treasury bill rate + 50 bps.

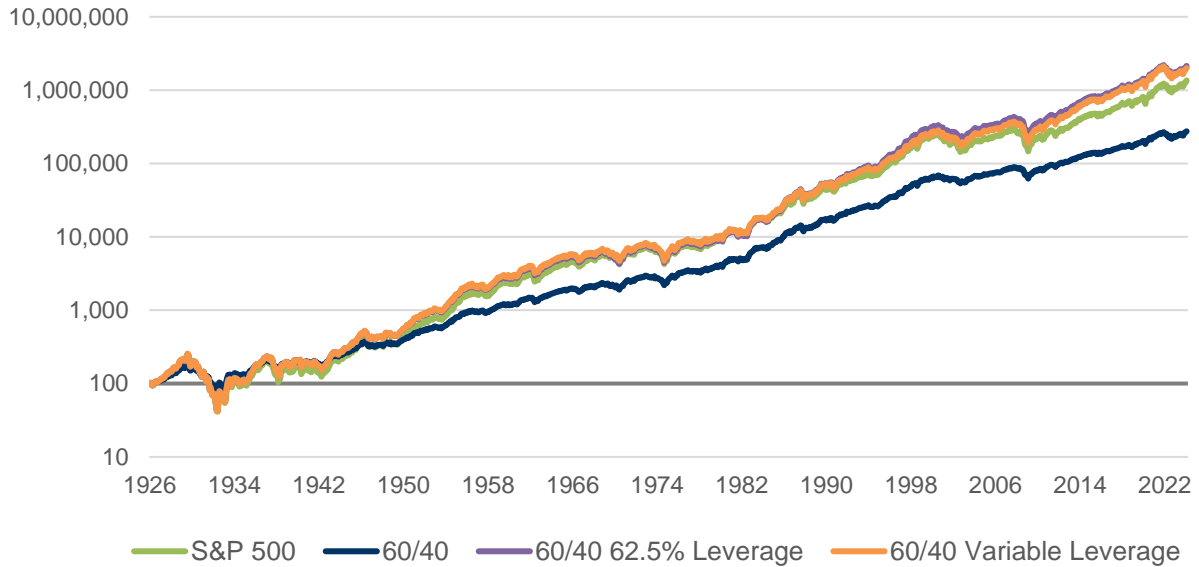
We considered leverage in the amount required for the diversified portfolio to have the same volatility as the all-equity portfolio determined in two ways – a fixed degree of leverage based on in-sample volatility estimates and a variable degree of leverage based on trailing volatility estimates. Performance statistics for the period are shown in Table 1 and a graph of cumulative wealth appears in Figure 1.

Table 1

	S&P 500	60/40	60/40 with 62.5% Leverage	60/40 with Variable Leverage (based on 36-Month Lookback)
CAGR	10.2%	8.4%	10.7%	10.6%
Volatility	18.2%	11.2%	18.2%	18.3%

Figure 1

1926 - 2024



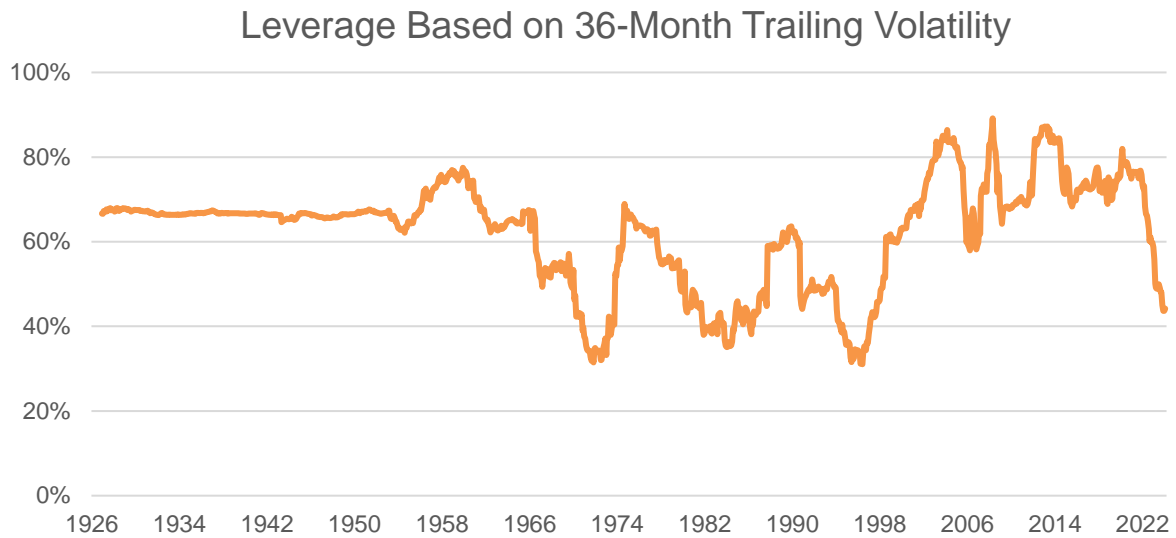
Note first that the all-equity (S&P 500) portfolio outperformed the unleveraged 60/40 portfolio by 1.8% per annum and attained a terminal wealth that was 4.9 times greater. That is a good reminder of the potential adverse consequences of simple diversification on wealth creation in the long run.

