

**MSCI**

# Minimum Volatility Indexing

The Long-Term View

July 2013

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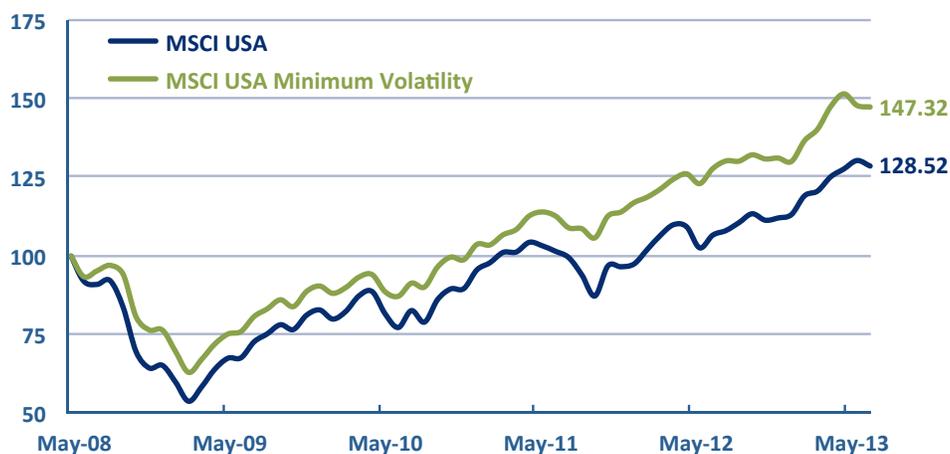


## Confronting Market Volatility

Volatility seems to be a recurring threat in modern equity financial markets. Many in the investment community were unprepared for the magnitude of the financial crisis in 2008. High levels of volatility affected country, regional and global market indexes alike. Some institutional investors fled to the safety of low performing bonds rather than endure the volatility of equities. Then again in 2011, volatility returned in force with extreme events such as the European debt crisis and the US credit rating downgrade.

*Crisis periods are typically characterized by spikes in market volatility.*

Minimum variance or minimum volatility strategies aim to mitigate the effects of whipsawing equity markets and cushion potential downside events. The MSCI Minimum Volatility Indexes seek to reflect the performance of such strategies. Launched in April 2008, the MSCI USA Minimum Volatility Index, for example, significantly outperformed the US broad market through the downturns of the 2008 global financial crisis and over the following periods of continued volatility. (See **Figure 1.**)



**Figure 1:** The MSCI USA Minimum Volatility Index outperformed the MSCI USA Index, its parent index, by cumulatively mitigating downturns. (May 2008 – Jun 2013)



The outperformance of minimum volatility strategy indexing was not unique to the US market; in global markets—both developed and emerging—the MSCI Minimum Volatility Indexes outpaced their respective broad market cap weighted parent indexes. (See **Figures 2-4.**)



*Figure 2:* The MSCI Emerging Markets Minimum Volatility Index significantly outperformed the MSCI Emerging Markets Index, given the highly volatile return patterns of the parent index. (Nov 2009 – Jun 2013)

*The MSCI Minimum Volatility Indexes have outperformed their broad parent indexes across global markets since inception.*



*Figure 3:* The MSCI ACWI Minimum Volatility Index—covering developed and emerging markets—outperformed its MSCI parent index by lessening the impact of the parent index downturns. (Nov 2009 – Jun 2013)



Figure 4: The MSCI EAFE Minimum Volatility Index—covering global developed markets except for the US and Canada—outpaced its parent index by mitigating its downturns. (Nov 2009 – Jun 2013)

Figure 5 shows annualized returns and volatilities for four MSCI Minimum Volatility Indexes (and their parent indexes). In each case, the MSCI Minimum Volatility Index outperformed its parent index with less risk since index inception. The MSCI ACWI Minimum Volatility Index, for example, not only reduced risk by 40% on an annualized basis from Nov 2009-Jun 2013, but it also outperformed the MSCI ACWI Index by 36% on an annualized basis over the period.

