S&P Dow Jones Indices
A Division of S&P Global

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Popularized in the turmoil following the 2008 financial crisis, low volatility strategies, as the name suggests, have served well in times of market instability.

The Valuation of Low Volatility

"Reasoning will never make a man correct an ill opinion, which by reasoning he never acquired…"

– Jonathan Swift, "Letter to a Young Clergyman"

EXECUTIVE SUMMARY

- Low volatility strategies, as the name suggests, typically perform well in times of market instability. Challenging traditional capital asset pricing theory, they have also outperformed their benchmarks over time despite exhibiting lower risk.
- Due to their popularity in recent years, some critics have claimed that low volatility stocks are overbought and overvalued.
- We attempt to quantify the current valuation of low volatility. Moreover, we ask if it is possible to identify valuation environments during which low volatility strategies offer more bang for the buck.
- Compared with historical levels, recent valuations for low volatility do appear relatively rich. However, as an indicator of the relative performance of low volatility strategies, value has never been particularly valuable.

THE RISE OF LOW VOLATILITY

What is commonly referred to as the low volatility anomaly is not a recent discovery; it has been well documented in academic research for over four decades.[1] Popularized in the turmoil following the 2008 financial crisis, low volatility strategies, as the name suggests, have served well in times of market instability. Here is the anomalous aspect: despite their lower risk, low volatility strategies have outperformed their benchmarks over time, challenging classic capital asset pricing theory that risk and reward go hand in hand. "The long-term outperformance of low-risk portfolios is perhaps the greatest anomaly in finance."[2]

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[1] Jensen, Michael C., Fischer Black, and Myron S. Scholes, "The Capital Asset Pricing Model: Some Empirical Tests," *Studies in the Theory of Capital Markets*, Praeger Publishers Inc., 1972. See also Fama, Eugene F. and James D. MacBeth, "Risk, Return, and Equilibrium: Empirical Tests," *The Journal of Political Economy*, Vol. 81, No. 3 (May - Jun., 1973), pp. 607–636.

[2] Baker, Malcolm, Brendan Bradley, and Jeffrey Wurgler, "Benchmarks as Limits to Arbitrage: Understanding the Low-Volatility Anomaly," *Financial Analysts Journal*, Vol. 67, No.1 (January/February 2011), pp. 40-54. See also Chan, Fei Mei and Craig J. Lazzara, "Is the Low Volatility Anomaly Universal?" April 2015.

The S&P 500® Low Volatility Index[3] is an example of such a strategy. From January 1991 to June 2016, this index delivered an average annual return of 11.19%, compared with 9.78% for the S&P 500, with less volatility (standard deviations of 11% and 14%, respectively).

Exhibit 1: S&P 500 and S&P 500 Low Volatility Performance
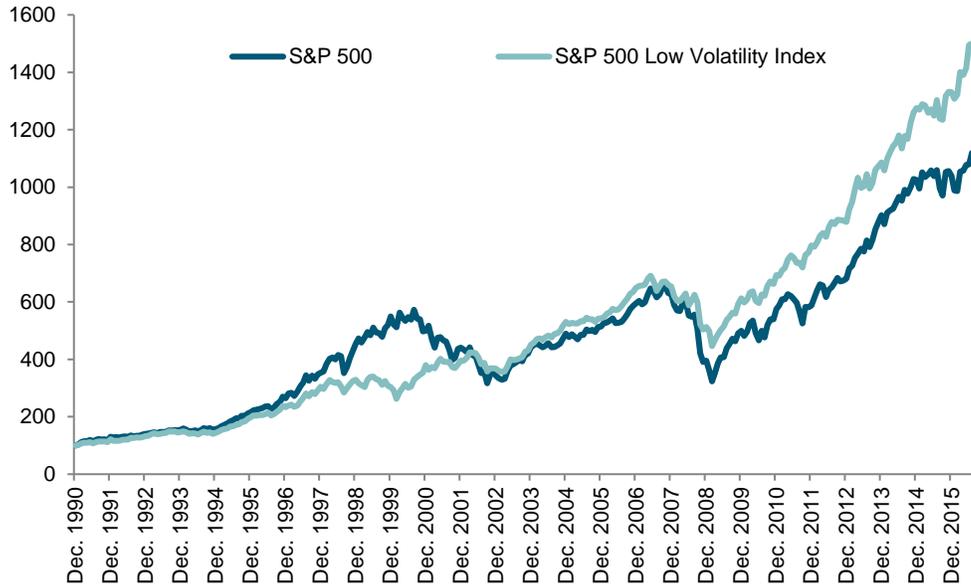
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, through June 30, 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

