Long-Term Investing With Leveraged Exchange Traded Funds

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Abstract
The aggressive design of new investment products – like exchange traded funds (ETF) – provides more choices for investors to manage wealth. Recent innovations of leveraged and inverse ETFs entice investors to integrate the compounding of leverage into a traditional long-term portfolio strategy. The following illustration and analysis provides evidence that long-term strategies involving leveraged ETFs is appropriate only for sophisticated investors that can utilize short sales and pairs trading. Buy and hold strategies that include leveraged ETFs will experience decay and erosion of capital at multiples larger than what would be expected. Furthermore, simple buy and hold strategies could even produce returns opposite to those expected.

Keywords: leveraged exchange traded funds, decay, inverse ETF

1. Introduction

Exchange Traded Funds (ETF) have grown in popularity over the past twenty years, from the first U.S. ETF in 1993 that tracks the S&P 500 Index (SPY) to almost 1,000 today. They are attractive instruments in a portfolio for several reasons. First, some ETFs have tax advantages over traditional mutual funds as realized income may be considered a lower-taxed dividend. Actively managed mutual funds, on the other hand, may pass on capital gains and make the owner liable for higher taxes even when the investor continues to hold the position. Second, many ETFs track a particular index such as the S&P 500 and have lower turnover, thereby reducing the expenses and costs associated with the fund. Third, ETFs afford the investor the ability to trade these investments like an individual stock, while often offering the diversification of a mutual fund. Mutual funds are sold once per day at the closing Net Asset Value of the fund, while ETFs are liquid and can be traded throughout the day, making them much more liquid than traditional funds.

The evolution of ETFs has been aggressive and creative. Investors have a wide range of ETFs available with a comprehensive menu of investment categories. These products offer a simple solution for the small investor looking to gain exposure to any asset class. The existence of ETFs allows the small investor to build a diversified, low cost portfolio for their goals, risk tolerance, or investment strategy. Day traders can also benefit by placing macro bets on sectors or indices with less risk than they would otherwise take on an individual stock. The liquidity of the majority of ETFs is also conducive to traders attempting to place short term trades.

Several companies have pushed the envelope on these products and now offer ETFs that double or even triple the daily movements of popular market indices or sectors. While several ETF families and mutual fund families offer these leveraged ETFs, this analysis will focus on ProShares and Direxion which offer two of the most popular leveraged instruments. ProShares designed ETFs to double the daily returns (before fees and expenses) of a particular index or benchmark. They also have developed ETFs that may double the inverse of a market index, that is, moving twice that associated index but in the opposite direction. Over 60 ProShares ETFs are segmented by market capitalization, style, sector, asset class, commodity type, and currency. Direxion is even more aggressive in the design of ETFs and offers products that move three times the direction or three times the opposite direction of the stated index.

These investments have become popular with investors and traders as the super bullish or super bearish investor can through the use of a leveraged ETF double or triple their bet without the use of margin or credit. The average daily volume traded each day of many of these ETFs approaches 100 million shares. Not only do these investments see active trading volume, but they are also hot topics on financial websites, blogs, chat rooms, newspaper and magazine articles and other sources of media and information. A quick search on any search engine will return a wide array of information devoted to leveraged ETFs.

2. Characteristics of Leveraged ETFs

The initial attraction to leverage ETF investment vehicles is compelling. They offer the ability to magnify your returns and earn a higher and faster return on investment in a simple transaction. The average investor can now gain the benefits of leverage without using options, futures, or margin. On the other hand, the initial investment is exposed to increased risks and can quickly produce significant losses. The inherent volatility makes leveraged ETFs inappropriate for an investor who is risk averse. This paper considers leveraged instruments for longer-term investors. The typical long-term investor believes that the market (stocks) will be higher in the future than it is today; at least that is what traditional financial research demonstrates [Evans (1968), Fama (1998), Shiryaev, Xu and Zhou (2008)]. If the primary reason that people invest is to increase wealth, then perhaps a buy and hold approach, which is the conventional wisdom, using leveraged ETFs could help investors reach their goal two or three times faster than investing in a non-leveraged or traditional ETF.

Investopedia.com defines leverage as “the use of various financial instruments or borrowed capital, such as margin, to increase the potential return of an investment.” The semi-annual report for ProShares gives detailed information on the components of each ETF they offer. The ProShares Ultra ETF seeks daily investment results that correspond to twice (200%) the daily performance of the index or sector that it tracks. The holdings for Ultra consist of common stock, swap agreements, and futures contracts. The ProShares UltraShort ETF seeks daily investment results that correspond to twice (200%) the inverse (opposite) of the daily performance of the index or sector that it tracks. The only holdings in UltraShort are swap agreements.