	MSCI Parent Index	MSCI Min Vol Index
<b>Annualized Returns (%)</b>		
MSCI ACWI <sup>1</sup>	9.47	12.84
MSCI EAFE <sup>1</sup>	5.52	8.20
MSCI Emerging Markets <sup>1</sup>	3.56	13.10
MSCI USA <sup>2</sup>	6.18	8.78
<b>Annualized Volatility (%)</b>		
MSCI ACWI <sup>1</sup>	16.08	9.68
MSCI EAFE <sup>1</sup>	18.26	12.04
MSCI Emerging Markets <sup>1</sup>	20.30	15.59
MSCI USA <sup>2</sup>	18.56	14.34

<sup>1</sup> Data from Nov 2009–June 2013, <sup>2</sup> Data from Apr 2008–June 2013.

Figure 5: Risk and return characteristics of MSCI parent indexes relative to the MSCI Minimum Volatility Indexes. Note that this data represents a limited sample period reflecting the track records of the minimum volatility indexes since their respective launch dates. Over longer time frames and different market conditions, performance statistics would likely differ.



## Background

### The Low Volatility Effect

Numerous studies have shown that low volatility investing has historically outperformed the broad market with less realized volatility over the long-term. The low volatility effect is considered an anomaly because it challenges standard investment theory that riskier assets should be rewarded with higher expected returns while less risky assets receive lower expected returns. Instead, some theorists have suggested that investors may be consistently drawn to more visible, higher volatility stocks, thus providing opportunities for investors willing to seek out lower volatility opportunities.

Research has shown that this low volatility effect persists even after adjusting for a range of other explanatory variables including stock size, book-to-market pricing, liquidity or leverage as well as across different economic regimes and high and low volatility regimes.

### The Minimum Variance Portfolio

The theoretical minimum variance (MV) portfolio has been widely known since the appearance of Dr Harry Markowitz's seminal paper, "Portfolio Selection," first published in the *Journal of Finance* in 1952. The theoretical minimum variance portfolio in **Figure 6** is positioned at the leftmost point of the mean-variance efficient frontier and represents the lowest return-variance for a given stock universe. The theoretical minimum variance portfolio is the one portfolio on the efficient frontier that minimizes risk *without* requiring an expected return input.

All other portfolios on the efficient frontier have an optimal combination of stocks that minimize risk for a given expected return (they have an optimum risk/return ratio). This optimum ratio is composed from the risk/return ratio of all stocks in the portfolio together with the risk/return ratios of the stocks to one another.

*Research on the minimum variance (MV) portfolio has a long history, since 1952.*

*Minimum variance or managed variance strategies came into favor in the early 1990s and have had an increasing appeal in recent years.*