The volatilities of the all-equity and 60/40 portfolios were 18.2% and 11.2%, respectively. The degree of leverage that would have been required for all-equities and leveraged 60/40 to have equal realized volatility over the period consequently was 62.5%. With leverage fixed at 62.5%, the CAGR of the diversified portfolio rose to 10.7%, exceeding that of the all-equity portfolio by 0.5% per annum and resulting in about 1.6 times higher terminal wealth over the period.

Clearly, the determination of 62.5% leverage to equalize volatility is an in-sample estimate. In practice, the required leverage would have to be determined by backward-looking volatility estimates. We experimented with different lookback periods and found the results to be insensitive to period length. Table 1 shows the outcome from adjusting leverage on a monthly basis using the ratio of volatilities estimated over a trailing 36-month period. In the backtest, simulating the more realistic variable-leverage approach reduced the CAGR by 10 bps. We also chose to ignore transaction costs, which would have an additional negative impact on performance depending on the frequency of rebalancing and leverage adjustment.

Figure 2 shows how leverage would have evolved using backward-looking estimates. The variation is quite large, ranging between 30% and 90%, and the average, perhaps unsurprisingly, is approximately 62.5%. It seems remarkable that allowing leverage to vary this much around the average value of 62.5% would have so little impact on performance. We will not belabor this point and give the leveraged 60/40 approach the benefit of the doubt in terms of parameter determination.

Figure 2



These results are very similar to the findings of Asness (1996) where he considered the S&P 500 as well but used a corporate rather than Treasury bond index. He found that the CAGR of the 60/40 portfolio with 55% leverage exceeded that of the all-equity portfolio over the period from 1926-1993 by 0.8% using the 1-month T-bill rate as the borrowing cost. When he more conservatively assumed a borrowing cost of 50 bps over the 1-month T-bill rate, the outperformance fell to 0.5% per annum.

To reiterate, we do not advocate for investors to blindly embrace the 100% equity approach, nor are we attempting to prove that one approach will be superior. We do contend, however, that the argument in favor of the leveraged 60/40 portfolio over 100% equities is not very strong. This contention primarily stems from the very small observed improvement in CAGR (with equal volatility) and the tenuous connection to MPT which ignores practical limitations.

With only a 0.5% difference in return, we cannot reject the null hypothesis of a 0% difference at the 5% significance level. More importantly, by drilling down into the backtested results, we uncover very unattractive aspects of the leveraged 60/40 performance. These features should give any sensible investor pause before adopting this strategy on a large scale, or even adopting it at all. Here are some specifics.

The performance of the leveraged 60/40 portfolio has been inconsistent, underperforming 100% equities over extended periods in the past.

This is evident from Figure 3 which shows the difference in CAGR (leveraged 60/40 minus all-equity) over rolling 10-year periods. Over the entire 30-year period from 1950 through 1979, the leveraged 60/40 portfolio underperformed the all-equity portfolio by 90 bps per annum. This underperformance is not just a phenomenon of the distant past. Figure 4 shows how badly the leveraged 60/40 performed in 2022 and 2023. Many long-term investors update asset allocation decisions periodically. For example, U.S. public pension funds conduct asset-liability studies typically every three years. It is unlikely they would stay the course with a leveraged strategy that performed poorly over a three-year period, let alone over a decade or longer. Individual investors are likely to be even more impatient.

