
Derivatives Strategies for Endowment and Foundation Portfolios: The Manager Perspective

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Endowment and foundation funds typically use a mix of 60 percent equities and 40 percent fixed income in their portfolios. Historical data show, however, that for long-term investors, a 100 percent equity portfolio yields the highest returns. But the all-equity portfolio has a standard deviation of 20 percent. For investors willing to accept this level of risk, a levered 60/40 stocks/bonds portfolio actually produces returns greater than the 100 percent equity portfolio.

Many endowment and foundation funds automatically maintain a mix of 60 percent stocks and 40 percent bonds, and numerous researchers will tell them they are wrong. Charts showing the cumulative value of \$1 invested in various portfolios from 1926 through 1993 show that dollar growing to \$800 if invested in equities, \$40 if invested in bonds, and \$330 if invested in the 60/40 mix. Over a long horizon, a 100 percent equity investment has dominated the 60/40 diversified portfolio. The obvious conclusion from such evidence is that long-term investors should invest only in stocks.

That conclusion is precisely the notion that this presentation will attempt to dispel. Foundations and endowments may not be taking enough risk, but once they decide to take on additional risk, there are better ways to achieve higher returns than a 100 percent equity portfolio. This presentation, like the paper on which it is based, argues that long-term investors who are willing to bear the risk of a 100 percent equity portfolio can do better with a diversified portfolio while keeping their risk the same.¹

Benefits of Levering the 60/40 Portfolio

Comparing the returns of a 100 percent stock portfolio and those of a 100 percent bond portfolio with

¹Clifford S. Asness, "Why Not 100% Equities," *The Journal of Portfolio Management* (January 1996):29–34.

those of a 60/40 portfolio is not an apples-to-apples comparison because of differences in volatility. **Table 1** gives the returns and volatilities over the 1926–93 period for three such portfolios. Stocks have returned roughly 5 percent more than bonds on an annual basis and have also beaten the 60/40 portfolio. Average standard deviation for stocks over the entire period is 20 percent, however, which means that two-thirds of the time, stock returns should have been within 20 percent of the average return. Bonds have been considerably less volatile, about one-third the volatility of stocks. The 60/40 portfolio has also been considerably less volatile than stocks, which is to be expected because of both the presence of bonds and the power of diversification. Over the long run, returns from stocks are better than returns from bonds or a 60/40 portfolio. They should be; they are considerably more volatile.

The purpose of levering is to achieve the high returns that are desired without raising the volatility. The investor must choose a level of risk tolerance for a given amount of return or, alternatively, minimize risk for a desired level of return. For example, assuming that the 20 percent volatility from stocks is acceptable to an investor, the issue is how that investor can come up with an alternative portfolio that has the same volatility as an all-equity portfolio but provides higher returns. One solution is that, instead of putting all of the money in a very

Table 1. Performance of Stocks, Bonds, and a 60/40 Portfolio, 1926–93

Portfolio	Compound Gross Return	Standard Deviation
100 percent stocks	10.3%	20.0%
100 percent bonds	5.6	6.8
60/40 stocks/bonds	8.9	12.9

Note: Stocks represented by the S&P 500 Index and bonds by the Ibbotson Associates total-return series for long-term corporate bonds. The 60/40 portfolio is rebalanced every month. The return assumes that monthly returns are reinvested in the strategy.

Source: Clifford S. Asness, based on data from Ibbotson Associates.

volatile asset, such as equities, the investor puts all of the money in a diversified portfolio—say, 60 percent stocks and 40 percent bonds—and then borrows funds to buy more of this diversified portfolio.

The investor with the 60/40 portfolio and a standard deviation of 12.9 percent knows that some amount of leverage will get the portfolio to the 20 percent standard deviation—the standard deviation of stocks—that the investor finds acceptable. The investor can construct a new portfolio by purchasing $20.0/12.9 = 1.55$ dollars of the 60/40 portfolio and can finance this purchase by borrowing 55 cents. Putting the \$1.55 in the 60/40 portfolio provides the same volatility as the all-equity portfolio. The investor winds up with 93 cents invested in stocks and 62 cents in bonds. In other words, starting with 100 percent equities, the strategy is to take 7 percent out, invest another 62 cents in bonds, and end up with the same volatility as the all-equity portfolio.