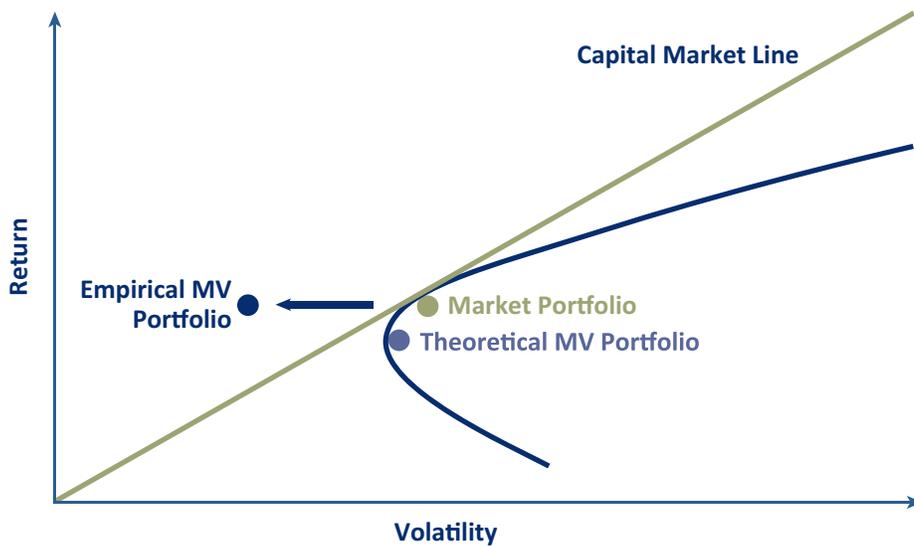


Figure 6:  
 The theoretical minimum variance (MV) portfolio lies at the far left tip of the efficient frontier.  
 The empirical MV portfolio reflects the observations of numerous studies that support the superior risk-adjusted returns of a minimum variance strategy relative to the market.

The empirical minimum volatility portfolio in **Figure 6** reflects an extensive number of empirical studies observing that minimum variance strategies have delivered superior realized risk-adjusted performance relative to capitalization weighted market indices. The MSCI Minimum Volatility Indexes are similarly constructed to reduce the risk of the parent index, while maintaining similar returns over the long-term.

### The Logic behind Minimum Volatility Indexes

Whether one measures risk by beta or by volatility, minimum volatility indexes have historically outperformed broad market indexes over time. In stable markets, for example, individual stock betas tend to be clustered closely around 1. Therefore, in less volatile markets, an index composed of low-beta stocks may actually lose little in terms of return.

When markets become stressed, however, stock betas can become far more dispersed. This is when a focus on low-beta stocks may prove effective. As the broad market falls, the low-beta or low volatility index will likely lose value, but it will likely lose proportionally less than the market cap weighted index with riskier stocks.

With lower drawdowns in volatile markets, low-beta strategy indexes can produce superior risk-adjusted returns relative to their broad market equivalents. If an index falls 10%, it must appreciate 11% to get back to where it started; if it loses 20%, it must appreciate 25% to return to its original level. With compounding, lower drawdowns can enhance the impact of longer term upside returns in an absolute sense.

*With lower drawdowns in turbulent times, the risk-adjusted performance of a low-beta index can outpace that of the related broad market over the long-term.*



## MSCI Minimum Volatility Index Characteristics

The MSCI Minimum Volatility Indexes are designed to reflect broad market performance with less risk. Each minimum volatility index is based on an established market cap weighted MSCI parent index and aims to outperform the parent index on a risk-adjusted basis over the long-term—especially in periods of financial crisis when volatility is at a high level.

*The MSCI Minimum Volatility Indexes are designed to reflect broad market performance with less risk.*

Although minimum volatility indexes have generally outperformed the market with lower risk, their short-term behaviors in different market conditions can vary greatly. Historically, the MSCI Minimum Volatility Indexes have shown the following general characteristics across global markets and in the US over various time frames that we have tested as far back as 1988:

- Low index beta relative to their cap weighted parent indexes; minimum volatility index betas have averaged about .70
- An average of 25-30% less volatility than their cap weighted parent index, although this figure can vary over time and by markets
- A bias towards stocks with low total and idiosyncratic risk
- A bias towards stocks with lower market capitalization than the average stock within the parent index

### Minimum Volatility Index Risk Measures

**Figure 7** illustrates the rolling 3-year realized volatility of the MSCI ACWI Minimum Volatility Index in comparison to its parent index, MSCI ACWI. The chart highlights the significant risk reduction of the minimum volatility index versus the cap weighted parent index, especially during the global crisis in 2008 and in the following years of turmoil.

