Fire! Fire! *Is U.S. Low Volatility a Crowded Trade?*

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Picture George Costanza screaming "FIRE! FIRE!" and barreling his way out the door, knocking over old women and children, and you will have a very good visual idea of what a "crowded trade" means to an investment manager. Conceptually, a crowded trade occurs "when a security or strategy has attracted a 'large' group of investors" and "a crowded trade becomes 'bad' when everyone runs for the exits at the same time."[1]

The rise in popularity of low volatility strategies over the past three years has been nothing short of breathtaking, with both the explosion of investment research articles and the launch of new products based on this concept.[2]

The "birth" of the low volatility effect can be attributed to two radically different sources.[3] From an *academic* perspective, the low volatility effect can be attributed to the pioneering researchers who tested the capital asset pricing model (CAPM) and found that "high-beta securities had significantly negative intercepts and low-beta securities had significantly positive intercepts, contrary to the predictions of the traditional form of the model."[4] They also found that the slope was "considerably flatter than predicted."[5]

From an *applied* investment perspective, the *low volatility investing anomaly* can be attributed to Haugen and Heins [1972], whose early studies concluded that "over the long run, stock portfolios with lesser variance in monthly returns have experienced greater average returns than their 'riskier' counterparts."[6] Haugen updated his work with Baker in 1991, finding that "the evidence supports the hypothesis that investment opportunities existed over the period 1972 through 1989 to build equity portfolios with equal or greater return but significantly lower volatility than cap-weighted portfolios."[7] Notwithstanding both the ongoing critical empirical tests of the CAPM and the early work of Haugen and his colleagues, it would take 15 years before academic interest was rekindled on the topic of low volatility investing.[8]

Clarke et al. [2006] led the research charge, updating, extending, and confirming the earlier work of Haugen and Baker [1991]. Importantly, they found that "minimum-variance portfolios tend to have both a value and small-size bias" and can attribute "some of the value-added of minimum-variance portfolios to the value factor, even after the imposition of ex ante neutrality constraints." Blitz et al. [2007] significantly add to our understanding of the low volatility effect by documenting this result in global equity markets, disentangling and distinguishing a volatility effect distinct from classic size, value, and momentum effects, and suggesting possible explanations for the success of this strategy. Behr et al. [2008] test a constrained

minimum variance strategy and find superior results relative to a market cap weighted benchmark, but "no noteworthy statistically higher performance metrics in comparison to the equally weighted portfolio." Barberis et al. [2007] employ cumulative prospect theory to predict that "positively skewed securities…will earn a low average return" (i.e., stocks with high idiosyncratic risk will have low average returns). Maillard et al. [2010] compare and contrast equally weighted minimum variance and equally weighted risk contribution portfolios. Scherer [2010] extends Blitz and van Vleit [2007], attributing the variation in excess returns in minimum variance investing to Fama/French factors and two anomalies (low beta and low residual risk). Arnott et al. [2010] present the case for combining strategies in cap, fundamental, and minimum variance weights to create a "diversified beta."

Other notable articles followed. Baker et al. [2011] state that "while there are many candidates for the greatest anomaly in finance, the most worthy is the long term success of the low volatility and low beta stock portfolios." Beyond this bold statement, the authors use behavioral models to help explain this anomaly as being driven by investor preferences for lotteries, along with overconfidence and representativeness biases in conjunction with limits to arbitrage. Blitz and van Vliet [2011] argue for the evaluation of low volatility strategies

against cap weighted indexes employing risk-adjusted performance metrics such as Sharpe or Jensen ratios. In Haugen's final paper with Baker [2012], the authors find the low volatility anomaly exists in all global equity markets around the world, including emerging markets. Blitz et al. [2012a] also "document the clear presence of volatility effect in emerging markets" and find a "low correlation between the volatility effects in emerging and developed equity markets which argues against a common factor explanation."

Finally, a nice, succinct review of "smart beta" investing including low beta strategies can be found in Blitz [2012]. In this article, smart beta is defined as "passively following an index in which stock weights are not proportional to their market capitalizations, but based on some alternative weighting scheme."[9]

As the low volatility research tsunami continued, some papers started to take some of the gloss off low volatility investing. Chow et al. [2011] highlight the investing "costs" of low volatility investing, which include "underperformance in an upward-trending market…substantial tracking error…limited capacity, less liquidity and higher turnover rates." Li et al. [2014] continue this theme of questioning the practical applicability of low volatility strategies by finding "no anomalous returns for equal-weighted long–short (low-risk minus high-risk) portfolios and that alpha is

E X H I B I T 1
Sample of Published Research Relating to Low Volatility Strategies
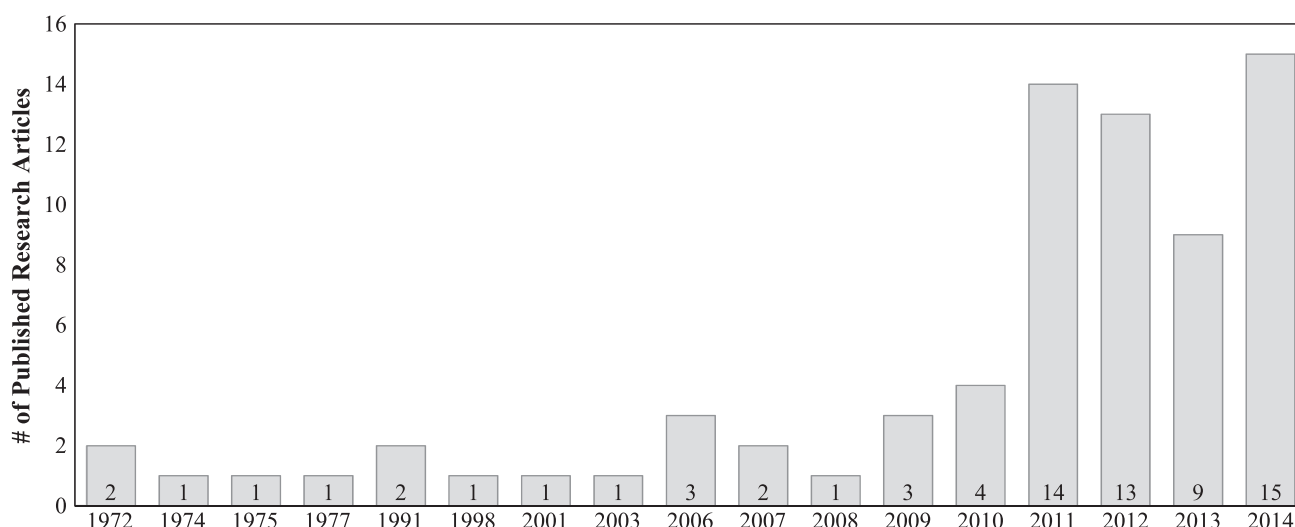
Source: Hillsdale Investment Management.

largely eliminated when omitting low priced stocks…" Additionally, performance "was significantly reduced by high transaction costs…" Li et al. [2014] find that the "high excess returns related to long-short 'low volatility portfolios cannot be viewed purely as compensation for systematic factor risk…The excess returns may be driven more by some market mispricing connected with volatility as a stock characteristic.'" Clarke et al. [2014], in their novella-entitled paper "The Not-so-well-known Three-and-one-half Factor Mo" find that "the realized alphas of low-beta (high-beta) portfolios are reduced (increased) when a separate beta factor is included."

The next wave of low vol research has already begun, with Frazzini and Pedersen [2014] extending low volatility thinking to other markets and establishing that the security market line is relatively flat "in 18 of 19 international equity markets, in treasury markets, for corporate bonds sorted by maturity and by rating, and in futures markets." They "show how this deviation from the standard CAPM can be captured using betting against beta factors…" Asness et al. [2014] suggest that low risk investing is not attributable to industry bets, as it has generated superior returns both as "an industry-neutral bet within each industry and as a pure bet across industries." Bender et al. [2014] "advance beta" by combining stocks with lower volatility, higher quality, and lower valuations. Goldberg et al. [2014] recommend that investors can manage their minimum variance portfolios by "targeting specific active exposures."

Finally, given all this research, it is not surprising to find two excellent books on low volatility research. Blitz et al. [2012b] is an excellent compendium of their key low risk investing articles while Falkenstein [2012] reviews asset pricing and the theoretical and empirical issues with the CAPM, explaining why low volatility strategies succeed.

