

ABR Dynamic Funds' Portfolio Construction Series: Part 21

Leverage has been a poor measure of risk but a useful tool for setting risk

This installment begins briefly with some comments on leverage as a poor measure of risk, and then it uses real-world sources of leverage (including their costs) as a tool to set risk.

Leverage as a Measure of Risk

Consider two pairs of portfolios to illustrate. In both pairs, only Portfolio 2 was leveraged, and, in both pairs, it is very hard not to conclude that Portfolio 2 was less risky.

- Pair 1
 - Portfolio 1: 100% Tesla stock
 - Portfolio 2: 200% short-dated U.S. treasury bills

- Pair 2
 - Portfolio 1: 100% S&P 500
 - Portfolio 2: 100% long exposure to the S&P 500 plus 100% short exposure the S&P 500

Granted these are extreme examples, but they serve to illustrate the point that simply measuring leverage does not take into account what is being leveraged. **In fact, it has actually been theoretically possible to add to a portfolio, even to the point of leverage, while *reducing* the portfolio's risk, provided the addition could have been counted upon to win when the rest of the portfolio lost.**

At this point some readers may be thinking of rebuttals:

- In more realistic situations than the above two pairs of portfolios, leveraging a particular investment 2:1 would have doubled that investment's gains and losses.
 - True, but that doubling of the gains and losses would have been precisely captured as a doubling of volatility. As a measure of risk, leverage added nothing to volatility in this case.

- Some leveraged investments, like private equity, come with lockup periods.
 - True, but that is a feature of the illiquidity, not the leverage, of the investment. It has been possible to use leverage while retaining intra-day liquidity.

Leverage as a Tool for Setting the Desired Level of Risk

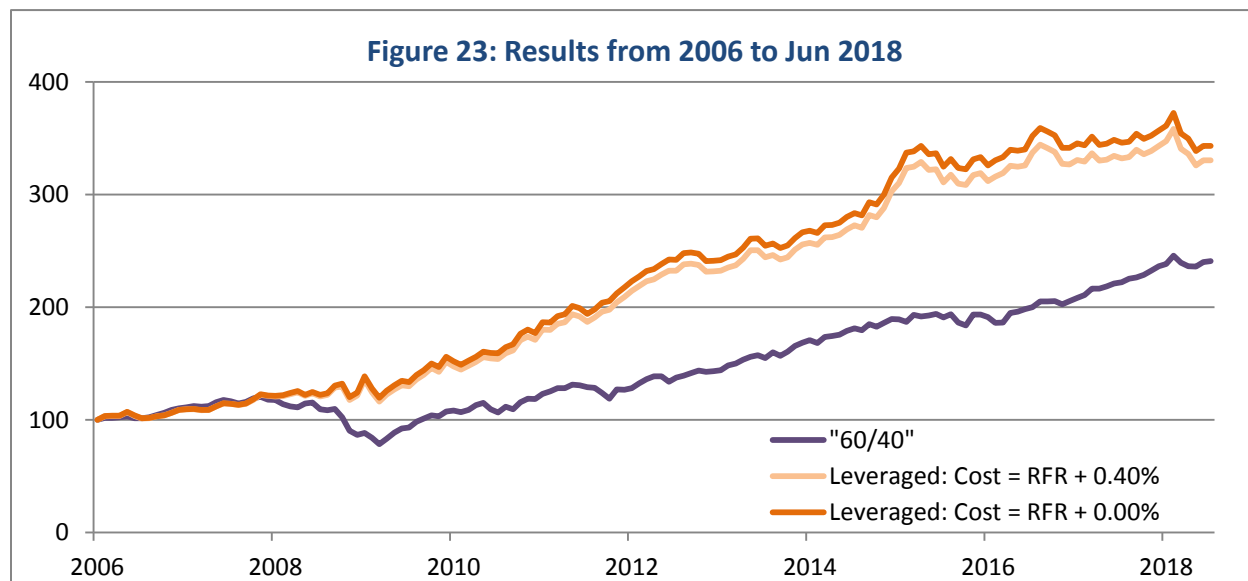
Installment 20 showed several leveraged portfolios, net of the risk-free rate as a borrowing cost. For example, see Figure 15 and Table 4 on page 3 of [installment 20](#). The current installment will build on that foundation by running the same principle of maximizing the reward for every dollar put at risk while including a hypothetical cost of leverage (a bit higher than the risk-free rate, of course).