VALUE AND LOW VOLATILITY

Value, as a source of stocks' outperformance over time, is one of the building blocks of the Fama-French Three Factor Model.[4] To analyze the relationship between valuation and low volatility stocks, we ask if it is possible to identify entry points for low volatility strategies which offer the most bang for the buck, as well as to identify times when valuations appear so lofty that exiting makes sense.

To make this assessment, we used three metrics traditionally thought of as fundamental elements of valuation: the ratios of book to price, sales to price, and earnings to price.[5] We formed a composite value score by normalizing and weighting each of these three components equally, and then computed the weighted average value score for the S&P 500 and the S&P 500 Low Volatility Index.

> Value, as a source of stocks' outperformance over time, is one of the building blocks of the Fama-French Three Factor Model.

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[3] The S&P 500 Low Volatility Index is designed to reflect the performance of the 100 stocks in the S&P 500 with the lowest historical standard deviation of returns.

[4] Fama, Eugene F. and Kenneth R. French, "The Cross-Section of Expected Stock Returns," The Journal of Finance, Vol. 47, No. 2 (June 1992), pp. 427–465.

[5] These three variables are the inputs that drive the S&P 500 Value and related style indices.

Results are shown in Exhibit 2a, while Exhibit 2b shows the spread between the S&P 500 Low Volatility Index and its parent, the S&P 500. In both cases, positive numbers indicate relative cheapness and negative numbers signal potential overvaluation.[6]

Exhibit 2a: Valuations for the S&P 500 and S&P 500 Low Volatility Index
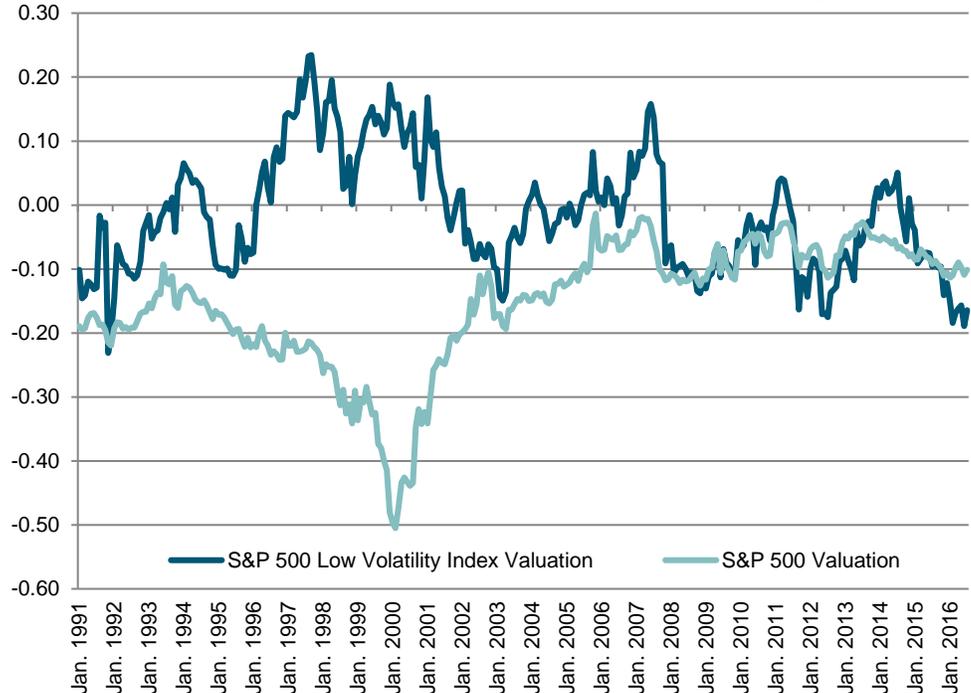
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, through June 30, 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

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[6]   We normalized around the equal-weighted S&P 500, so the average valuation score for S&P 500 members is 0.00 with a standard deviation of 1.00. The typical negative valuation scores for the cap-weighted S&P 500 reflect slighter richer valuations for larger companies—a trend that was most evident during the late 1990s' technology bubble and its aftermath.