IS LOW VOLATILITY A CROWDED TRADE? IS THERE "TOO MUCH" CAPITAL INVESTED IN LOW VOLATILITY BASED STRATEGIES?

It is not surprising that, with all this recent notable attention on low volatility strategies, some investors have asked whether these strategies are becoming "crowded." We address this question next and play detective by investigating potential signs of crowding in low volatility based strategies.

The classic concept behind a crowded strategy is that there is simply "too much capital" invested in it![10] As low volatility based strategies are considered "smart beta strategies" and are often viewed as substitutes for market cap index based strategies, let us compare how much capital is invested in each of these approaches. Exhibit 2 compares assets under management (AUM) in U.S. low volatility strategies versus the AUM in market cap index funds.[11] The AUM in market cap index based strategies is more than 100 times greater than the AUM in low volatility based strategies. Liberally extending the compar-

E X H I B I T   2
AUM by Fund Category

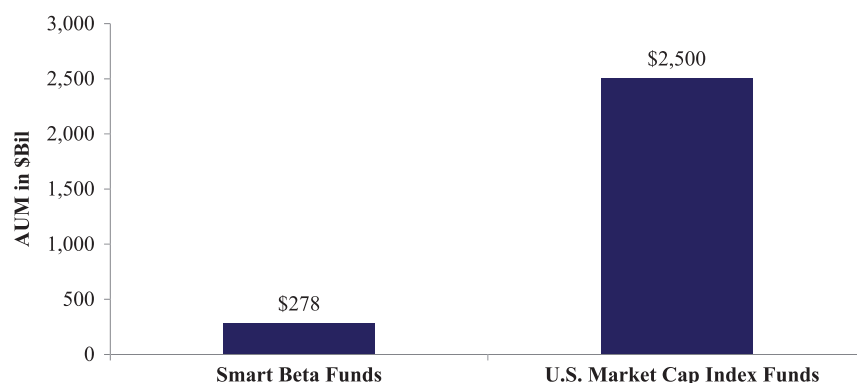U.S. Low Volatility vs. U.S. Market Cap Index Funds
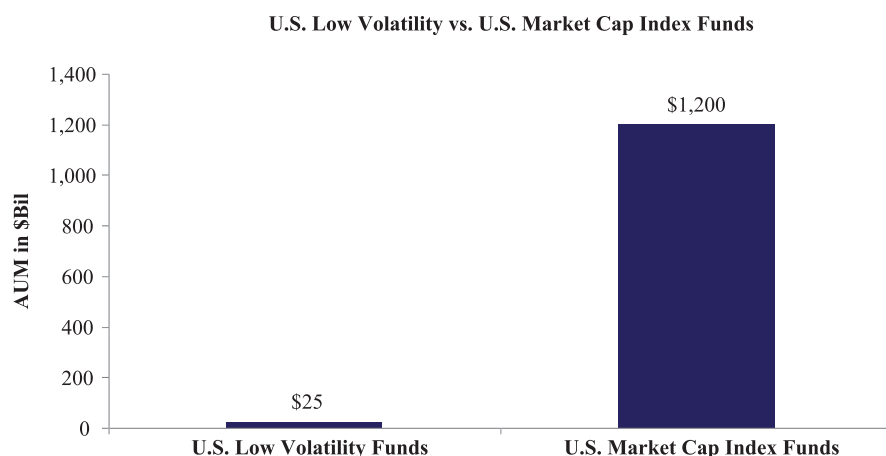
Source: Hillsdale Investment Management/eVestment Alliance/etfdb. Date of fund AUM varies based on fund data availability. (Dec 31, 2013–Mar 31, 2004).

E X H I B I T   3
AUM by Fund Category

Smart Beta vs. U.S. Market Cap Index Funds

Source: Smart Beta strategies are transparent, rules-based investment strategies that are designed to provide exposure to market segment, factors, or concepts. (Agather, Rolf. "Smart Beta: Implications for Active Management." CFA Society Miami, Russell Investments, September 2013.)

U.S. Market Cap Index Funds include institutional passive index funds, retail mutual funds and ETFs. Institutional passive fund data retrieved from eVestment Alliance using large/mid/small cap passive index funds as of Sep 30, 2013. Mutual fund data provided by Investment Company Institute as of Dec 2012. ETF data provided by ETF Database as of Feb 3, 2014.

ison to include smart beta strategies, the AUM invested in market cap indexes is almost 10 times as large as the AUM in "smart beta" type strategies (see Exhibit 3). It is clear that, relative to index strategies, there is very little capital invested in low volatility strategies.[12]

Ironically, these comparisons suggest that *market cap indexed based strategies may be suffering from crowding.* Indeed this is the case, as popular market cap indexes undergo a "reconstitution effect" as they are rebalanced (i.e., there are significant abnormal returns around stock additions and deletions).[13] This "effect" is caused by the crowds of index fund managers and ETF providers rebalancing their market cap based index portfolios and strategies.[14] No such "effect" has yet been observed with low volatility indexes.

OTHER POSSIBLE SIGNALS THAT THE LOW VOLATILITY INVESTING SPACE IS CROWDED

Performance Is Very Different Than Expected

Low volatility strategies have fairly predictable excess return patterns relative to the market. As an indicator of low volatility performance, we mimic the

S&P 500 Low Volatility Total Return Index (SPLVI) back to 1991 with results illustrated in Exhibit 4. From this back test, we can see that a low volatility strategy is generally expected to outperform (underperform) during extreme market declines (upswings).[15] If these strategies were becoming "crowded" one would expect that the performance of these strategies would begin to deviate relative to expectations (i.e., outperform during market upswings or underperform during market declines).

Since the SPLVI went "live," the performance has been as claimed, suggesting no indication of crowding (see Exhibit 5).

Unattractive Valuations

If low volatility strategies are crowded with inves-tors, the fundamentals for these strategies should be very unattractive and inconsistent with historical experience. In examining the historical characteristics of low vola-tility based strategies, it is worthwhile to first point out that two attributes stand out.[16]

First, most fundamentals tend to have significantly lower "volatility" than the cap-weighted index. Second, low volatility fundamentals tend to hover between +/− 1 standard deviation from the median of the specific

E X H I B I T 4

Back Test Monthly Excess Returns by Market Performance*
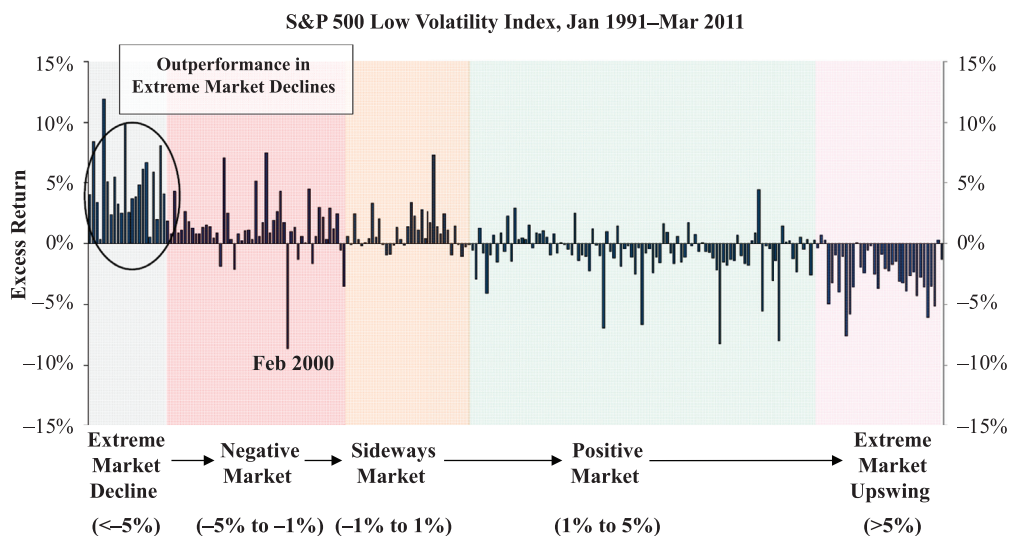
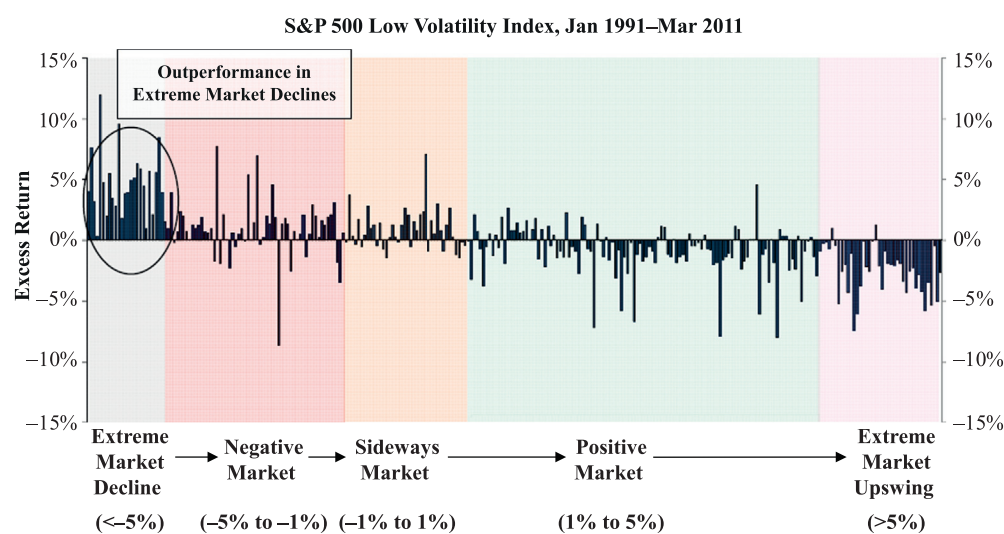**S&P 500 Low Volatility Index, Jan 1991–Mar 2011**