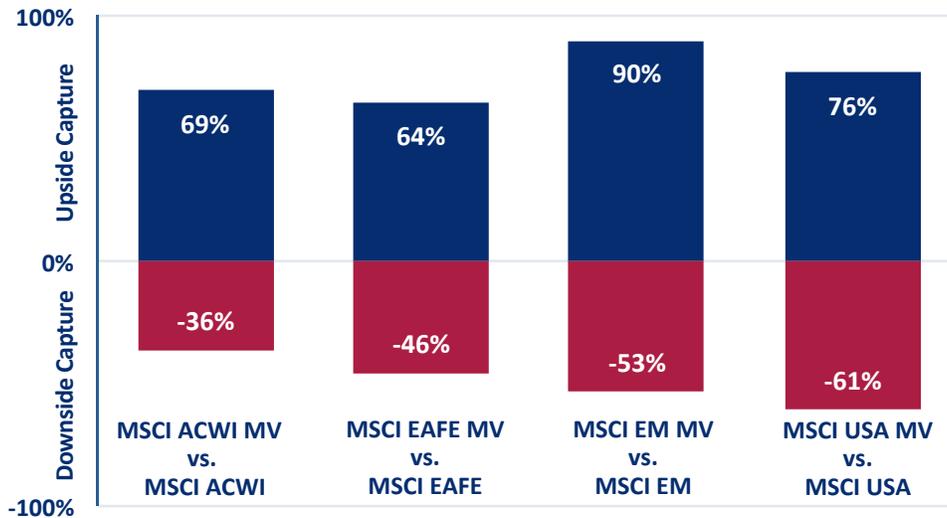


**Figure 7:** The rolling 3-year realized volatility of the MSCI ACWI Minimum Volatility Index has been consistently lower than that of the parent index; the chart displays significantly lower volatility relative to its parent index from the financial crisis of 2008 through June 2013.

*From late 2005 through 2007 when the volatility of the MSCI ACWI Index was at its lowest, the risk reduction of the MSCI ACWI Minimum Volatility Index was at its lowest. In contrast, when the global crisis struck, the ACWI Minimum Volatility Index reduced risk substantially.*

## Upside and Downside Capture

Another property of minimum volatility indexes is shown through their upside and downside capture ratios.



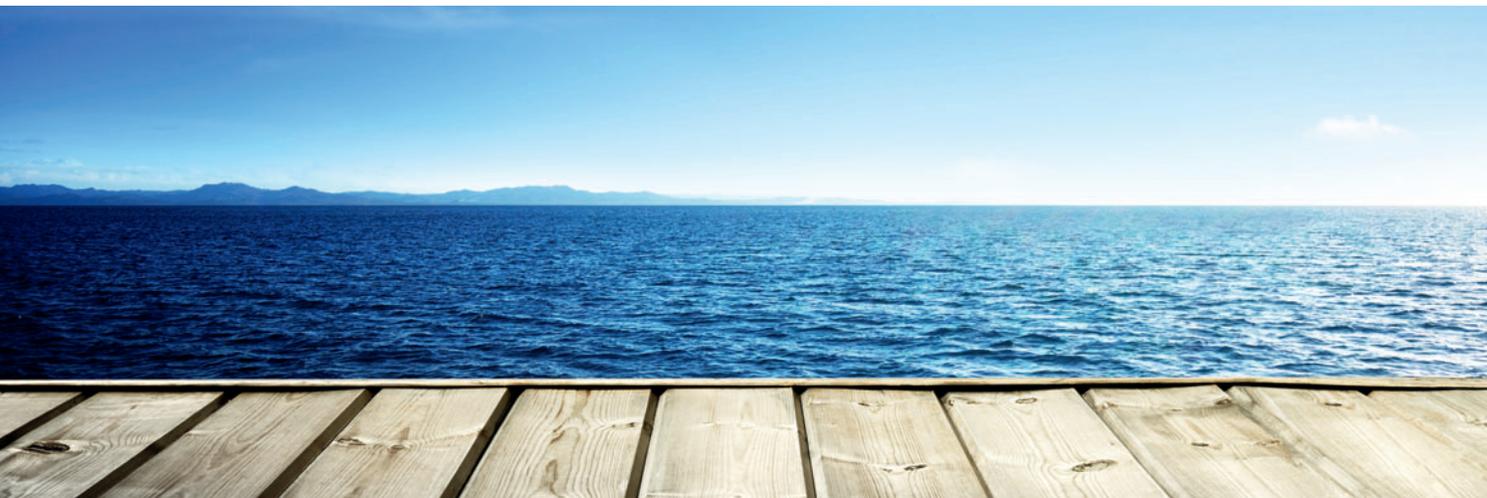
**Figure 8:** The chart displays the average upside and downside capture ratios of the MSCI Minimum Volatility (MV) Indexes relative to their parent indexes since inception. It illustrates that while the MSCI Minimum Volatility Indexes have produced significantly lower drawdowns, they have also substantially participated on the upside.