Direxion funds follow a similar strategy. The prospectus states that Bull 3X ETFs seek daily investment results of 300% of the price performance of the target index. Under normal circumstances, the funds create long positions by investing at least 80% in the common stock of the underlying index. Direxion also invests in financial instruments that combine to provide leveraged and unleveraged exposure to the target index. The Bear 3X ETFs do not invest in equity securities but focuses exclusively on swap contracts.

3. Risks of Investing in Leveraged ETFs

After reviewing the basic strategy of leveraged ETFs as well as their holdings, the risks of investing in these funds should be compared to the risk of the market. The additional risks above and beyond what would be encountered in a traditional equity investment include, but may not be limited to, tracking error risk, aggressive investment techniques risk, leverage risk, counterparty risk, credit risk, daily correlation risk, daily rebalancing risk, high portfolio turnover risk and market volatility risk.

Tracking error risk affects the ability of a fund to achieve its daily target. Factors that may contribute to this include fees and expenses (0.95% annually for funds in each family), high portfolio turnover, transaction costs, or a temporary lack of liquidity for the securities held by the fund. Direxion acknowledges that returns could be worse than expected. That is, despite the attempt by the fund managers to create a fund that tracks an index, the combination of other risks could produce returns in the ETF that are significantly different from those of the index they are designed to mimic. In addition, a fund that meets its daily target over a period of time may not produce the returns that might be expected in light of the returns of its index or benchmark for that period. Differences may result from the compounding effect of daily market fluctuations, the use of leverage and the inverse correlation on short or Bear funds. This means that the funds may return less than expected given the amount of risk that an investor is taking to earn the double or triple return.

Daily correlation risk is similar to tracking error risk in that the fund may not have a high degree of correlation to its benchmark, consequently preventing the fund from achieving its investment objective. Factors that can contribute to this risk include fees, expenses, transaction costs, costs associated with the use of leveraged investment techniques, income items, accounting standards and disruptions or illiquidity in the markets for the securities or financial instruments in which the fund invests.

Aggressive investment and leverage risk means that an investor must be willing to accept extreme volatility and through the use of leverage will incur financing charges which will affect the performance of the funds. As interest rates rise, the cost of executing the investment strategies that use margin or credit to gain the return multiple will rise as well.

A fund will be subject to credit risk with respect to the amount it expects to receive from counterparties to financial instruments and repurchase agreements entered into by the fund. In the event a counter party becomes bankrupt or otherwise fails to perform its obligations due to financial difficulties, additional costs are borne by the fund and the investor. A fund may experience significant delays in obtaining any recovery in a bankruptcy or other reorganization proceeding, or the fund may obtain only limited recovery or no recovery at all. This happened to ProShares on September 15, 2008 when Lehman Brothers Holdings, Inc. filed a petition for Chapter 11 bankruptcy. Some settlement payments to the funds were delayed as a result of the Lehman bankruptcy (Checkler, 2012). While ProShares agreed to reimburse any losses the funds may have incurred, this risk is an additional consideration for an investor.

Portfolio turnover will have a negative impact on longer-term investors. Frequent trading could increase the rate of creation and redemption of fund shares and the portfolio turnover which could further increase the expenses to a fund. Since the portfolios of both ProShares and Direxion are rebalanced every day, daily transaction costs will be incurred by investors who own these funds for the long term, thereby exposing them to an additional risk.