*Benchmark is the S&P 500 Index.

Source: See Disclosures. Hillsdale Investment Management.

E X H I B I T 5

Actual Monthly Excess Returns by Market Performance*

S&P 500 Low Volatility Index, Jan 1991–Mar 2011

*Benchmark is the S&P 500 Index.

Source: See Disclosures. Hillsdale Investment Management.

characteristic over time. Perhaps this stability in fundamentals helps to partially explain the superior return to risk ratio of these strategies over time relative to market cap based indexes.

Both of these character traits are clearly evident when comparing the price to book ratio of the SPLVI versus the S&P 500 Index. More specifically, the standard deviation of this ratio for the SPLVI is about a third that of the Index (i.e., 0.35 versus 1.08). In more than 24 years of data, the price-to-book ratio for the SPLVI has also tended to be lower than the Index while trading fairly consistently within the +/− 1 standard deviation channel. Interestingly enough, at the end of June 2014, the price to book ratio for the SPLVI was significantly lower than that of the Index, with no sign of overvaluation (see Exhibit 6).
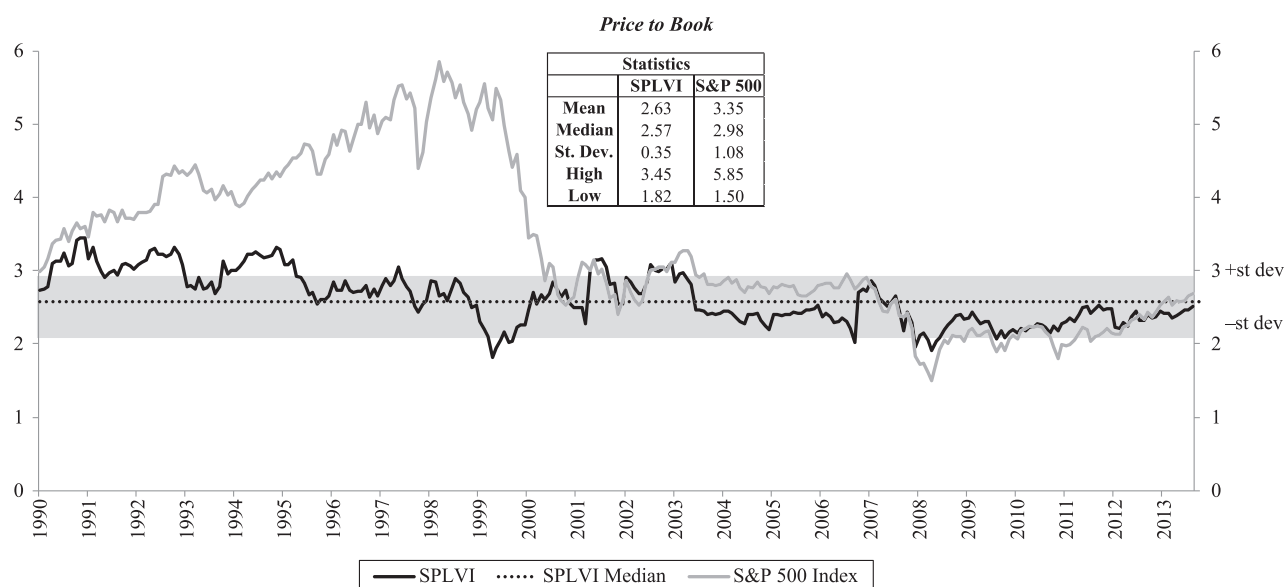
We find pretty much the same story in extending our analysis to look at 18 other typical factors over 24 years of history. In comparison to the S&P 500 Index, the fundamentals for the SPLVI tend to be in line with historical experience and are more stable than those for the Index. More specifically, in the long term, relative to the Index, the fundamentals of the SPLVI display the following characteristics: lower cap and liquidity, similar p/e, lower or similar price to cash flow, higher dividend yield, much higher payout ratio, lower return on equity and reinvestment rate, higher return on total assets, higher and similar cash flow/debt, similar debt/equity, similar quarterly earnings and lower estimated EPS growth, higher quarterly earnings surprise, very stable quarterly earnings revisions, and similar price momentum. There are currently no indications of crowding leading to fundamentals inconsistent with historical experience or a deterioration in factors (see Exhibit 7).

However, there is one factor that does stand out for both the SPLVI and the Index: price to sales since mid-2011 for the SPLVI has moved significantly higher. This has occurred as the price-to-sales ratio of the Index has also moved significantly beyond its average tendency over the past 10 years (see Exhibit 8). The significantly higher price-to-sales ratio for the SPLVI can be largely attributed to a growing allocation to financials and industrials, sectors that tend to have higher price-to-sales ratios than the Index[17] (see Exhibit 9). The lower volatility stocks within these sectors tend to have significantly higher price-to-sales ratios relative to the overall sectors in the Index.

E X H I B I T 6
S&P 500 Low Volatility Index

Statistics	SPLVI	S&P 500
Mean	2.63	3.35
Median	2.57	2.98
St. Dev.	0.35	1.08
High	3.45	5.85
Low	1.82	1.50

