A Second Look at the 'Floor-Leverage Model'

By Kerry Pechter *Thu, Nov 7, 2013*

Two weeks ago we reported on new research by Jason Scott and John Watson of Financial Engines about a retirement income strategy that combines 85% safe assets with a 15% allocation to a triple-leveraged, daily-balanced ETF. One reader contested its value, and one of the authors has replied.

A little controversy always helps draw attention to an important topic that might otherwise go unnoticed.

Our cover story from two weeks ago about using a triple-leveraged ETF fund for upside in an otherwise low-risk retirement portfolio strategy ('The Floor-Leverage Model," October 22, 2013) elicited a note of admonishment from Laurence B. Siegel, the director of the Research Foundation of the CFA Institute.

The *RIJ* article reported on a retirement investment strategy that Jason Scott and John Watson of Financial Engines described recently in the *Financial Analysts Journal*. They recommended investing 85% of savings in safe assets (for stable income) and the rest in one of the off-the-shelf, daily-rebalanced triple-leveraged exchange-traded funds that are currently offered (for upside).

Siegel, the author and co-author of many scholarly articles on retirement income and related financial themes, copied *RIJ* on an email saying that the strategy wouldn't work as advertised—or not as many readers were likely to believe it would work. We forwared Siegel's remarks to Jason Scott. Scott responded that the 3x ETFs that he used have an internal mechanism that might resolve Siegel's objection.

Here's Siegel's original note:

"One problem (among many) with the triple-leveraged strategy is that the 3x leveraged portfolio does not deliver 3x the market return! It's less, and can be much less, and can even be negative when the market return is positive.

"Take a hypothetical $100 investment in the 3x leveraged exchange-traded fund. Say the market falls 10% on the first day. The portfolio delivers a minus-30% return so you have $70 left. The next day, the market returns to its original level, which means it experiences a positive 11.11% return.

"The 3x portfolio delivers a +33.33% return so the $70 now grows to $93.33, not $100. If the market is this volatile (a standard deviation of 10% per day), the erosion of value takes place at 6.67% every two days until you have essentially no money left, while the market itself is unchanged. In practice, the market's volatility is a little less than 1% per day, not 10%, so the erosion is slower.

"Note that it's possible to take advantage of this mathematical property of leveraged ETFs. After the market has fallen 10%, you "top up" by buying $30 more of the 3x leveraged fund. When the market then rises 11.11%, the portfolio grows from $100 to $133.33. You are now beating the market! Your cost basis is $130 but your portfolio value is $133.33, again while the market has gone nowhere. But this takes a lot of trading and a lot of spare cash, and almost nobody does it."

Here's Scott's reply:

"I completely agree that the 3x leverage fund does not deliver 3x the market return. Beyond a single day's return, 3x the market is not an appropriate benchmark given the fund is short (i.e., has borrowing costs) and is rebalanced daily.

First, borrowing costs are clearly a drag on the leveraged return. Logically, without alpha, a $1 investment can't generate the returns of a $3 investment. You have to consider the costs associated with borrowing the other $2.

The other factor, beyond borrowing costs, is the daily rebalancing of the 3x fund. Simple compounding dictates that the 3x leveraged fund won't deliver 3x the market return over longer periods.

A quick example: Suppose the return on the market for one day is R and the next day is S. The cumulative market return is (1+R)*(1+S) – 1, or R + S + 2*R*S. The cumulative return on the 3x fund rebalanced daily is (ignoring borrowing costs) (1+3R)*(1+3S) – 1, or 3R + 3S + 9*R*S

Note that the 3x leveraged fund's two-day return isn't three times as large as the market's two-day return. The cross-term from compounding (R*S) is different. This becomes a bigger and bigger factor as the time horizon expands.

Given the difference in returns, which investment is better? Neither is better *per se*, but if you want to implement a CPPI strategy, the daily-rebalanced fund is the appropriate choice.

A CPPI strategy is conservative when you are near the floor and aggressive when you are better able to absorb losses. For instance, if you have 1% of wealth above the floor, a CPPI-3 strategy would hold a 3% equity position. Similarly, if you have 15% of wealth in excess of the floor, a CPPI-3 strategy would hold a 45% equity position. The daily-rebalanced 3x fund provides this consistent triple exposure. A 3x-the-market strategy doesn't.

Another illustration of this point: Suppose you take $1, borrow $2 and invest the entire $3 in the market with a buy and hold strategy. Without borrowing costs, your returns will be 3x the market. If the market drops by 20%, your $3 investment in the market drops to $2.40. Because you are using a buy and hold strategy, you don't change a thing. The result is that you have $0.40 in value controlling a $2.40 portfolio.

In other words, your leverage ratio after a 20% market drop has ballooned to 6! This is much riskier than the CPPI target surplus leverage of 3. You risk losing the remaining $0.40 of surplus (and perhaps erode the floor as well).

The daily-rebalanced leverage fund starts off the same way. You have $2 in borrowed money and $3 invested in the market. A 20% market drop results in a $2.40 market exposure. Because of the rebalancing, however, the daily 3x fund uses $1.20 to retire debt. After this rebalance, the positions look just like they would have had the initial investment been $0.40—$0.40 invested, $0.80 borrowed and $1.20 market exposure. The target 3x exposure is retained.

The Floor-Leverage Rule approach does not suggest investing in the 3x leverage fund because it somehow will deliver long-term performance equal to 3x the market (it obviously does not and cannot). *Rather, the purpose of the 3x leverage fund is to combine with the risk-free investment to deliver buy-and-hold CPPI returns.* (Author's emphasis.) In that regard, the 3x fund delivers the expected performance.

Let me put it a different way. Suppose you take a CPPI-3 strategy and decompose it into a risk-free portfolio that guarantees the CPPI floor and a residual portfolio. The returns from the residual portfolio will be the same as the returns generated by a daily-rebalanced 3x leverage fund. The residual portfolio will *not* generate three times the market return over any time horizon.

The historical performance section of the paper and the CPPI discussion cover this in detail. I should underscore again that this research reflects my views and those of my co-author, and may or may not reflect the views of Financial Engines.

"A very high level summary of the paper is:

- A theoretical model suggests that an annually-reviewed CPPI strategy should appeal to an average-risk retiree with a preference for sustainable spending.
- The desired CPPI strategy can be implemented with minimal transactions (annual) and a guaranteed floor if a 3x leverage fund is available for investment.
- Such an investment has been recently introduced.
- One possible outcome: the Floor-Leverage Rule for Retirement.

In a follow-up email, Scott responded to a question from RIJ about the timing of transfers of profits from the 3x leveraged ETF to the flooring account. His reply:

"Harvesting should occur only if the leveraged account exceeds 15% of the total portfolio value. As such, harvesting should never exhaust the leverage account. Poor markets could result in the leverage account failing to provide any income increases. In principle, the value of the leverage account shouldn't go to zero unless the share price of the leverage ETF goes to zero.

"I haven't investigated whether harvesting more often than annually would improve efficiency. I would guess the impact is marginal. More frequent harvesting might be warranted in a large market run-up. Taking money off the table immediately seems like a better strategy than being potentially over-exposed to the market."