Figure 3

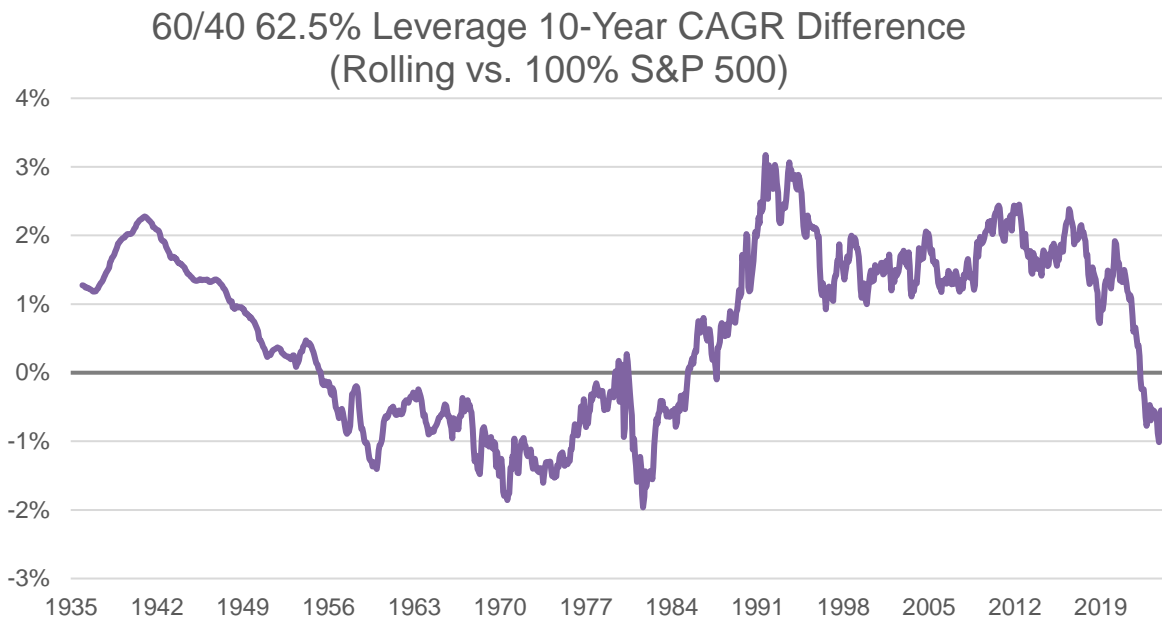
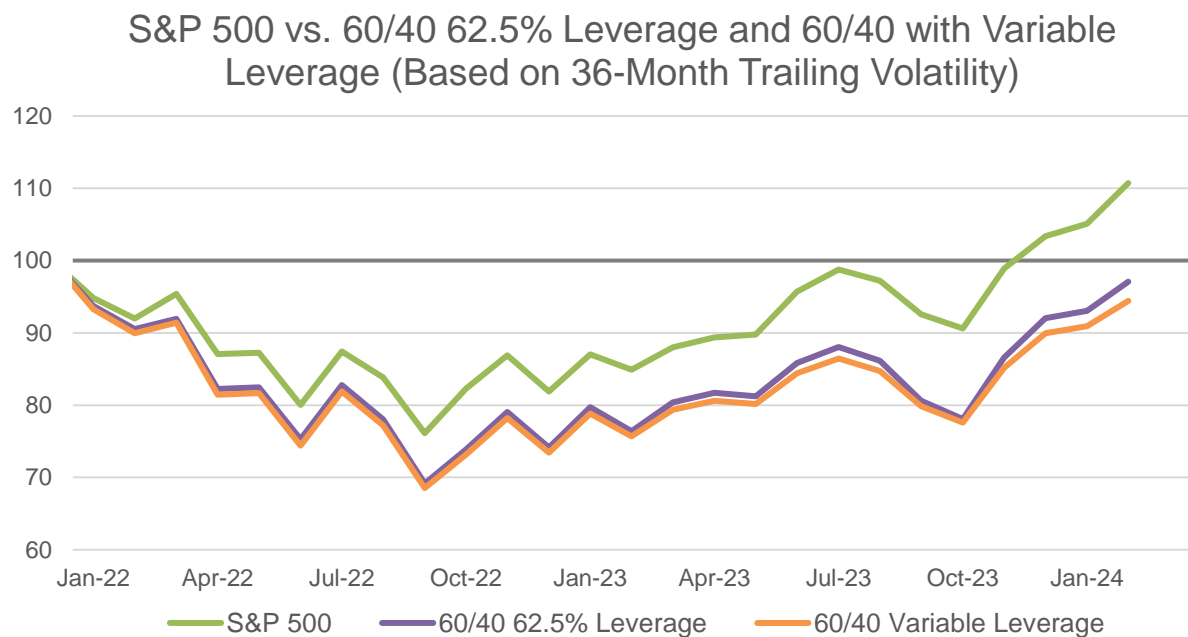