Cap-weighted, split calculation. Data is based on back test. As of June 30, 2014.
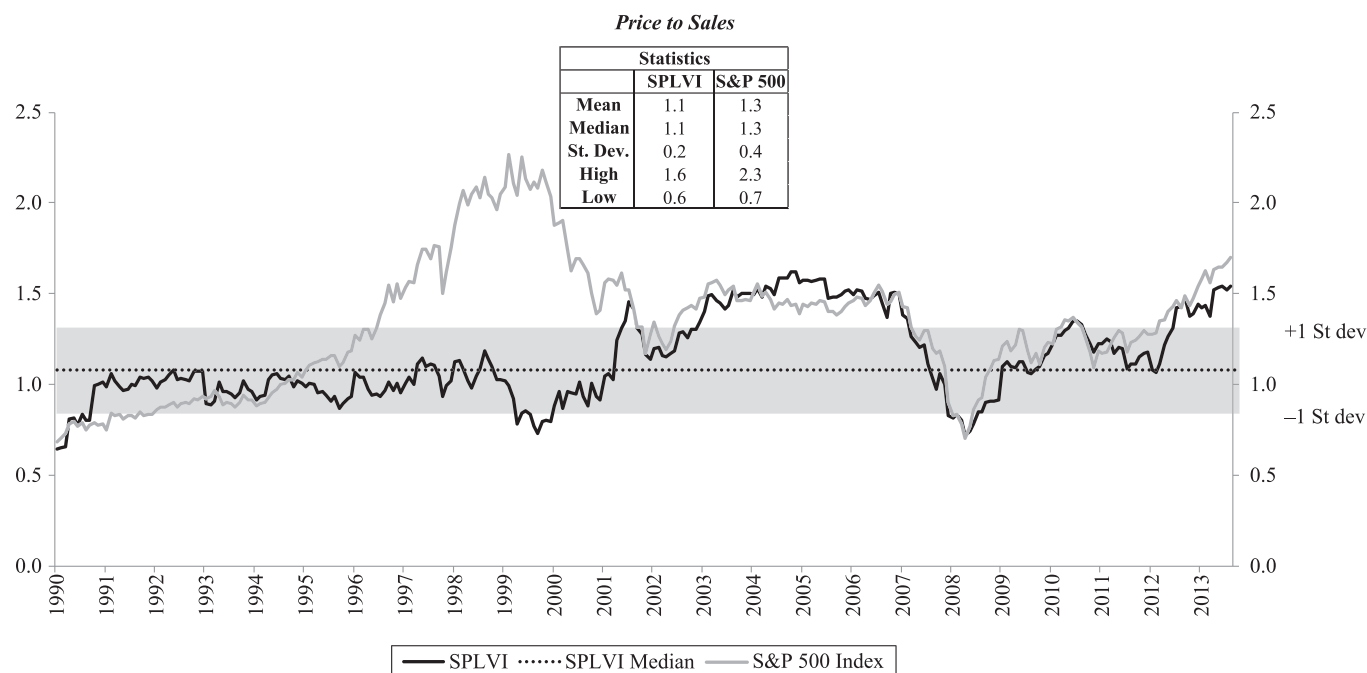*Source: Hillsdale Investment Management.*

E x h i b i t   7
S&P 500 Low Volatility Index Historical Fundamental Attributes

Factor Type	Factor Description	2009	2010	2011	2012	2013	2014
Size and	**Market Cap ($ Millions)**						
Liquidity	SPLVI	37,074	37,889	43,971	43,721	53,521	58,953
	S&P 500 Index	81,794	89,553	95,790	106,760	121,904	126,855
	Average Daily Value Traded ($ Millions)						
	SPLVI	210	185	237	177	195	208
	S&P 500 Index	628	660	720	837	675	671
Value	**Price to Book**						
	SPLVI	2.4	2.2	2.4	2.2	2.4	2.5
	S&P 500 Index	2.2	2.2	2.0	2.1	2.6	2.7
	Price to Sales						
	SPLVI	1.1	1.3	1.3	1.1	1.4	1.5
	S&P 500 Index	1.2	1.3	1.2	1.3	1.6	1.7
	Price to Earnings Trl.						
	SPLVI	14.4	14.1	14.9	15.5	17.1	17.4
	S&P 500 Index	21.2	15.8	14.0	14.3	17.6	18.0
	Price to Earnings Est.						
	SPLVI	13.3	13.5	14.1	14.7	15.8	16.8
	S&P 500 Index	14.6	13.4	12.0	12.9	15.7	16.5
	Price to Cash Flow Est.						
	SPLVI	9.0	9.0	9.4	9.4	11.3	11.4
	S&P 500 Index	15.1	11.9	8.2	9.9	12.7	12.1
Income	**Dividend Yield (%)**						
	SPLVI	3.0	3.4	3.3	3.4	2.7	2.6
	S&P 500 Index	1.9	1.9	2.2	2.2	2.0	2.0
	Dividend Payout Ratio Est. (%)						
	SPLVI	40.0	45.9	46.3	50.0	43.0	43.6
	S&P 500 Index	28.2	24.8	26.1	29.0	30.6	32.6
Capital	**Return on Equity Est. (%)**						
Efficiency	SPLVI	18.3	16.3	16.7	15.0	15.3	14.9
and	S&P 500 Index	15.1	16.4	16.6	16.5	16.9	16.3
Leverage	**Reinvestment Rate Est. (%)**						
	SPLVI	11.0	8.8	9.0	7.5	8.7	8.4
	S&P 500 Index	10.9	12.3	12.3	11.7	11.7	11.0
	Return on Total Assets Trl. (%)						
	SPLVI	5.6	4.7	5.2	4.4	4.0	3.9
	S&P 500 Index	2.0	3.0	3.2	3.4	3.4	3.4
	Cash Flow to Debt						
	SPLVI	0.3	0.3	0.3	0.3	0.3	0.3
	S&P 500 Index	0.2	0.2	0.3	0.3	0.3	0.3
	Debt to Equity						
	SPLVI	0.9	0.9	0.9	0.9	0.7	0.7
	S&P 500 Index	1.0	0.9	0.8	0.8	0.8	0.7
Growth	**Quarterly Earnings Growth Est. (%)**						
	SPLVI	0.7	1.8	1.4	0.6	1.1	2.2
	S&P 500 Index	−5.4	5.5	3.9	1.2	1.6	1.7
	Current Year Est. EPS Growth (%)						
	SPLVI	9.0	4.8	3.4	6.2	6.3	5.6
	S&P 500 Index	30.6	13.9	9.9	9.5	10.0	7.5
Consensus &	**Quarterly Earnings Surprise (%)**						
Technical	SPLVI	21.2	25.6	42.5	32.3	23.6	20.9
	S&P 500 Index	2.6	−2.2	−2.1	−5.4	−3.0	−4.8
	3 Month Earnings Revision (%)						
	SPLVI	1.0	−1.1	−0.7	−0.9	−0.4	0.2
	S&P 500 Index	3.2	0.7	−3.5	−2.3	−1.0	−1.6
	3 Month Price Change (%)						
	SPLVI	7.2	4.4	8.5	−1.0	6.7	4.2
	S&P 500 Index	5.7	10.0	11.0	−1.2	10.0	2.4

For Periods Ending Dec 31. Data for 2014 as of June 30, 2014.

Exhibit 8
S&P 500 Low Volatility Index

Price to Sales

Statistics		
	SPLVI	**S&P 500**
Mean	1.1	1.3
Median	1.1	1.3
St. Dev.	0.2	0.4
High	1.6	2.3
Low	0.6	0.7

Cap-weighted, split calculation. Data is based on back test. As of June 30, 2014.
Source: Hillsdale Investment Management.

Do Current Attributes Indicate Crowding or Misvaluation?

From a cross-sectional factor perspective, current factors indicate the following relative to the Index: significantly lower risk, similar capital efficiency, better valuations, higher dividend yield, some growth, mixed technicals, and lower cap and liquidity (see Exhibit 10).

These attributes are consistent with other empirical research that has identified a number of factors (cap, yield, value, liquidity, volatility, and beta) that are consistently illustrated in low volatility strategies.[18]

Factor Crowding

Quantitatively based strategies can suffer from what is known as factor crowding (i.e., too many investors chasing a particular factor or set of factors, resulting in an unexpected sharp performance deterioration in the strategies utilizing these factors). One particular factor that stands out for low volatility based strategies is higher dividend yield. Are higher dividend yielding stocks illustrating elements of crowding today?[19]

For example, since the end of the financial crisis, retail investors considering stock investments have illustrated a preference for higher-yielding stocks (see Exhibit 11).

While these equity income inflows have been strong over the past four years, they represent only a small percentage of the total equity market and the Dividend Index Aggregate Market Cap (see Exhibit 12).

Perhaps more interesting is the fact that the dividend yield spread between the SPLVI and S&P 500 Index has significantly narrowed, mostly as a result of the decline in yield of the stocks in the SPLVI (see Exhibit 13). Could this decline in yield reflect increased demand and investor crowding? This could reasonably be considered one indicator or early-warning sign of low volatility overvaluation. However, we have also been at these levels before, such as back in 2007 and, of course, during the financial crisis.