The upside and downside capture ratios indicate whether a given index has outperformed its parent index over periods of market strength and weakness, and if so, by how much. Since inception (May 2008), the MSCI USA Minimum Volatility Index, for example, captured 76.37% of the positive returns of its parent index, the MSCI USA Index; simultaneously, the MSCI USA Minimum Volatility Index lost 60.57% relative to the losses of the parent index. Over the 65-month period since inception, the MSCI USA Minimum Volatility Index outperformed the parent index in 20 of the 24 months of the parent's negative returns. Conversely, in the 41 months when the MSCI USA Index had positive returns, the MSCI USA Minimum Volatility Index outperformed its parent in 10 of those 41 months.

Historically, minimum volatility strategy indexes have outperformed their respective parent indexes (or market benchmarks). However, they have tended to outperform less frequently when markets were trending upward. This pattern is reversed when markets have faced headwinds.

*Historically, minimum volatility indexes have tended to outperform their broad market parent indexes when equity markets are falling; they have also tended to lag their parent indexes when markets rally.*



## MSCI Minimum Volatility Index Construction

Each MSCI Minimum Volatility Index is based on a broad market parent index and seeks to target a subset of stocks from the parent index with reduced volatility characteristics.

The process of calculating the best combination of stocks from the parent index with the lowest absolute volatility is called “optimization” and relies on the factor exposures of each stock in the parent index and their interaction with one another. The optimization process also involves the application of a series of constraints which are designed to maintain the country, sector and style characteristics of the parent index and to keep the MSCI Minimum Volatility Index turnover low—to an annual maximum of 20%.

**Figure 9** shows, for example, that the sector weights of an MSCI Minimum Volatility Index are constrained so that they do not deviate more than  $\pm 5\%$  from the sector weights of the parent index. Similarly, the style exposures are constrained so that all risk factors of an MSCI Minimum Volatility Index are restricted to  $\pm 0.25$  standard deviations relative to the parent index (except for the volatility factor, which is unconstrained so that the MSCI Minimum Volatility Index can achieve the lowest possible risk relative to the parent index).

*The MSCI Minimum Volatility Indexes are constructed using an optimization process that selects the best mix of low volatility stocks from a parent index, while simultaneously maintaining the country, sector and style characteristics of the parent.*