Figure 4



There has been little or no benefit in major equity drawdowns.

The investor must leverage more than 60% of their capital to match the volatility of an all-equity portfolio and, potentially, achieve only a slightly improved return over an extended period. It seems absurd that an investor would undertake such an endeavor while being exposed to the same significant drawdown risks.

Figures 5a, 5b, and 5c compare drawdowns for the strategies during the three worst periods for equities of the past century. In 5a, we see that leveraged 60/40 portfolio experienced the same peak-to-trough drawdown of over 80% as the S&P 500 during the Great Depression. The same is true with the peak-to-trough drawdown of over 40% following the 1973 Oil Embargo shown in 5b. During the 2000s, the leveraged 60/40 portfolio exhibited slight improvement in the Dotcom Bust (which was worse under the more realistic assumption of variable leverage) but fared no better than the S&P 500 during the Global Financial Crisis. In all cases, the investor experienced a much shallower drawdown with an unleveraged 60/40 portfolio.

Figure 5a

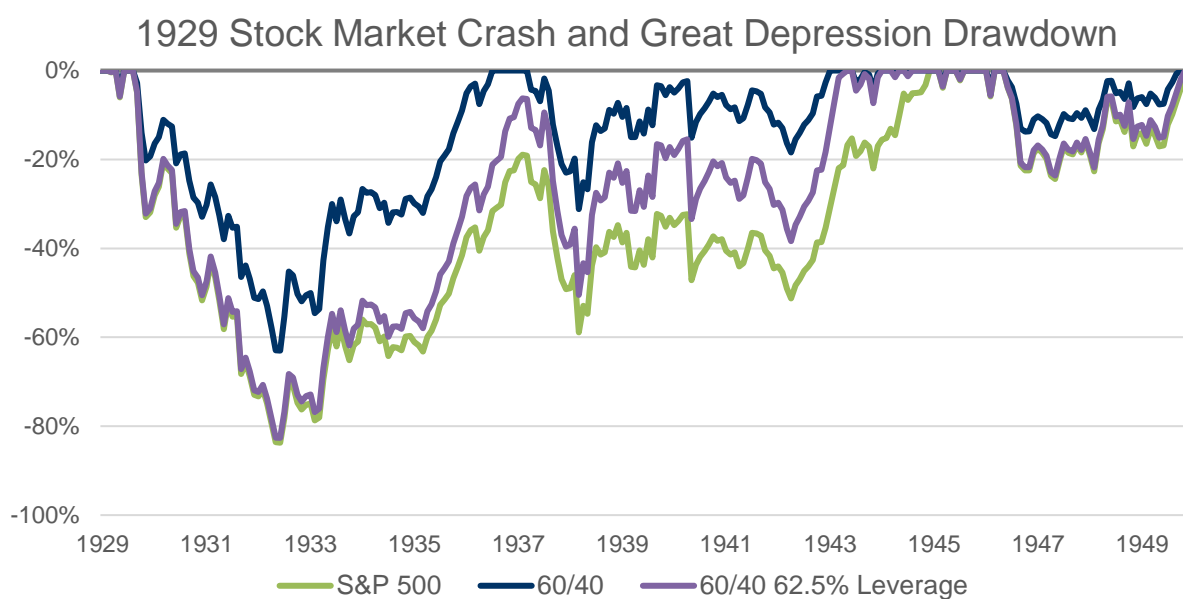


Figure 5b

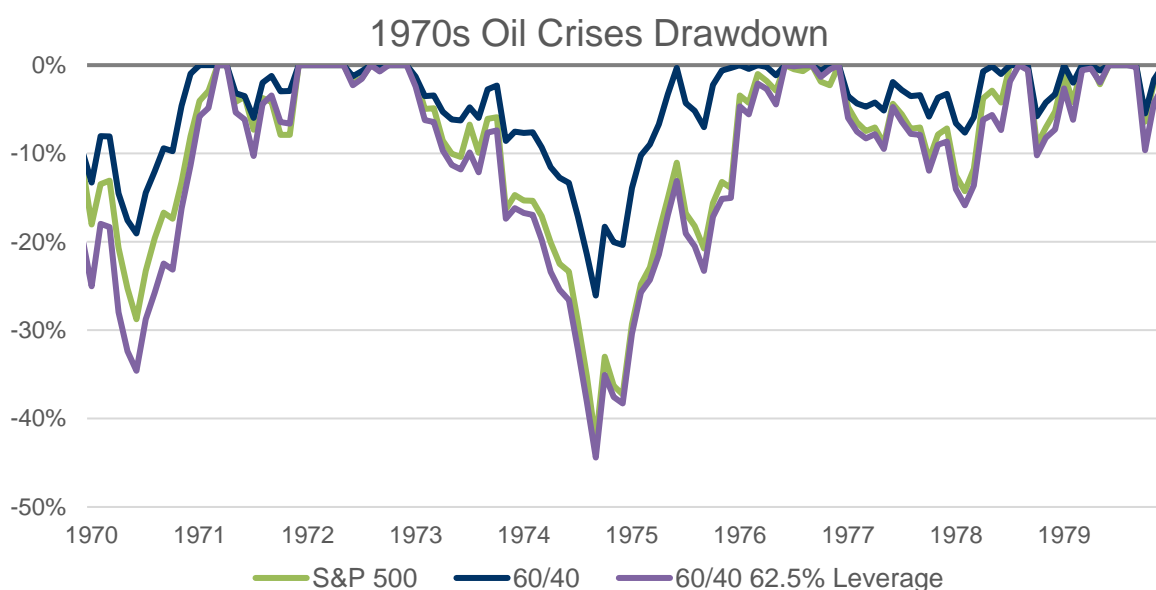
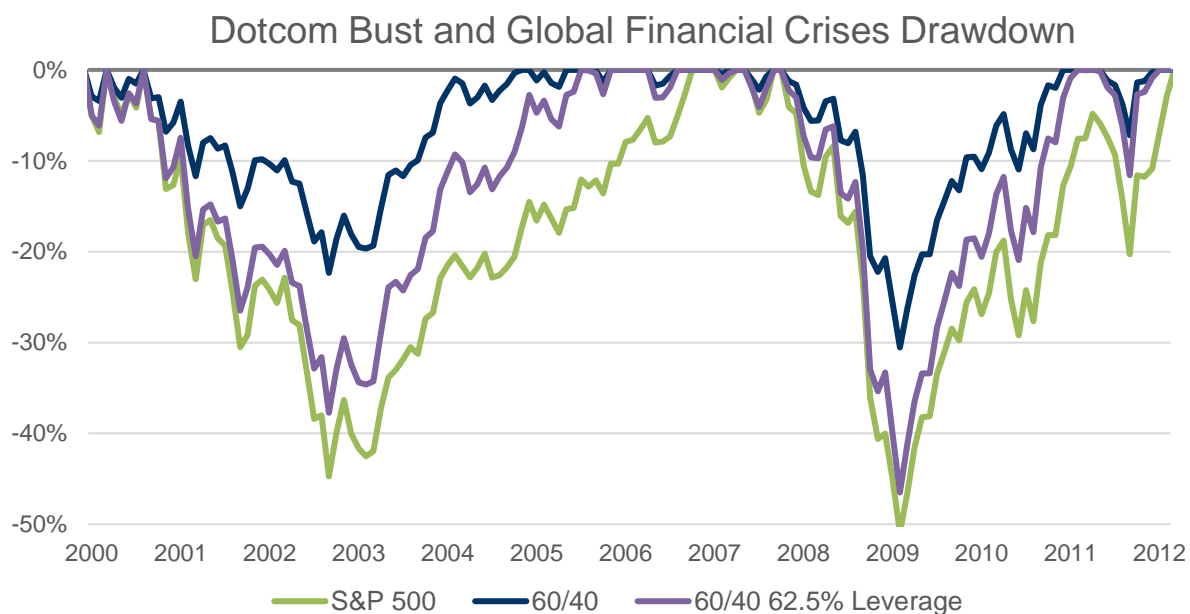


Figure 5c



Regardless of the arcane references to MPT, the 60/40 with 62.5% leverage is in essence just a long position of close to 100% in equities plus a huge leveraged bet on the spread between long duration bonds and short duration bills. It seems absurd that an investor would maintain such a cumbersome yet simplistic strategy and endure all of the drawdown risk of 100% equities in the hope of eking out a slightly better compound return over time – running the risk of long periods of underperformance.