Exhibit 9
S&P 500 Low Volatility Back Tested Rolling Sector Exposure

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Jun-14	S&P 500 Index
Technology	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	3.0%	2.0%	3.6%	5.6%	6.9%	4.8%	4.4%	3.6%	3.0%	4.8%	19.2%
Financials	9.1%	13.4%	4.5%	21.7%	32.8%	31.0%	26.0%	28.8%	33.9%	6.4%	1.0%	0.8%	8.1%	2.5%	12.5%	14.2%	17.9%	16.3%
Health Care	2.7%	2.6%	3.6%	7.5%	5.4%	3.7%	1.1%	7.7%	6.8%	17.5%	25.6%	19.4%	11.1%	12.2%	9.7%	12.0%	8.0%	12.7%
Cons. Disc.	16.0%	7.5%	8.1%	8.4%	11.5%	8.5%	11.5%	7.4%	7.5%	12.5%	3.8%	2.8%	3.1%	8.2%	2.0%	3.1%	2.2%	12.2%
Industrials	7.9%	9.8%	20.4%	5.6%	10.6%	7.2%	11.5%	12.7%	7.9%	16.9%	15.0%	8.2%	7.4%	4.5%	6.5%	14.6%	14.7%	10.6%
Cons. Staples	12.4%	15.8%	14.6%	19.4%	22.2%	21.3%	19.3%	16.1%	17.0%	24.8%	28.8%	29.2%	28.4%	28.3%	26.5%	18.8%	17.5%	10.4%
Energy	3.6%	6.4%	11.0%	5.9%	6.8%	9.0%	2.8%	0.0%	0.0%	0.0%	0.0%	1.8%	1.8%	1.7%	1.8%	3.2%	4.1%	10.0%
Materials	8.3%	1.7%	8.3%	6.1%	2.8%	2.8%	0.9%	1.8%	2.9%	2.9%	1.7%	1.8%	3.5%	1.7%	3.4%	6.1%	8.0%	3.5%
Utilities	38.2%	41.0%	29.6%	23.8%	7.9%	16.6%	23.9%	16.2%	20.3%	12.6%	17.7%	26.2%	27.7%	32.8%	31.0%	24.1%	21.8%	2.9%
Telecomm	1.8%	1.7%	0.0%	1.7%	0.0%	0.0%	1.9%	6.2%	1.7%	2.7%	0.8%	2.8%	4.1%	3.8%	2.9%	1.0%	1.0%	2.3%

Data is based on back test. For periods ending November 30th rebalance date. As of June 2, 2014.

Source: Hillsdale Investment Management.

Exhibit 10
### S&P 500 Low Volatility Index Cross-Sectional Fundamental Attributes

	SPLVI	S&P 500	Exposure vs. S&P 500
Risk			
120 Day Beta	0.7	1.0	
120 Day Standard Deviation (%)	14.6	21.0	
Earnings Variability	20.5	50.2	
Capital Efficiency			
Cash Flow to Debt	0.3	0.3	
Return on Equity trl. (%)	18.0	17.6	
Valuation			
Price/Book	2.5	2.6	
Price/Earnings (Est.)	16.5	16.2	
Price to Sales	1.5	1.7	
Price/Cash Flow	11.2	11.9	
Dividend Yield (%)	2.7	2.0	
Growth			
Quarterly Sales Growth (%)	2.4	0.8	
Quarterly Earnings Growth (%)	2.2	1.6	
Annual Est. Earnings Growth (%)	5.8	7.6	
Consensus/Technical			
Quarterly Earnings Surprise (%)	4.8	−9.8	
Quarterly Estimate Revision (%)	0.3	−1.5	
12 Month Price Change (%)	13.4	17.7	
Size			
Market Capital ($ Millions)	55,708	124,828	
Avg. Daily Value Traded	214	694	

Exposure based on one-tailed distribution and measures the standard deviation above/below the index. White bars indicate good spread versus Index while black bars indicate bad spreads versus Index. Standard deviation is based on the weighted sum of the portfolio's holdings individual standard deviations. Values for Governance/Management Quality and Trading Factors are based on a cap-weighted, non-split calculation. Values for Capital Efficiency, Value and Growth Factors are based on a cap-weighted, split calculation. Values for Consensus/Technical Factors are based on cap-weighted, split, and non-split calculations. Source: Hillsdale Investment Management.

Exhibit 11
Cumulative U.S. Mutual Fund Flows Since 2010

Since early 2010, U.S. Equity Funds have lost $86.8 Billion in outflows, whereas U.S. Equity Income Funds have gained an additional $84.6 Billion. However, since late 2012, U.S. Equity Funds have made a strong comeback, gaining about $218.9 Billion, an eighth ($26.4 Billion) of which have been into U.S. Equity Income Funds.

Monthly, Jan 2010–May 2014
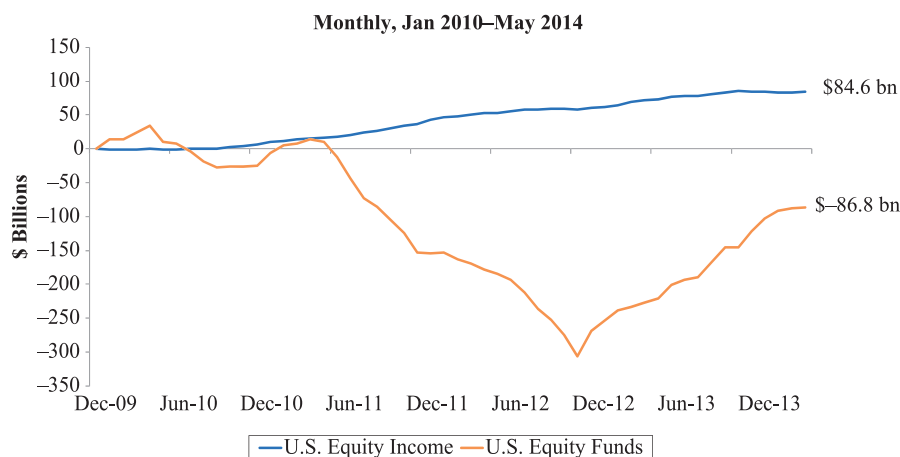
Source: Hillsdale Investment Management, CIBC World Markets. Data as of May 31, 2014.

Exhibit 12
Equity Income Flows as a Percentage of the Total Equity Market
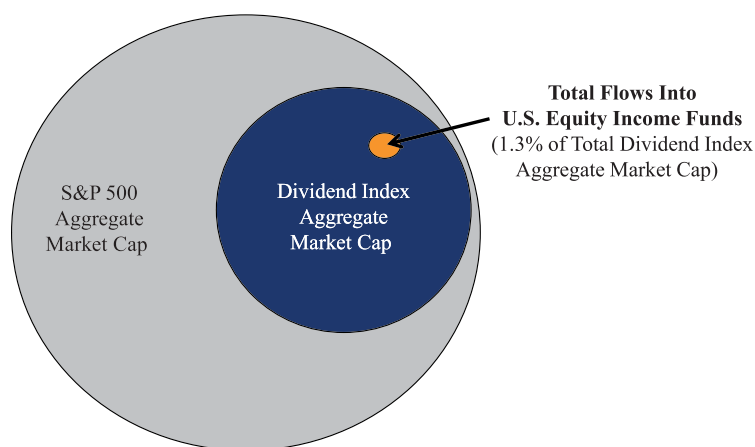
*Dividend Index includes stocks with a dividend yield that is 1.3x that of the S&P 500 dividend yield.
Source: Hillsdale Investment Management. Data as of May 31, 2014.

From a quantitative perspective, it is quite challenging to assess crowding in yield. A prominent quantitative research house suggests that yield is "somewhat crowded most of the time."[20]

As mentioned earlier, one character trait that low volatility based strategies can, at times, illustrate is a "value" bias.[21] In reviewing the fundamentals for the low volatility index, most—with the exception of price to sales—tended to be consistent with their long-term characteristics relative to the market, with no significant indicators of overvaluation.

One could extend this analysis and track the commonality in holdings between value managers and low volatility managers to gauge the degree of crowding among these types of investors. One hypothesis would suggest that there should *not* be a high degree of holdings commonality, as value managers employ active factor bets to add value relative to a benchmark. In contrast, low volatility managers are focused on a single objective—to systematically build a low volatility portfolio. Hence, any "value" bias illustrated by low volatility based strategies is a residual of the singular decision to invest in stocks with low volatility. The "proof is in the pudding" from a return to risk perspective. Active value managers perform very differently than low volatility strategies (see Exhibit 14).