Exhibit 2b: Relative Valuation for the S&P 500 Low Volatility Index

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, through June 30, 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

We can make several interesting observations from Exhibits 2a and 2b.

- Historically, the S&P 500 Low Volatility Index tends to be cheaper than the S&P 500, and in some cases (e.g., 1996-2001), quite significantly so.
- The relative cheapness of the S&P 500 Low Volatility Index has diminished over the past two years.
- As of June 30, 2016, the S&P 500 Low Volatility Index was modestly more expensive than the S&P 500.

What Exhibits 2a and 2b do not reveal is whether any of this is relevant from a performance standpoint.

RELATIVE VALUE AND RELATIVE PERFORMANCE

Does the relative valuation of the S&P 500 Low Volatility Index tell us anything about its performance prospects? There are several ways to address this question. Exhibit 3 combines the relative valuation analysis of Exhibit 2b (lighter line) with the relative performance of the S&P 500 Low Volatility Index (darker line). When the darker line is rising, the S&P 500 Low Volatility Index is outperforming, and vice versa. **The relationship between valuation and performance, and in particular the causality of the relationship, seems tenuous at best.**

For example, we see that the S&P 500 Low Volatility Index underperformed between 1991 and 1999, during which time it became progressively cheaper, and then it outperformed between 2000 and mid-2016, during which time it became relatively more expensive. Does it follow that the

The relative cheapness of the S&P 500 Low Volatility Index has diminished in the last two years.

S&P 500 Low Volatility Index's initial undervaluation caused the latter period's good relative performance? The difficulty in answering this question is that, relative to the S&P 500, **the index was cheap in 1996, when it underperformed, but it was just as cheap in 2001, when it outperformed**. After the global financial crisis of 2008, the S&P 500 Low Volatility Index's valuation was at a then all-time high, and yet its performance since then has been stellar. These observations suggest that although there appears to be an occasional relationship between the relative valuation of the S&P 500 Low Volatility Index and its relative performance, valuation, per se, cannot logically be the cause of that performance.

The S&P 500 Low Volatility Index was relatively cheap in 1996, when it underperformed, but it was just as cheap in 2001, when it outperformed.

Exhibit 3: Relative Valuation and Relative Performance of the S&P 500 Low Volatility Index
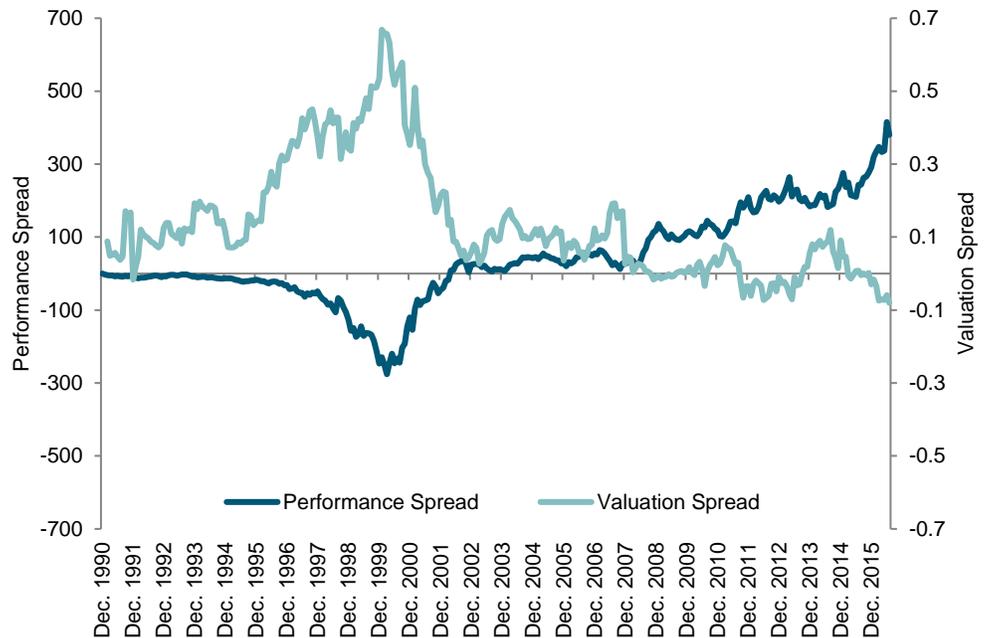
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, through June 30, 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 4 further illustrates the difficulty of drawing a causal link between valuation and performance. It breaks the cumulative data of Exhibit 3 into monthly increments; each point in the graph represents the relationship between the S&P 500 Low Volatility Index's relative valuation (horizontal axis) and its relative performance in the subsequent month (vertical axis).