The idea of a leveraged 60/40 portfolio appears even more unattractive when we consider the source of that sliver of outperformance observed in the backtest.

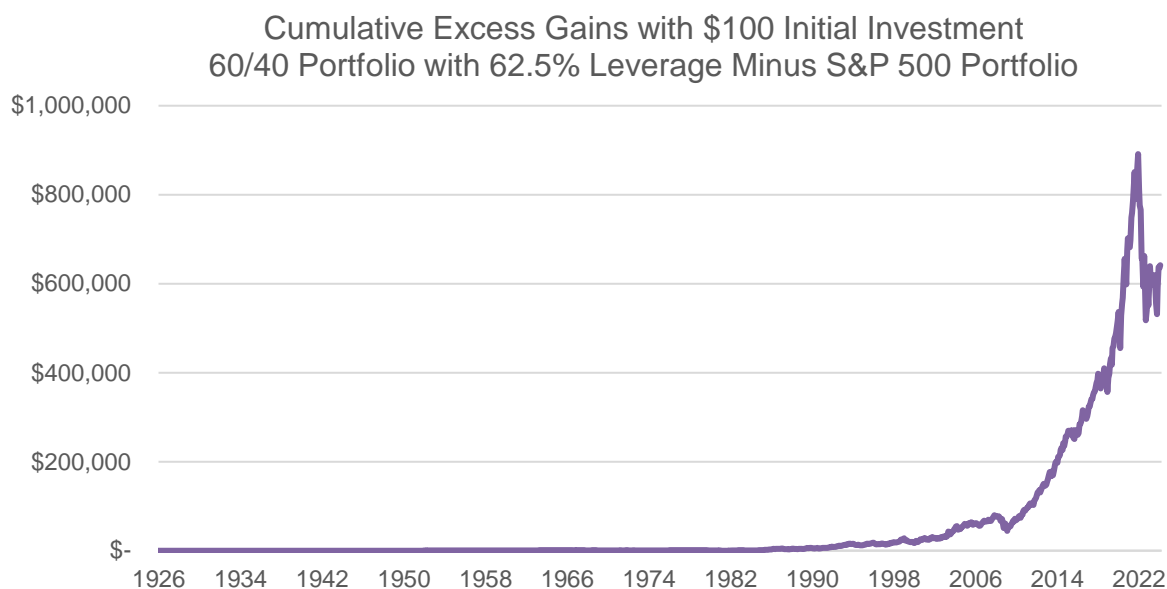
Virtually all of the long-term outperformance of the leveraged 60/40 portfolio came during the 40-year secular decline in interest rates.

U.S. interest rates peaked in the early 1980s as Federal Reserve Chairman Paul Volcker raised the federal funds rate to approximately 19% by December 1980 to combat double-digit inflation that had persisted beginning in the mid-1970s. The 1-month T-bill rate peaked at about 18.5% in February 1980 and the 10-year Treasury reached about 16% in September 1981. Thereafter ensued a 40-year secular decline in interest rates culminating in the 10-year yield reaching 0.54% during the COVID-19 pandemic in March 2020. Throughout that period the yield curve was upward sloping about 90% of the time. That combination of steadily declining funding rates from record high to record low levels along with a predominantly positive spread between long- and short-term rates created an unprecedented tailwind for the leveraged 60/40 strategy. It took roughly 40 years for interest rates to rise from the lows reached during the Great Depression to the highs in the 1980s.

Figure 6 clearly shows that the excess gains of the 60/40 portfolio with 62.5% leveraged were generated after interest rates peaked in the early 1980s. It also shows that the party ended abruptly with about one-third of those gains given back as the Federal Reserve finally hiked in response to inflation beginning in 2022.