Exhibit 13
Dividend Yield Spread Between S&P 500 Low Volatility Index and S&P 500 Index

Dividend Yield (%)

Statistics	
	Spread
Mean	1.1
Median	1.0
St. Dev.	0.4
High	2.9
Low	0.1

—— Yield Spread ······ Median Spread
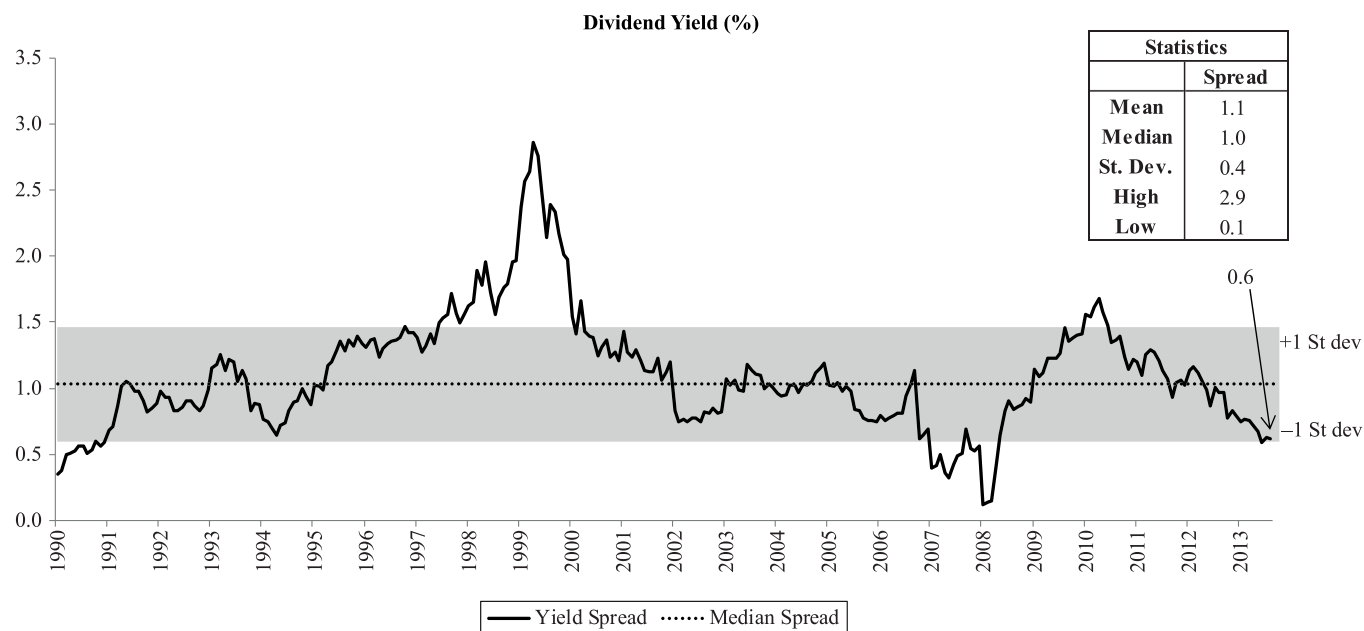
Data is monthly. Simulation: Data prior to Oct 2011 is based on back test.
Source: Hillsdale Investment Management.

STILL WORRIED ABOUT CROWDING?

If you are still worried about crowding in the low volatility space, monitor the asset size of your low volatility manager, as both lower cap and liquidity are risk–return premiums identified in the low volatility anomaly.[22] There are diseconomies of size for low volatility managers (i.e., the larger the assets under management, the greater the trade costs and delay of trades).

To monitor the potential of crowding, consider the following:

1. Read the popular press to see where the "crowd" is going.
2. Track securities holdings in the particular investment about which you are concerned.
3. Monitor fundamentals that you think are leading or coincidental indicators of crowded trades.
4. Measure intra-portfolio correlations (i.e., which stocks, factors, or portfolios are moving together and why).

5. If you are managing a low volatility strategy, consider changing the rebalancing schedule, reducing the need for "trading" speed, and employing a liquidity risk management system.

All for Naught?

Part of the success of low volatility strategies is based on the assumption that market anomalies can exist. From a capital market perspective, the rewards for "betting on high volatility" have been episodic at best.[23]

The "true" low volatility believer might argue that all this analysis is for naught as, by definition, low volatility based strategies cannot become crowded. More specifically, low volatility stocks cannot suffer from crowding for as the "herd" chases these stocks, attempting to "copycat" a low volatility based strategy, the volatility of these stocks will increase and correspondingly these securities will exit the strategy.[24]

Of course, how fast these crowded stocks exit a strategy depends on the "signal-to-noise ratio" of the
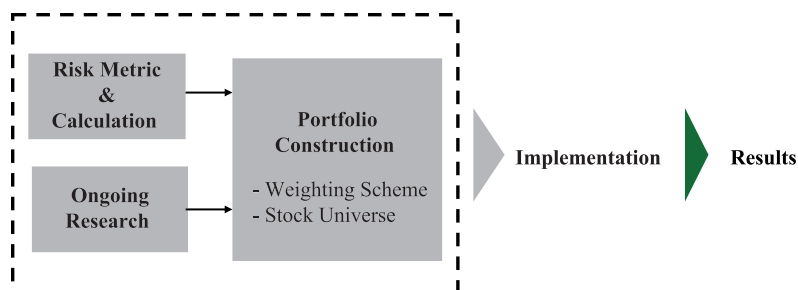
E X H I B I T   1 4
S&P 500 Low Volatility Index vs. U.S. Large Cap Value Managers

S&P 500 Low Volatility Index vs. U.S. Large Cap Value Managers

◆ U.S. Large Cap Equity Value Managers
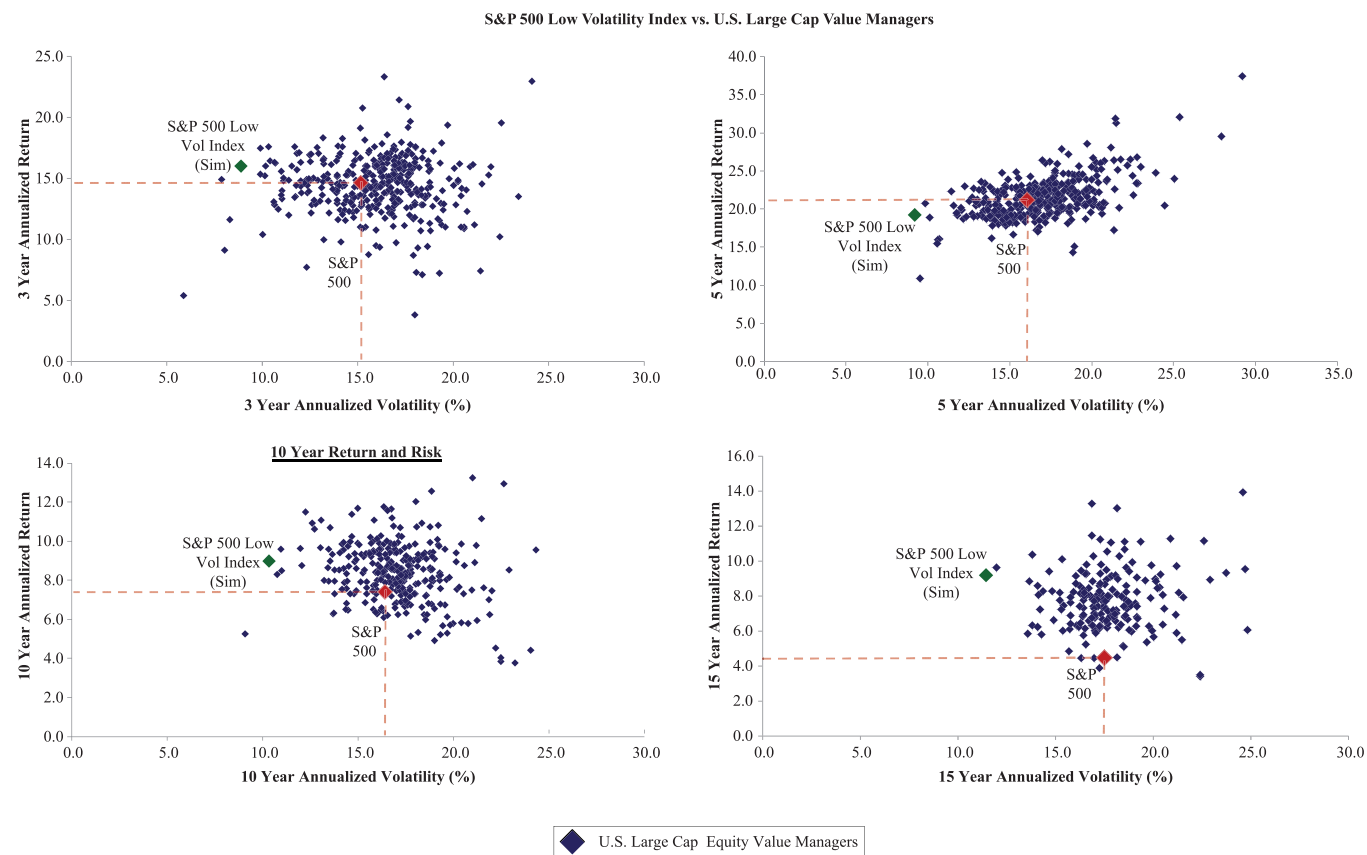
Source: Hillsdale Investment Management, eVestment Alliance. U.S. Large Cap Value Manager Universe. Ending March 31, 2014.