The average return for the levered 60/40 portfolio is actually higher than the return for the 100 percent equity portfolio. For the 1926–93 period, \$1 invested in the levered 60/40 portfolio (assuming an investment of 155 percent each month in the 60/40 portfolio and –55 percent each month in the 1-month T-bill) grew to \$1,400. The results show the power of diversification; the effect operates because bonds and stocks are not perfectly correlated. The return of 11.1 percent can be compared with the returns shown in Table 1. Because the volatilities of the levered 60/40 and 100 percent equity portfolios were kept similar by design, the

60/40 levered portfolio is shown to clearly dominate the all-equity portfolio on risk–return.

Implementing the Levered Strategy

This strategy can be implemented in two ways. One way is to simply borrow the additional funds required, which creates the leverage. Because of possibly prohibitive borrowing costs and organizational constraints on borrowing, this strategy may be difficult to implement.

An alternative approach is to use futures contracts—specifically, purchase the 60/40 portfolio, go long the appropriate amount of S&P 500 Index contracts to get from the 60 percent to the 93 percent exposure in stocks, and also take a long position in a bond index to get up to the desired 62 percent exposure in bonds. This approach comes very close to levering up the 60/40 portfolio to the desired 20 percent standard deviation with low transaction costs and without outright borrowing.

Using futures, however, presents a couple of problems. One is that futures generally require posting a small margin amount; fortunately, this requirement does not change the results much. Second, because futures are marked to market daily, all gains or losses on the futures contract have to be settled up that day. This problem is not likely to be severe. At 1.5 to 1.0, the 60/40 portfolio would have to go down more than 60 percent in a day to create a bankruptcy problem, which is highly unlikely. Other problems are potential mismatches between bond indexes and available bond futures contracts. No futures contract is available for many of the common corporate bond indexes—for instance, the Ibbotson long-term corporate series used in this study. Although Treasury futures have high correlations with corporate bond indexes, some mismatch is bound to occur.

Another issue is that in dealing with levered, derivatives-based strategies, the analysis should include worst-case scenarios. Table 2 describes a few such disastrous scenarios over the 1926–93 time

Table 2. Returns for Worst Months and Years: Levered 60/40 and 100 Percent Equity Portfolios, 1926–93

Period	Index	Worst Month/Year and Return	Worst Year and Return
1926–93	100 percent stocks	9/31 –29.7%	7/31–6/32 –67.6%
	Levered 60/40	9/31 –27.8	7/31–6/32 –66.6
1946–93	100 percent stocks	10/87 –21.5	10/73–9/72 –38.9
	Levered 60/40	10/87 –17.2	10/73–9/72 –44.2

Source: Clifford S. Asness, based on data from Ibbotson Associates.

period and the returns to the 100 percent equity portfolio and the levered 60/40 portfolio. Some of the worst cases are slightly worse for one portfolio or the other, but essentially, the worst-case scenarios are comparable (at least at the monthly level). Using the past can be dangerous, of course, but in the past almost 67 years, no case has been much worse for the levered 60/40 portfolio than for the 100 percent equity portfolio.

One of the difficulties in quantitative research is that data for long periods are required to make strong statistical statements, but a model is only as good as its out-of-sample performance. Therefore, although the period is only two years, **Table 3** compares some out-of-sample results with the historical results for the levered 60/40 portfolio and the 100 percent equity portfolio. Even though, by construction, the risk in the two portfolios is the same, the

levered 60/40 portfolio outperformed the all-equity portfolio for this short out-of-sample period by about 200 basis points.

Conclusion

The investment decision requires resolving two issues. One is to choose a level of risk tolerance for a given amount of return or, alternatively, minimize risk for a desired return level. The second issue is to construct portfolios that best achieve the objectives. Levering the traditional endowment/foundation portfolio mix of 60 percent equities and 40 percent bonds produced the same volatility as an all-equity portfolio with more return for the 1926–93 period and for two out-of-sample years, 1994 and 1995.

The leverage can be obtained through outright borrowing to buy the additional assets, but this approach has drawbacks. Futures, however, are an exceedingly simple and efficient way to implement a strategy that levers up the 60/40 portfolio to attain higher risk-adjusted returns than by using an all-equity portfolio. Leverage and derivatives are not the only solution; funds can consider adding small-capitalization stocks or alternative assets to obtain the higher returns while adding bonds to maintain diversity and improve the risk–return trade-off.

