
# The Leveraged ETF Compounding Problem

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Exchange traded funds (ETFs) are similar to index mutual funds. Unlike mutual funds, however, which trade only once a day, ETFs trade at varying prices throughout the day similar to stocks. Since State Street Global Investors introduced the first ETF in the United States in 1993 (SPDR, which tracks the S&P 500 Index), investments in ETFs have grown rapidly to $2 trillion in 2010 from $66 billion in 2000. Moreover, underlying ETF portfolios have expanded to include bonds, foreign stocks and commodities.

Investors have the ability to leverage purchases of ETFs, which can double or triple the returns. This sounds like a good idea for long-term investors, however, the rebalancing necessary to magnify the underlying index on a daily basis can cause serious long-term compounding issues, generally referred to as the "constant leverage gap" The predominant conclusion from most studies of leveraged ETFs is that, since volatility exerts the greatest influence on investment returns for ETFs, long-term investors need to be cognizant of volatility levels and devise an investment strategy which anticipates and accounts for this phenomenon (See, for example: Guedj, Ilan, Guohua Li, and Craig McCann. "Leveraged and Inverse ETFs, Holding Periods and Investment Shortfalls", *The Journal of Index Investing*, Winter 2010.

Thus, the critical question becomes: what level of volatility is too high for successful long-term holding of leveraged funds? William J Trainor, Jr. concludes that there is no definitive method to determine exactly what volatility is too high given that holding leveraged funds for an extended period, even during periods of high volatility, can be justified by the mere expectation of very high expected returns (See: "Solving the Leveraged ETF Compounding Problem", *Journal of Index Investing*, Spring 2011). Trainor nevertheless points out that, given that bullish leveraged funds are likely to outperform in low-volatility conditions and do poorly in highly volatile markets, investors need some indicator of when markets are likely to become less favorable. His recommendation is a simplistic use of the VIX (Chicago Board Options Exchange Volatility Index), a popular measure of implied volatility of S&P 500 index options, to project future volatility. His formulation to minimize the compounding problem is to invest in leveraged ETFs only during periods of expected low volatility, defined by VIX values of less than 20% standard deviation.

While this concept has merit, a model that is ETF index specific, has a statistical basis and rationale, and takes into account an investor's risk tolerance prior to the initial investment decision would seem to be a preferred strategy. Such a methodology is the use of stop orders based on the standard deviation of investment specific leveraged ETFs. By placing a stop order an investor makes a decision about the selling point before the actual sale, and in so doing, reduces the risk of significant losses. While losses cannot be eliminated, by assuming a normal distribution of price movement, it is possible to predict a range of probable outcomes. For example, if an investor is willing to accept a 16% chance of being stopped out due to random variability, a one standard deviation stop order would be the decision rule. Probabilities of 7% and 2% correspond to 1.5 and 2.0 standard deviations, respectively. (See: Schalow, David L. "Setting Stops with Standard Deviations", *Journal of Portfolio Management*, Summer 1996). An example of how using stop orders to reduce variability in leveraged ETFs, and thus risk, was demonstrated by eliminating weekly observations that exceeded one standard deviation below the mean price during the three year period ending May 30, 2011 for QLD (Proshares Ultra QQQ), the 2X leveraged ETF for the PowerShares QQQ, where the standard deviation was reduced by 15%, from $20.86 to $17.75.