As a brief reminder, "SPY" is equity behavior; "TLT" is interest rate behavior; "LV" is long volatility behavior; and "MF" is managed futures behavior, and all portfolios will be constructed by combining those four components to maximize the reward for every dollar put at risk. For a brief summary of all

four components as well as their individual performance graphs, please see the Appendix at the end of installment 20.

Borrowing

For the cost to leverage via borrowing, we are using the risk-free rate (RFR) plus 0.40% per year.ⁱ The following graph and table (Figure 23 and Table 7) show the results and allocations of a RFR+0.40% cost-of-leverage portfolio compared to the RFR cost-of-leverage portfolio from installment 20, where both portfolios match the volatility of "60/40."



Source: ABR White paper (data from Bloomberg)

Table 7 Jan 2006 - Jun 2018	"60/40"	VARYING COST OF LEVERAGE - BORROWING	
		RFR + 0.40%	RFR + 0.00%
Annualized Return	7.29%	10.04%	10.37%
Annualized Volatility	8.98%	8.98%	8.98%
Sharpe Ratio	0.66	0.97	1.01
Maximum Drawdown	34.8%	14.2%	13.7%
"SPY" Allocation	60%	57%	56%
"TLT" Allocation	0%	30%	29%
"LV" Allocation	0%	66%	70%
"MF" Allocation	0%	22%	22%
COREPLUS Bond Allocation	40%	0%	0%
Leverage	0%	75%	78%

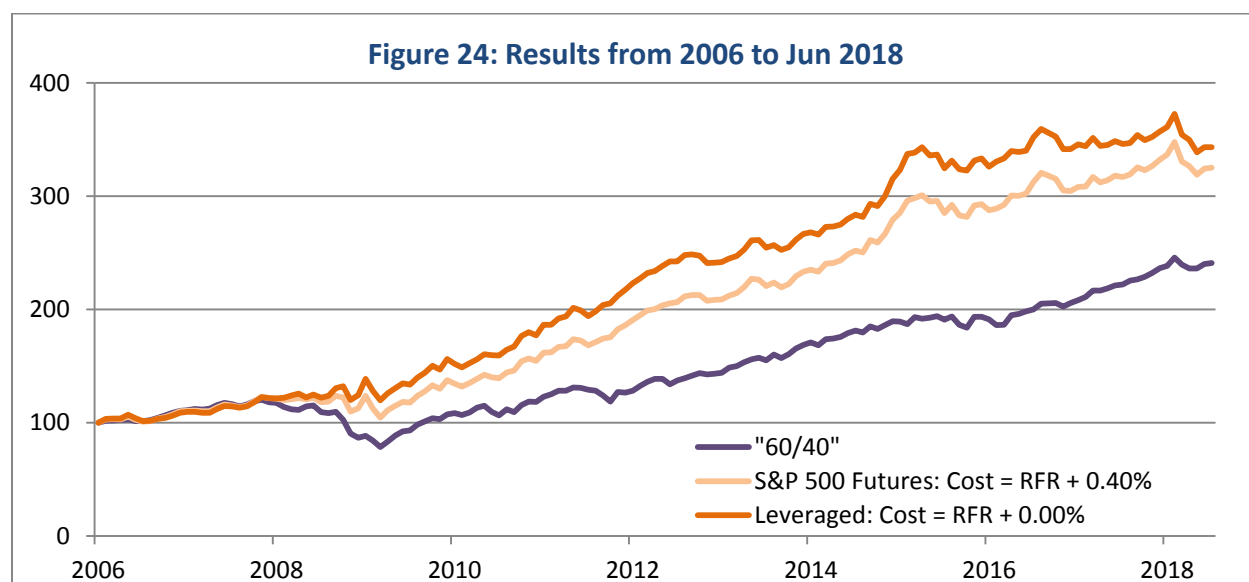
Source: ABR White paper (data from Bloomberg)

Futures

There are other ways to achieve leverage-like behavior for investors who cannot or will not borrow. Many of them are beyond the scope of this series. However, one of them is the use of futures.