Table 3. Comparison of Historical Data with Out-of-Sample Results for 1994–95

Portfolio	Compound Gross Return, 1926–93	Compound Gross Return, 1994–95
100 percent stocks	10.3%	18.9%
100 percent bonds	5.6	9.6
60 percent stocks, 40 percent bonds	8.9	15.1
Levered 60/40	11.1	20.8

Source: Clifford S. Asness, based on data from Ibbotson Associates.

Question and Answer Session

Clifford S. Asness
Laurence B. Siegel

Question: Does the cost of portfolio insurance exceed the benefits?

Siegel: The cost of portfolio insurance will always exceed the benefits if the market does not fall or if you hold the portfolio insurance position forever; the costs continue to roll in, but over the long run, the market rises, so you lose. If you buy portfolio insurance before a market decline and then terminate the program after it pays off, then the costs don't exceed the benefits. So, cost has something to do with your ability to time the strategy. As a long-term strategy, it may be a loser.

Question: Mr. Asness, did you include the trading cost associated with the futures strategy?

Asness: Most of my work was comparing one passive portfolio with a levered passive portfolio. I did omit trading costs in most of the analyses. I discuss a couple of borrowing assumptions in the paper published in *The Journal of Portfolio Management*. I also discuss what happens if you make those more onerous assumptions and at what point the levered 60/40 strategy would actually not be better.

Question: Mr. Siegel, are the fundamental characteristics of founders' stock fairly constant, or do they change enough so that a portfolio counterbalancing heavy founders' stock has to be constantly rebalanced?

Siegel: The fundamental characteristics of stock do change, and you should change your companion portfolio if the risks of the

heavily weighted company change over time. Also, the method of using a counterbalancing portfolio is not powerful enough to reduce the risks from overweighting completely because not enough securities exist with the right characteristics to undo more than 10–15 percent of a fund in founders' stock. When the fund has 20 percent or more in founders' stock, it will have a certain amount of unsystematic risk no matter what it does with other stocks.

Question: In the levered 60/40 strategy, should one restrict the portfolio to the S&P 500 and Treasury securities, or can one use any kind of stocks and bonds?

Asness: The bond and stock example I used was meant to be illustrative only. The message I want to emphasize has two aspects. First, you want to make the decision about how much risk you are willing to bear and how much return you are trying to achieve somewhat separately from the decision about how to build the portfolio. You do not want to go automatically to the one asset that happens to match one of those two parameters. The second aspect of the message is that derivatives are, in many cases, an efficient way to implement a risk–return strategy. The analysis and the message are not meant to apply only to stocks versus bonds.

Siegel: I would add that if you relax the constraint of never having more than 100 percent or never having less than zero in an asset, you are going to get more opportunities that earn high rates of return per unit of risk. Say you can go

more than 100 percent in stocks and bonds combined or less than zero in cash by borrowing cash, then the efficient frontier moves up and to the left, and you are better off.

Question: When you take into consideration the transaction costs of rebalancing, what is the most efficient derivatives tool to implement the levered 60/40 strategy—options or futures?

Asness: A lot depends on your time frame. If you are changing allocations, futures are very, very strongly recommended. The top three or four index futures that are actively traded and have a very large open interest would be the best tools. The S&P 500 futures contract, the 30-year Treasury-bond contract, and some other Treasury contracts are extremely cheap to trade.

Some of the swap solutions become competitive with futures if you are going to hold the securities for a long period; you have to roll futures over, in effect, because they have short-term maturities. Those roll-over costs can add up over the long term. They are not excessive, but a long-term swap can be a little cheaper. Swaps, however, do not offer the same flexibility for tactical rebalancing.

Question: What applications of derivatives would significantly reduce the risk of a portfolio?

Asness: Let's take another example. If you assume a fund has 100 percent invested in bonds and apply the logic that the fund should be diversified, I would argue that putting a third of its

money in cash, a third in bonds, and a third in equities would provide comparable volatility to investing it all in bonds and would offer more expected return. This argument is much easier for most to accept than the one I presented because it does not involve any

leverage. In fact, it involves increasing cash.

Many of the arguments about using derivatives or being at the right point on the efficient frontier and separating the decision work equally well from the perspective of increasing return for risk or

reducing risk for return. Everyone wants to focus on the raising-return side because it is more fun and more interesting, but you can also focus on holding the return equal and reducing the risk.