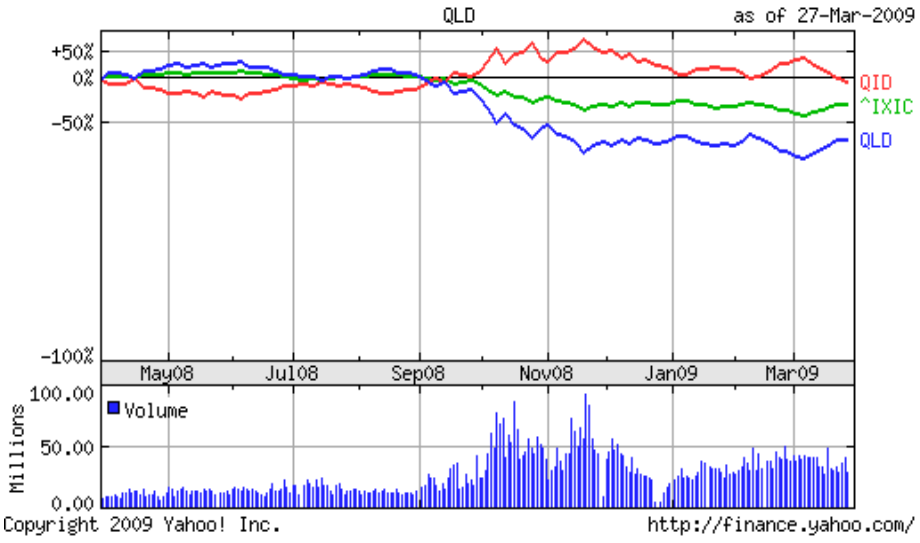
Perhaps most disconcerting to the long-term investor is daily rebalancing risk. There is decay in the value of leveraged ETFs over long periods of time because of daily rebalancing. In fact, none of the leveraged ETFs attempt to produce returns which are a multiple of the return of the benchmark for periods longer than a single day. Each fund rebalances daily. Daily rebalancing will impair a fund's performance if the benchmark experiences volatility. The ramifications of this ensuing decay are the focus of the remainder of this paper as it greatly impacts the returns of a long-term investment strategy.

4. ETF Decay from Daily Rebalancing

An index can essentially end the year flat, but an investor holding a triple leveraged fund could see significant capital lost due to decay, all the while taking on much more additional risk. Consequently, a leveraged ETF may not be an appropriate instrument for one desiring wealth accumulation through traditional slow and steady buy and hold strategies [Bruce and Trask (2008), Carver (2009), McCall (2009), McCarthy (2009), Trainor and Baryla (2008)].

Figure 1 summarizes the performance of the NASDAQ Composite Index (IXIC), the ProShares Ultra Short NASDAQ ETF (QID), and the ProShares Ultra NASDAQ ETF (QLD). For the 12 months ending March 27, 2009, the NASDAQ was down approximately 38%. One would assume that an investor with a short position (long position) in the NASDAQ would have obtained significant profits (losses). The double long ETF (QLD) is indeed down more than the NASDAQ (IXIC); however, the double short QID is also down. Both exhibit negative returns despite one being double long and the other being double short (double inverse). Consequently, a thoughtful investor who expected a drop in the index and positioned themselves accordingly in QID would still be down on their original investment, rather than up twice as much as the index is down. This date range was selected because volatility and market direction combined in a substantial way to illustrate surprising, contrary behavior of the index and the two leveraged ETFs.

Figure 1: Performance of NASDAQ, QID and QLD: 12 months ending March 27, 2009



These leveraged ETFs may not be an effective instrument for a long-term investor who is trying to position a portfolio for a bullish or bearish move in the market. Over longer periods of time leveraged ETFs may track the market or indices differently than they will on a daily basis. Such performance can be frustrating to the investor who has correctly anticipated the direction of the market or an index and has identified an instrument that should magnify returns when their thesis plays out.

5. Analysis of Leveraged Decay

For many, the result of both the 2X long and 2X short ETFs producing negative returns may be astonishing. Consider the following example for illustrative purposes: Let's say the S&P 500 Index is at 1,000 and an investor has both an S&P leveraged double long (2X) ETF valued at $100 and an S&P leveraged double short (-2X) ETF valued at $100. On Day 1 the market goes up 25% to 1,250. If perfectly tracking, the long ETF will rise 50% and be valued at $150, while the short ETF declines 50% to $50.

Now assume that the next day the market index goes down 20%, returning to the original 1,000. The double long ETF valued at $150 falls 40% to $90. The double short ETF, valued at $50 on the previous day, will rise 40% to $70. At the end of two tumultuous trading days the S&P 500 Index is right back where it started at 1,000; however, the long ETF is 10% below where it started ($90 vs. $100) and the short ETF is 30% below where it started ($70 vs. $100). Neither one of them tracked perfectly. In fact, although the market index showed no change, both leveraged ETFs produced negative returns, even though one was long and the other was short. The difference in the tracking is the decay.