S&P 500 futures typically require only about 5% of the notional value to be held as margin. That would free up 95% of the "SPY" allocation to be used for leverage. The following graph and table (Figure 24 and Table 8) show the result for an investor who wished to use futures with no other source of leverage. Futures typically underperform their underlying index by about the interest rate as a condition of being free from arbitrage opportunities. We have again used the risk-free rate plus 0.40% (RFR+0.40%) to account for this underperformance of futures.

One additional constraint has to be added to the optimization: the leverage must be less than or equal to 95% of the "SPY" allocation to allow S&P 500 futures to be the only source of leverage. Treasuries can often be used to post margin for futures, rendering this additional constraint unnecessary due to the "TLT" allocation, but we are ignoring that possibility in this illustration (its result is shown above in Figure 23 and Table 7). The results are still quite compelling.



Source: ABR White paper (data from Bloomberg)

Table 8 Jan 2006 - Jun 2018	"60/40"	VARYING COST OF LEVERAGE - S&P 500 FUTURES	
		RFR + 0.40%	RFR + 0.00%
Annualized Return	7.29%	9.89%	10.37%
Annualized Volatility	8.98%	8.98%	8.98%
Sharpe Ratio	0.66	0.95	1.01
Maximum Drawdown	34.8%	15.6%	13.7%
"SPY" Allocation	60%	62%	56%
"TLT" Allocation	0%	33%	29%
"LV" Allocation	0%	45%	70%
"MF" Allocation	0%	19%	22%
COREPLUS Bond Allocation	40%	0%	0%
Leverage	0%	59%	78%

Source: ABR White paper (data from Bloomberg)

As promised 20 installments ago in the introduction, we have arrived at a much improved portfolio, net of a realistic cost of leverage in Figures 23 and 24. It significantly increased the return and Sharpe

ratio of “60/40” while matching the volatility and halving the maximum drawdown. It did so simply by maximizing the reward for every dollar put at risk and by using leverage as a tool to dial risk up or down to the desired level. In other words, and also as promised in the introduction, it was the result of Modern Portfolio Theory (MPT) applied across asset classes instead of within them. Finally, it was relatively simple; it was achieved with nothing more than four benchmarks and the “Solver” tool in Excel.

Observations

1. Leverage was a poor measure of risk but a useful tool for dialing up or down risk, which was better measured by volatility. See [installment 4](#) for more on that topic.
2. The lessons of [installment 6](#), [installment 13](#), and the “Fooled by the Wrapper” [installments](#) were on full display here.
 - a. A high volatility component behavior just meant less of it was required in order to achieve the same result on the whole portfolio. That would have reduced the need for, and the cost of, leverage.
 - b. Conversely, a low beta investment, with a high correlation, mostly just tied up too much capital without providing diversification.
3. Significant allocations to truly uncorrelated alternatives (“LV” and “MF” in these installments, but that is not meant to suggest they were the only ones) were required to maximize the reward for each dollar put at risk.
 - a. This is the fundamental idea of MPT. *It has been possible to achieve the average return of a basket of investments with less than their average volatility.* The reduction in volatility was bigger for less correlated investments.
4. Long-term outperformance required patience. These improved portfolios did not beat “60/40” in strong bull markets.
 - a. Performance chasers likely reduced their diversification and long-term results, in line with [installment 7](#).
 - b. However, these improved portfolios beat “60/40” over the full market cycle and didn’t lag very much in strong bull markets. Furthermore, they were likely a much easier investing plan to stick with, especially in crises ([installment 15](#)).

Looking Ahead: Over the next two installments, we will address the following questions:

- *What adjustments can be made for the fact that these results are based on historical data but investors cannot invest in the past?*
- *Once investors have selected the behaviors they want in their portfolios, how might they go about selecting specific investments to gain exposure to those behaviors?*

ⁱ A borrowing cost of 0.40% over the risk-free rate is a figure used in other material, and, at the time of this writing, there is a broker-dealer offering 0.30% on balances over \$3M.