Exhibit 4: Monthly Relative Value Scores and S&P 500 Low Volatility Index Performance Spread in Subsequent Month

There is no obvious relationship between the level of valuation and the S&P 500 Low Volatility Index's subsequent performance—indeed, their correlation is -0.01.

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, through June 30, 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 4's scatter plot is indeed scattered. **There is no obvious relationship between the level of valuation and the S&P 500 Low Volatility Index's subsequent performance.** Indeed, their correlation is -0.01.

Finally, Exhibit 5 divides our monthly data into four quartiles based on the S&P 500 Low Volatility Index's relative valuation.

Exhibit 5: Relative Performance of the S&P 500 Low Volatility Index by Valuation Quartile

CATEGORY	NUMBER OF MONTHS	S&P 500 (%)	S&P 500 LOW VOLATILITY INDEX (%)	S&P 500 LOW VOLATILITY INDEX MINUS S&P 500 (%)	HIT RATE (%)
Most Expensive	76	0.83	1.00	0.17	51
Moderately Expensive	76	0.74	0.78	0.04	50
Moderately Cheap	76	0.77	0.92	0.15	52
Most Cheap	77	0.74	0.84	0.10	50

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1990, through June 30, 2016. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Here again, **there seems to be no relationship between valuation and subsequent performance**. When the S&P 500 Low Volatility Index was most expensive, it tended to outperform roughly one-half of the time, by an average of 17 bps per month. When the S&P 500 Low Volatility Index was cheapest, it tended to outperform roughly one-half of the time, by an average of 10 bps per month. What we observe from the hit rates (percentage of months that the S&P 500 Low Volatility Index outperformed the S&P 500) is that the S&P 500 Low Volatility Index is just as likely to underperform as it is to outperform **across all quartiles**.

THE RELEVANCE OF VALUE

As an indicator of entry and exit points for low volatility strategies, value does not appear to be valuable.

Value investing has a long history, and there is ample evidence that value is a factor of stocks' outperformance over time. As such, the temptation to use valuation to make inferences about the prospective relative performance of low volatility strategies is entirely understandable. Our analysis finds little evidence of a systematic relationship between valuation and low volatility. As an indicator of entry and exit points for low volatility strategies, **value does not appear to be valuable**.

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PERFORMANCE DISCLOSURE

The S&P 500 Low Volatility Index was launched on April 4, 2011. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. Complete index methodology details are available at www.spdji.com.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its datafeed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown. The back-test period does not necessarily correspond to the entire available history of the Index. Please refer to the methodology paper for the Index, available at www.spdji.com for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices LLC maintains the Index and calculates the Index levels and performance shown or discussed, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US $10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US $1,650), the net return would be 8.35% (or US $8,350) for the year. Over a three year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US $5,375, and a cumulative net return of 27.2% (or US $27,200).

GENERAL DISCLAIMER