Figure 2: Relative Performance for the S&P 500 Index and 2X Long and 2X Short ETFs

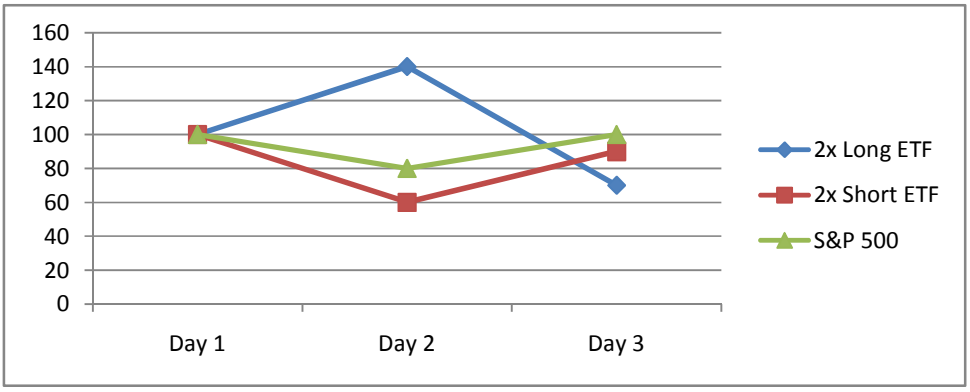


Figure 2 further demonstrates the destruction of capital that can occur in leveraged funds. The decay that occurs in the double long and double short ETFs would cause the value of the original investments to be substantially less than they were only two days before, even with the market returning to its original starting point. The 2X long ETF is now down 10% in two days while the 2X short ETF is down 30%, while the market index that the leveraged ETFs are designed to track returned to neutral. This does not even consider the excessive volatility that one would experience in the interim. Even a more modest 5.0% increase in the market on day one and a 5.3% decrease in the market on day two would leave an investor starting at $100 in each fund, ending with $98.34 in the 2X long ETF and $99.54 in the 2X short ETF. After these two days the market would be back to where it started, yet based on the proposed return this is not what a perfectly correlated investment should produce.

6. A Hedging Strategy for the Long Term Investor

The associated volatility could be a boon to market timers or day traders who are extremely nimble. However, a long term investor who buys these funds thinking they will help them reach their goals at a more rapid pace may be very disappointed. This natural decay which is stronger in the 3X but also is noticeable in the 2X leveraged ETFs makes it difficult to profit over extended periods of time for investors long either side of the trade. Market volatility makes the decay happen at an ever increasing rate. Over a long enough period of time, the value on either side of the trade should erode, making it difficult for investors to profit – at least produce a profit that is reasonable for the added risk borne from holding a leveraged instrument.

A potential hedge that covers both sides of the transaction is to short both the long and the short leveraged ETFs that correspond to the same market index or sector. This should be a low risk method to profit from the decay as well as to enable one to capture the 0.95% expense ratio that each fund incurs. The investor should be protected as the two positions should offset each other with one going up and the other going down by similar amounts on a daily basis. The decay in the value of the ETFs over time should allow an investor to close out their short position for a profit every time. The strategy will work most efficiently in a volatile market that trades sideways. The expectation is that the leverage will magnify losses to the downside more than gains to the upside.

ProShares and Direxion both offer several pairs of Bull and Bear funds that could be combined as shorts in a pairs trade. An equal amount would need to be shorted in both the Bull and the Bear ETFs. There are difficulties involved with initiating this strategy, and investors are exposed to risk that potential losses are unlimited [Avellaneda and Zhang (2010), Charupat and Min (2011), Elston and Choi (2009), Rompotis (2012)]. While one of the ETFs in the pairs trade may go up over 100%, it cannot go lower than 0%. This could be a dangerous trade to initiate in a whipsaw market that relentlessly moves up or down for an extended number of trading sessions. Furthermore, the two funds do not always perfectly mirror one another. There is also difficulty finding shares to borrow to initiate the short position. This leads one to believe that hedge funds or large brokers are already taking advantage of this strategy. The trade also requires margin and extreme volatility has caused the funds to sell well above or below their NAV for short periods of time. This may cause a position to be closed by a brokerage firm at the most inopportune time unless the investor has set aside capital in the trading account to protect against margin calls. An investor who is short may incur margin costs and may need to pay any dividends to the long investor from which the shares were borrowed.

The analysis back tested several pairs of ETFs to measure the trade's viability going forward. Funds that have up and down moves that inversely mirror each other most consistently should create the most profitable and lowest risk trades. The analysis initiated the trade by shorting $1,000 of the Bull and $1,000 of the Bear funds and tried to find the optimal rebalancing point of the trade. Table 1 presents the ticker symbols of the seven pairs trades that are tested.