E X H I B I T   1 5
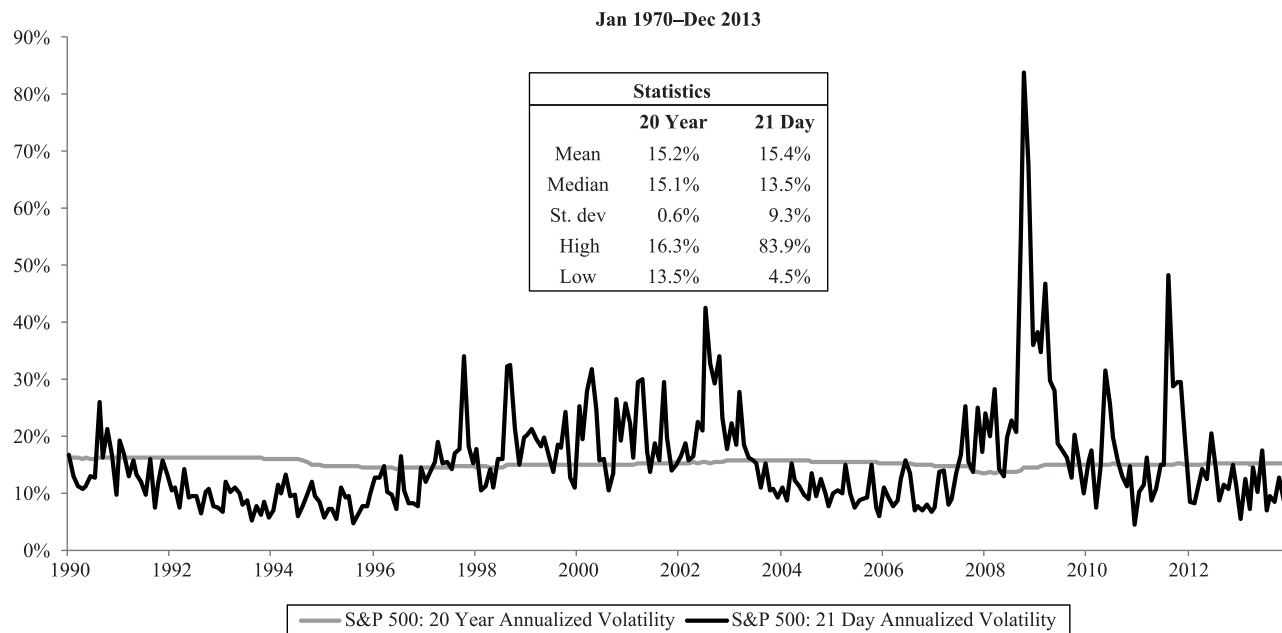**Investment Process for a Typical Low Volatility Strategy**

investment process for a particular low volatility strategy, or how quickly the strategy's process translates the information contained in stock volatility through to the portfolio construction methodology (see Exhibit 15).

More specifically, if the strategy employs a process that is very long (short) term in nature, the strategy's system will receive a very muted (noisy) informational signal. As a simple illustration of this concept, stock volatility measured in a very long (or very short) term frequency can result in a very weak (noisy) signal of volatility[25] (see Exhibit 16).

The hopes of low volatility investors looking to avoid crowded trades rest on the

E X H I B I T   1 6

**S&P 500: Monthly Rolling 20 Year vs. 1 Month Annualized Equity Volatility**

Jan 1970–Dec 2013

Statistics		
	20 Year	**21 Day**
Mean	15.2%	15.4%
Median	15.1%	13.5%
St. dev	0.6%	9.3%
High	16.3%	83.9%
Low	13.5%	4.5%

S&P 500: 20 Year Annualized Volatility — S&P 500: 21 Day Annualized Volatility

Source: Hillsdale Investment Management.

E X H I B I T   1 7

Low Volatility U.S. Equity Funds

3 Year Return and Risk, Ending December 31, 2013, U.S. Dollars
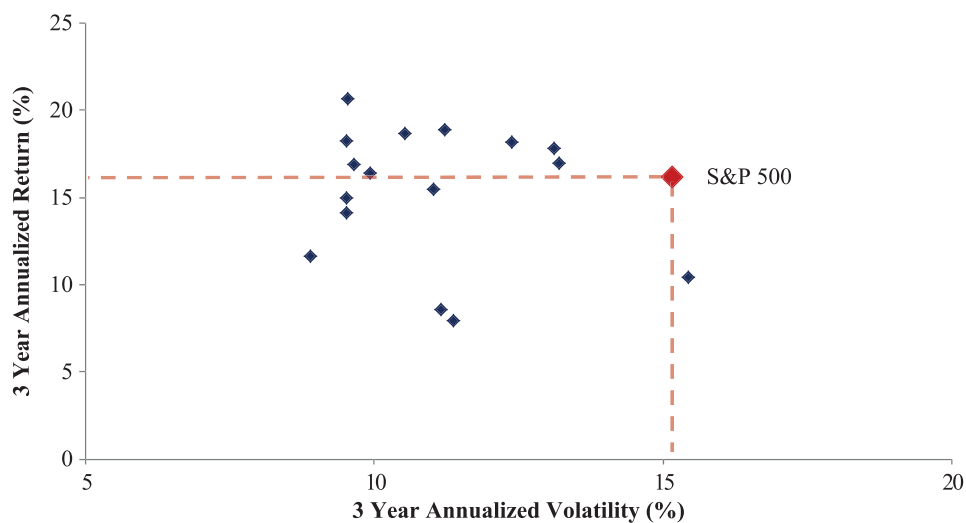
Source: eVestment Alliance, December 31, 2013.

assumption that their manager has an extremely resilient process that can detect and exit "crowded" stocks before the herd. Is this a reasonable assumption to make? We address this issue next.

Are All Low Volatility Managers the Same?

It would be reasonable for an investor to assume that similar rules-based strategies, such as low volatility, should yield similar results. A simple comparison illustrates that even what appear to be similar strategies on the surface, can, in fact, have dissimilar results. Comparing the "live" track record of low volatility strategies solidifies this point. There is almost a 700 basis point spread in volatility and at least a 1,300 basis point spread in annualized return among the "low volatility" managers over the past three years in eVestment Alliance's database.[26] At least all the managers, except one, have lower volatility than the Index. The comparative data suggest very strongly that low volatility based strategies can differ very significantly in real-time results (see Exhibit 17). This confirms that low volatility managers are different and that any analysis undertaken on low volatility strategies is strategy-specific.

FIRE! FIRE! IS THERE A FIRE?

There has been much talk about crowding in low volatility strategies. In examining this issue, we have a number of conclusions for investors. Studying a variety of indicators, including investor cash flows, performance, fundamentals, and factors, we find very little evidence of crowding in U.S. low volatility strategies. However, relative to the market cap index, both the dividend yield spread and the price-to-sales ratio for the SPLVI suggest that this strategy is not as attractive as it once was. While low volatility strategies can at times exhibit some "value-like" characteristics, these factors are a residual of process and these strategies should not be confused with active value approaches. Since low volatility managers can significantly differ both in terms of process and outcome, our empirical results cannot be widely applied across all low volatility based strategies. Instead, each low volatility strategy should be assessed on its merits. Finally, it is also possible that the persistent anomalous behavior of low volatility based strategies may in the future change or decay, as with any other inefficiency.[27] In conclusion, investors should always be aware of the implicit factor bets and investment objectives of their selected strategies.