It seems improbable that investors today will experience as favorable a tailwind for the leveraged 60/40 strategy within their lifetimes. Furthermore, the 2022-2023 experience highlights the relevance of the adage “past performance is not indicative of future results” particularly for the leveraged 60/40 strategy.

Figure 6



Leverage involves risks like margin calls that the academic backtests miss.

A leveraged 60/40 portfolio, at its core, can be thought of as taking the 100% equity portfolio and borrowing against its value to buy long-dated Treasury bonds. With the same equity components, return/risk characteristics of the leveraged portfolio should be similar to 100% equities most of the time. However, the leveraged portfolio returns will be enhanced by the bond component only when the return of the long-dated Treasuries exceeds the funding cost.

Portfolio A =
100% Equities

Portfolio B =
100% Equities + 60% UST (minus funding)

If the returns of the leveraged bond component are ultimately positive over time as these simple backtests suggest, why wouldn't everyone do this? We ask this tongue-in-cheek, of course, as the primary reason is **RISK**. Institutional investors would never apply this degree of leverage, particularly when concentrated in a single asset class (bonds) regardless of a backtest or the underlying “theory.”

The collapse of LTCM in 1998 serves as a powerful reminder of the dangers of leverage, even when applied to seemingly low-risk instruments like bonds, albeit at a much larger scale in that case. Recall that a leveraged arbitrage strategy involving on-the-run and off-the-run Treasury bonds was a major contributor to LTCM's losses. When equity markets are distressed, the cost of borrowing significantly increases, as providers of leverage are squeezed for capital and pass along higher rates for liquidity to their end users. We witnessed

margin rates more than triple during the financial crisis of 2008, with the required collateral being a variable controlled by the leverage provider.

We must also anticipate scenarios where the usual market dynamics deviate during a crisis. For example, if equities were to drop by 30% or more, it's conceivable that the bonds may not increase as expected. We had a glimpse of such an anomaly in 2022. A simple stress test (Table 2) reveals the detrimental impact of leverage when the correlation unexpectedly turns positive.

Table 2

60/40 P&L		Realized Stock/Bond Correlation										
		-1.0	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	1.0
Stock Move	-10%	-4%	-4%	-5%	-5%	-5%	-6%	-6%	-7%	-7%	-7%	-8%
	-20%	-8%	-9%	-10%	-10%	-11%	-12%	-13%	-13%	-14%	-15%	-16%
	-30%	-12%	-13%	-15%	-16%	-17%	-18%	-19%	-20%	-21%	-22%	-23%
	-40%	-16%	-18%	-19%	-21%	-22%	-24%	-25%	-27%	-28%	-30%	-31%
	-50%	-21%	-23%	-24%	-26%	-28%	-30%	-32%	-34%	-35%	-37%	-39%
	-60%	-25%	-27%	-29%	-31%	-34%	-36%	-38%	-40%	-42%	-45%	-47%
	-70%	-29%	-32%	-34%	-37%	-39%	-42%	-44%	-47%	-50%	-52%	-55%
	-80%	-33%	-36%	-39%	-42%	-45%	-48%	-51%	-54%	-57%	-60%	-62%
	-90%	-37%	-41%	-44%	-47%	-51%	-54%	-57%	-60%	-64%	-67%	-70%

Using 95th percentile Bond vol = 8.2% (Mean is 5.3%, Median is 4.7%) in the last 50 years

100/60 P&L		Realized Stock/Bond Correlation										
		-1.0	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	1.0
Stock Move	-10%	-7%	-7%	-8%	-9%	-9%	-10%	-10%	-11%	-12%	-12%	-13%
	-20%	-14%	-15%	-16%	-18%	-19%	-20%	-21%	-22%	-23%	-24%	-25%
	-30%	-21%	-23%	-25%	-26%	-28%	-30%	-31%	-33%	-35%	-36%	-38%
	-40%	-29%	-31%	-33%	-35%	-38%	-40%	-42%	-44%	-46%	-49%	-51%
	-50%	-36%	-39%	-42%	-44%	-47%	-50%	-53%	-55%	-58%	-61%	-64%
	-60%	-43%	-47%	-50%	-53%	-56%	-60%	-63%	-66%	-70%	-73%	-76%
	-70%	-51%	-54%	-58%	-62%	-66%	-70%	-74%	-77%	-81%	-85%	-89%
	-80%	-58%	-62%	-67%	-71%	-75%	-80%	-84%	-89%	-93%	-97%	-102%
	-90%	-65%	-70%	-75%	-80%	-85%	-90%	-95%	-100%	-104%	-109%	-114%

Using 95th percentile Bond vol = 8.2% (Mean is 5.3%, Median is 4.7%) in the last 50 years

With the current high fiscal deficits, it is not difficult to envision a scenario where a collapse in long-dated bonds is *causing* the crash. The stress test reveals the risk that any bank facilitating the “leverage” would be considering. Don’t you think they would be asking for more capital as the position becomes more volatile?