Table 1: Pairs Trade Ticker Symbols

ProShares (2X)

Index	Bull 2X	Bear 2X
NASDAQ	QLD	QID
S&P 500	SSO	SDS
DJ US Fin	UYG	SKF

Direxion (3X)

Index	Bull 3X	Bear 3X
Russell 2000	TNA	TNZ
Russell 1000 Fin	FAS	FAZ
Russell 1000 En	ERX	ERY
Russell 1000	BGU	BGZ

The NASDAQ, S&P 500, Russell 2000 and Russell 1000 indices are selected to gauge the effect of decay on what should be a more broad-based and less volatile group of stocks. The Financials and Energy indices will expose how the trade performs when using a concentrated and volatile basket of stocks. Commission fees and margin costs are not included in the analysis. Commissions would have a greater effect on short term trades than if the trades were allowed to stay open for an extended period of time. The trades are modeled to short $1,000 of the Bull and $1,000 of the Bear in each pair of positions. This causes the share amounts shorted to include fractional shares. In practice, the technique would require the trader to short a whole number of shares. The trade can also incur losses if left open for a short time frame due to extreme volatility or imperfect tracking. These paper losses occur in periods of extreme volatility and tend to even out over time. Frequent rebalancing keeps the decay from setting into both sides of the trade, and it produces additional commission fees which will erode gains.

Table 2 presents evidence that every pairs trade outperformed the S&P 500 Index as well as the corresponding targeted index since the release of the funds. The trades appear to work more effectively as time goes on and is more profitable in the 3X leveraged ETFs than it is in the 2X leveraged ETFs. The outperformance is compared to the target index of each pair and the S&P 500 Index. The target index in each pairs trade combination produced double digit negative returns. The sample period was deliberately selected to capture this direction of performance. However, since the pairs trade involved shorting both the long and short ETFs, the negative decay from shorting produced positive long-term returns and a premium (or alpha) of the index of 34.4% to 114.6%. Over the corresponding periods, the overall market represented by the S&P 500 Index produced positive returns; however, the premiums over the market through the pairs trades ranged from 30.3% to 82.8%.

Table 2: Long Term Pairs Trade Returns Relative Index Returns

ProShares (2X)

Bull Index	Bear 2X	Short 2X	Close Date	Index Date	HPR	Premium Return	S&P 500 Return		Premium Return	Return
NASDAQ	QLD	QID	7/13/06	4/9/09		48.3%	-14.8%	63.1%	32.5%	80.8%
S&P 500	SSO	SDS	7/13/06	4/9/09		36.4%	-32.5%	68.9%	32.5%	68.9%
DJ US Fin	UYG	SKF	2/1/07	4/9/09		41.6%	-73.0%	114.6%	41.3%	82.8%

Direxion (3X)

Bull Index	Bear 3X	Short 3X	Close Date	Index Date	HPR	Premium Return	S&P 500 Return		Premium Return	Return
Russell 2000	TNA	TNZ	11/19/08	4/9/09		44.7%	-3.1%	47.8%	1.4%	43.2%
Russell 1000 Fin	FAS	FAZ	11/19/08	4/9/09		80.4%	-14.1%	94.5%	1.4%	78.9%
Russell 1000 En	ERX	ERY	11/19/08	4/9/09		44.6%	-6.9%	51.5%	1.4%	43.2%
Russell 1000	BGU	BGZ	11/19/08	4/9/09		31.7%	-2.6%	34.4%	1.4%	30.3%

7. Conclusions

A review of the results supports the conclusion that individual leveraged ETFs are a poor investment choice for the long-term investor. Investing in the stock market has proven to be one of the greatest generators of wealth over extended periods of time; however, leveraged ETFs will erode a long-term investor's capital. To draw a disconcerting parallel, investing in these securities is eerily similar to visiting a casino. The

longer you play at the casino, the more the odds move in favor of the house. Leveraged ETFs are analogous since they may offer a larger short-term payout to the investor who times the market correctly and exits the trade quickly. However, the longer one holds leveraged ETFs, the greater the risk that the investor will lose the original investment due to decay. Market volatility and the leverage in these funds will cause severe underperformance over the long run. This reinforces the fact that they should only be used as a solution for short term traders. Long term investors would be wise to avoid leveraged ETFs as long instruments. On the other hand, hedging strategies like pairs trade shorting of both leveraged long and short ETFs could provide some profit opportunities in volatile market situations. For the average investor lacking the sophistication, capital and possible risk appetite, hedging long-term leveraged ETF bets should be approached with great caution.

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