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Year	Published Research
1972	Black, F., M.C. Jensen, and M. Scholes. "The Capital Asset Pricing Model: Some Empirical Tests." *Studies in the Theory of Capital Markets*, edited by M. C. Jensen. New York: Praeger, 1972. Haugen, R.A., and A.J. Heins. "On the Evidence Supporting the Existence of Risk Premiums in the Capital Market." Wisconsin working paper, December 1972.
1974	McEnally, R. "A Note on the Return Behavior of High Risk Common Stocks." *Journal of Finance*, Vol. 29, No. 1 (March 1974), pp. 199-202.
1975	Haugen, R., and N. Baker. "Risk and the Rate of Return on Financial Assets: Some Old Wine in New Bottles." *Journal of Financial and Quantitative Analysis* (1975), pp. 775-784.
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ENDNOTES

[1]See Pedersen [2009]. The portfolio manager's perspective can be summarized as "we don't subscribe to the view that once the fire starts, we'll be able to outrun everybody through the door…" (see also Vigna [2013]). For a look at crowded trades in the currency markets see Pojarliev and Levich [2011].

[2]A quick sampling of published work over the past 40 years, summarized in the appendix, reflects this outburst of written articles over the past four years, when 69% (51 articles) of low volatility papers have been published. The author is particularly surprised by this "resurrection" of ideas as the original work by Haugen and Baker [1991] was actually discussed by the author at several conferences in 1992. Clarke et al. [2006] suggest that, from a practical perspective, the industry did not have the "computing power and econometric techniques" required to implement these ideas. For example, "large-sample covariance matrixes include many separate security volatility estimates (i.e., $1,000 \times 999/2 = 499,500$) leading to estimation outliers that can dominate the optimized portfolio, a problem sometimes referred to as error maximization."

[3]Blitz and van Vliet [2007] define the "low" volatility effect as follows: "low-risk stocks exhibit significantly higher

risk-adjusted returns than the market portfolio, while high-risk stocks significantly underperform on a risk-adjusted basis."

[4]See Black et al. [1972].

[5]See Black et al. [1972]. This early study opened the floodgates of empirical studies testing the CAPM, eventually leading Fama to conclude that "beta as the sole variable explaining returns on stocks is dead" (Black [1993]) and concluding with French that this model in reality has "never been an empirical success" (Fama and French [2004]).

[6]Haugen et al. [1975] also critically assessed early asset pricing studies. In a later paper with Nardin L. Baker (Baker and Haugen [2012]), Haugen pointed out that his earlier working paper version of this article "documented a negative relationship between risk and return in both the U.S. Stock Market and the U.S. Bond Market." Unfortunately, most of the results of the original manuscript were excised in the review process. Miller [1977] uses the Knightian concept of uncertainty, which leads to divergence of opinions between investors, to suggest that the results from Haugen et al. [1975] "can be explained by the above theory if the riskiest stocks are also those about which there is the greatest divergence of opinion."

[7]See Haugen and Baker [1991].

[8]See note 2 for a discussion on the lag in empirical research and the most recent burst of activity. To be fair, there were some other articles between 1991 and 2006 that did lend further support to the low volatility effect, but in the author's opinion were not as critical as the Clarke et al. [2006] paper, which set out to replicate and advance the original work of Haugen and Baker [1991]. For example, Fernholz et al. [1998] suggest that a "diversity weighted index will have a performance advantage over a capitalization weighted index under conditions of neutral diversity change…" Miller [2001] attributes the lack of higher returns of high beta stocks to a bias created by investor divergence of opinion and limited short selling. Jagannathan and Ma [2003] find that minimum variance portfolios subject to nonnegative portfolio weights result in a much smaller (25 to 40) number of stocks than expected. Memmel and Kempf [2006] grapple with estimating the inputs for the global minimum variance portfolio. Finally, Clarke et al. [2006] employ the work of Ang et al. [2006] to help rationalize their results: "Our results are also consistent with recent research by Ang et al. [2006], who conclude that stocks with higher historical idiosyncratic volatility have lower realized returns. In general, we find that realized standard deviation is lowered by about one-fourth, and risk as measured by market beta is lowered by about one-third, compared to the capitalization-weighted market benchmark."

[9]One cannot help but point out that the ingenious marketing term "smart beta" is not sourced to the marketing department of a money management firm, but instead to the highly respected actuarial and investment consulting firm Towers Watson. For more on this matter see Hsu [2014] and Arnott and Kose [2014]. Smart beta is a very clever marketing term and correspondingly much has been written about it, as evidenced by the number of articles in 2014 that contained these words.

[10]For more details on the "cycle of crowding" see Lo [2008].

[11]Assets under management for low volatility strategies include institutional assets, ETFs, and mutual funds.

[12]It has been suggested that the rise in popularity in index fund investing has contributed to higher systematic equity market risk. For more on this see the thought-provoking article by Sullivan and Ziong [2012].

[13]For more details on the index effect, which is also known as the reconstitution, see Madhaven [2003].

[14]In an early research paper by Weigel and Weigel [1995], with respect to the Russell 2000, they conclude that there is "a membership effect…on the surface the timing of the reaction appears anomalous." They also conclude that it is empirically difficult to separate the price–pressure hypothesis and information/signaling theory.

[15]There is one odd negative excess return (−8.6%) for SPLVI during the extreme market decline that occurred in February 2000 at the peak of the dot-com bubble. In the following months this negative excess return was almost entirely erased, as the SPLVI had excess returns of 7.1% and 7.5% for April and May, respectively. In February, the Technology Sector, with a 28.4% weight in the S&P 500 Market Cap Index, was up 13.5%, while the SPLVI had a near-zero weight in Technology and was overweight underperforming sectors such as Consumer Staples and Financials. In the following months, the Technology Sector declined by −9.1% and −10.5% for April and May, respectively.

[16]For more on what investors can expect from low volatility based strategies see Marmer [2014].

[17]For financials, price to sales is not a very useful fundamental indicator. However, for materials, further individual security work would be warranted.

[18]A number of factors (cap, yield, value, liquidity, volatility, and beta) have been identified with low volatility strategies. Blitz and van Vliet [2007] distinguish a "pure" volatility effect. Scherer [2010] suggests Fama/French factors as well as low beta and low residual risk. Cap and value can be attributed to Chow et al. [2011]. The liquidity factor can be attributed to both Li et al. [2014] and Cahan et al. [2012]. Finally, Marmer [2014] suggests the yield factor.

[19]In an "entertaining" paper, Clarke et al. [2014] empirically find that after employing an "adjusted" Fama–French Model, the "returns-based performance measurement for the MSCI Minimum Volatility Index indicates that selecting low

beta stocks provides most of the value added in low volatility strategies."

[20]See Cahan et al. [2013].

[21]Scherer [2010] suggests that the alpha in low volatility strategies can be partially attributable to a value effect.

[22]See note 19 for sources.

[23]As noted earlier, "betting against beta" was empirically tested by Frazzini and Pedersen [2014], who found that "high beta is associated with low alpha…for U.S. equities, 20 international equity markets, Treasury bonds, corporate bonds and futures. A betting against beta (BAB) factor…. produces significant positive risk adjusted returns…"

[24]This idea of crowding caused by copycat investors is presented by Chincarini [2012]. Chincarini also suggests that these "copycats create a side effect, however: they crowd the space. The strategy's future returns depend increasingly on the copycat's behavior." These concepts can be traced back to the classic research paper by De Long et al. [1990]. More specifically, "positive feedback traders buy in response to today's price increase and so keep prices above fundamentals…" This thinking was extended by Nofsinger and Sias [1999]: "Herding and feedback trading have the potential to explain a number of financial phenomena, such as excess volatility, momentum and reversals in stocks prices. Herding is a group of investors trading in the same direction over a period of time; feedback trading involves correlation between herding and lag returns." Finally, Bikhchandani and Harma [2001] conclude that "herding results from an obvious intent by investors to copy the behavior of other investors."

[25]Empirical results of Clarke et al. [2006] suggest that using daily data may improve results.

[26]eVestment Alliance is a third-party provider of institutional investment data.

[27]McLean et al. [2014] find that the academic anomalies tend to decay four years following publication. Perhaps all the recent academic work on low volatility spells the death of this anomaly. On the other hand, McLean did find that there was a rebound effect after Year 4.

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