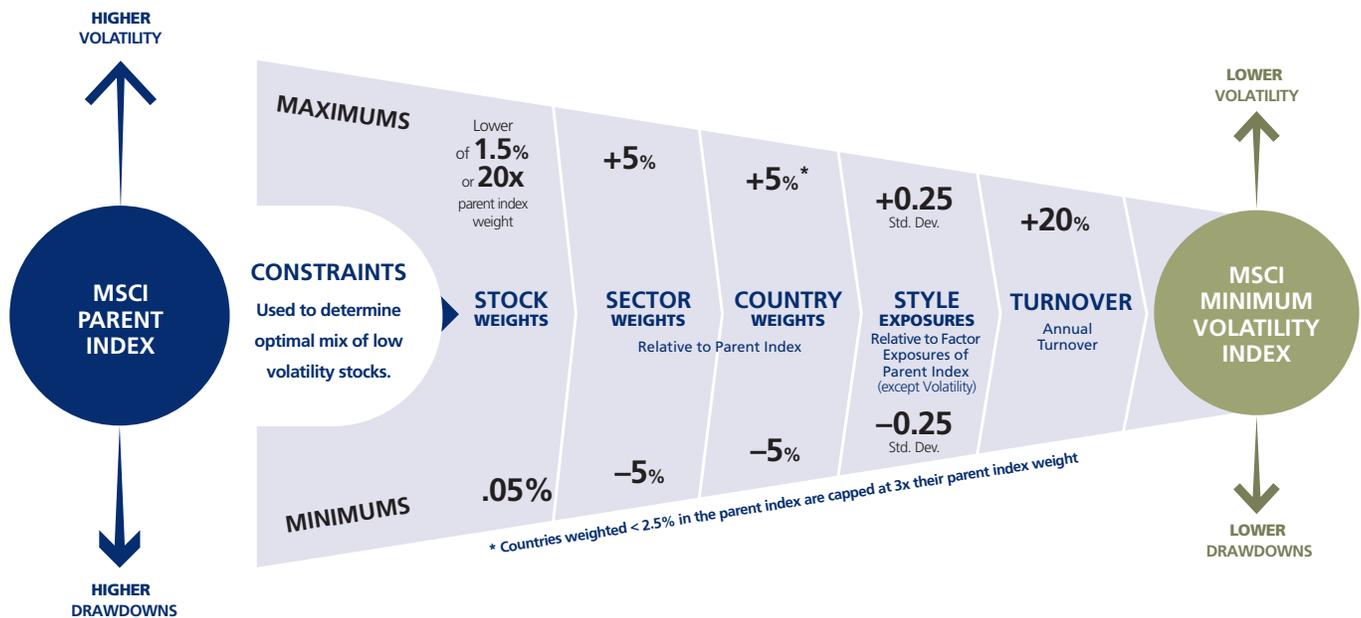


Figure 9: The optimization, or rebalancing, process occurs semi-annually and involves the application of a series of constraints. Sector weights, country weights and style exposures are all restricted to reflect the characteristics of the parent index.

Optimization constraints enable the MSCI Minimum Volatility Indexes to provide lower volatility and lower drawdowns while still reflecting their relative parent indexes without significant bias in countries, sectors and styles.

## Conclusion

Since the last financial crisis, many institutional investors have shown increasing interest in using risk-based investment strategies. While their primary incentive may be the need to cushion and diversify extreme risk, the potential to capture the “low volatility effect” provides an additional reason for why some investors adopt a minimum volatility strategy.

In April 2008, MSCI created the first minimum volatility indexes which can serve as relevant benchmarks for managed volatility equity strategies or as the basis for financial products such as ETFs. Each MSCI Minimum Volatility Index is calculated by optimizing a broad MSCI cap weighted parent index to produce an index with the lowest absolute volatility for a given set of constraints.

The MSCI Minimum Volatility Indexes have tended to outperform their broad market parent indexes in volatile markets; they have also tended to underperform their parent indexes when markets have rallied. Over all, since their inception, the MSCI Minimum Volatility Indexes have shown average monthly performance results that were comparable to their parent indexes, which has generally led to higher long-term compounded returns in contrast to the more volatile return series of the parent indexes.



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The company's flagship product offerings are: the MSCI indices with close to USD 7 trillion estimated to be benchmarked to them on a worldwide basis<sup>1</sup>; Barra multi-asset class factor models, portfolio risk and performance analytics; RiskMetrics multi-asset class market and credit risk analytics; IPD real estate information, indices and analytics; MSCI ESG (environmental, social and governance) Research screening, analysis and ratings; ISS governance research and outsourced proxy voting and reporting services; and FEA valuation models and risk management software for the energy and commodities markets. MSCI is headquartered in New York, with research and commercial offices around the world.

<sup>1</sup> As of September 30, 2012, as published by eVestment, Lipper and Bloomberg on January 31, 2013.