The reason that institutions don’t embrace this leveraged 60/40 concept stems from the recognition that leverage introduces risk far beyond the scope of oversimplified metrics like anticipated returns and drawdowns. Misjudging these risks can lead to catastrophic loss of wealth and poses significant career risk.

Conclusions

In all likelihood, equities will remain the dominant source of return, enabling long-term investors to meet their objectives. In the past, aversion to drawdown compelled investors to diversify with a large bond allocation as in a 60/40 portfolio. However, many of these investors now recognize that bonds are not a particularly effective hedge against equity tail risk and result in an unacceptably high drag on long-run performance. Predictably, proponents of Modern Portfolio Theory argue that leverage is the answer.

We have reproduced backtested results that show a 60/40 portfolio leveraged to the same volatility as an all-equity portfolio might have achieved a marginally better compound return since 1926. Nevertheless, upon closer examination, we have identified a number of flaws and pitfalls with this approach. In particular:

- The 0.5% CAGR difference seen in a backtest when leverage is chosen to equalize volatility is not significant at the 5% confidence level.
- The benefit of bonds as a diversifier, whether leveraged or not can be attributed in large part to the 40-year secular decline in interest rates, during which the 10-year Treasury yield decreased from over 16% to approximately 0.5%. Such a drastic decline is not something that can be reliably expected in the future.
- The leveraged 60/40 strategy performance was inconsistent with multi-decade periods of underperformance, calling its sustainability into question.
- To achieve equity-like returns, investors would need to apply leverage of about 60%. This is neither feasible nor desirable for most investors. Large institutional investors, such as pension funds, are currently exploring the use of moderate leverage ranging from 5 to 15%. They are more inclined to invest in private assets using that leverage than in bonds. However, it is inconceivable that any would apply leverage to invest in bonds at scale, risking severe underperformance (as in 2022) for only a marginal improvement in long-term returns.

The leveraged 60/40 portfolio is in effect just an exercise in raising the equity allocation towards or back to 100% and overlaying a bloated financed position in bonds as an inefficient and unreliable hedge against equity drawdown.

Investors would be better served to increase their equity allocation and instead add a small allocation to a more capital efficient and effective tail-risk hedging strategy. This would actually raise the compound returns while reducing the drawdown risk. At Universa, we employ a unique approach with this objective, backed by nearly two decades of experience. The underlying principles are discussed at length in the book *Safe Haven* by Universa's Chief Investment Officer Mark Spitznagel.

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The information shown in Figures 1 through 6 and Tables 1 through 2 is purely illustrative and meant to demonstrate at a conceptual level the differences among types of investment strategies or assets. None of the information shown portrays actual or hypothetical returns of any portfolio that Universa manages.

ⁱ Ennis, Richard M. "Cost, Performance, and Benchmark Bias of Public Pension Funds in the United States: An Unflattering Portrait." (March 17, 2022) <https://richardmennis.com/blog/cost-performance-and-benchmark-bias-of-public-pension-funds-in-the-united-states-an-unflattering-por>.

ⁱⁱ Anarkulova, Aizhan and Cederburg, Scott and O'Doherty, Michael S., "Beyond the Status Quo: A Critical Assessment of Lifecycle Investment Advice" (October 2, 2023). <https://ssrn.com/abstract=4590406> / <http://dx.doi.org/10.2139/ssrn.4590406>

ⁱⁱⁱ Asness, Clifford S. "Why Not 100% Equities (Or I Can't Believe We Are Doing This One Again)" (February 12, 2024). <https://www.aqr.com/Insights/Perspectives/Why-Not-100-Equities>

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^v Thaler, Richard H., and J. Peter Williamson. "College and University Endowment Funds: Why Not 100% Equities?" (*Journal of Portfolio Management*, Fall 1994), pp. 27-37.