



Focus: Volatility



VALUE



SIZE



MOMENTUM



QUALITY



YIELD



VOLATILITY



GROWTH



LIQUIDITY

Factor focus:

Volatility

In the realm of investing, a factor is any characteristic that helps explain the long-term risk and return performance of an asset. MSCI Factor Indexes are designed to capture the return of factors which have historically demonstrated excess market returns over the long run.

MSCI Factor Indexes are rules-based, transparent indexes targeting stocks with favorable factor characteristics – as backed by robust academic findings and empirical results – and are designed for simple implementation, replicability, and use for both traditional indexed and active mandates.

Defining Volatility

A minimum volatility strategy involves buying stocks based on the estimate of their volatility and correlations with other stocks.

Minimum volatility is categorized as a “defensive” factor, meaning it has tended to benefit during periods of economic contraction (see “Performance and Implementation”). This type of

strategy is more concerned with volatility management than with maximizing gains.

Paradoxically, the strategy has produced a premium over the market for long periods, contravening the principle that investors should not be rewarded with higher risk-adjusted returns for taking less than market risk.

The key objective of a minimum volatility strategy is to capture regional and global exposure to stocks with potentially less risk. Historically, the MSCI Minimum Volatility Indexes, for example, have realized lower volatility and lower drawdowns (peak-to-trough declines) relative to their parent index during significant market downturns.

Why investors have used minimum volatility strategies

Tactical investors have used MSCI Minimum Volatility Indexes to reduce risk during market downturns, while retaining exposure to equity. Strategic investors have recognized (1) the benefits of minimum volatility strategies in asset allocation and (2) that minimum volatility strategies have tended to outperform high volatility strategies on a risk-adjusted basis in the long run.

There are several behavioral explanations for the minimum volatility premium, which was identified in the early 1970s by economist Fischer Black and elaborated on by others

since then. One theory posits that investors underpay for low volatility stocks, viewing them as less rewarding, and overpay for high volatility stocks that are seen as long-shot opportunities for higher returns. A secondary academic explanation holds that investors can be overconfident in their ability to forecast the future, and that their opinions differ more for high volatility stocks, which have less certain outcomes, leading to higher volatility and lower returns.

In terms of methodology, the main approaches to implementing a minimum volatility strategy fall into two groups: (1) simple rank and selection and (2) optimization-based solutions.

A simple approach ranks the universe of stocks by their expected volatility, selects a subset of the constituents from the universe and then applies a weighting method. These approaches generally ignore the correlation between stock returns, which can have a significant impact on the overall volatility strategy.

While a simple rank and selection method reflects the volatility of individual stocks, optimization-based approaches account for both volatility and correlation effects, i.e., the magnitude and the degree to which stocks move in tandem. However, a naive unconstrained minimum volatility strategy has its own set of challenges,

such as biases toward certain sectors and countries, unwanted factor exposures and potentially high turnover at rebalancing. Well-designed optimizations with carefully constructed constraints, however, may be able to neutralize these shortcomings.

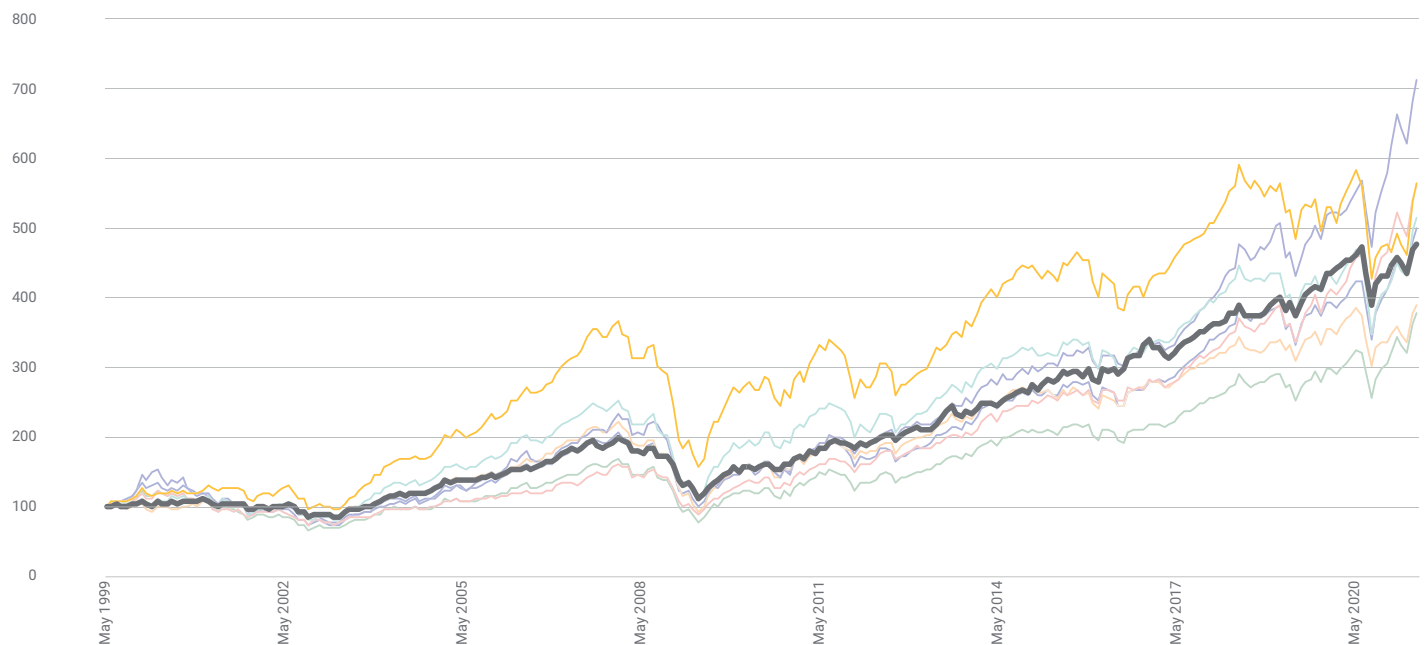
The MSCI Minimum Volatility Indexes are calculated by using an optimization designed to produce an index with the least overall volatility with a given set of sector, country, and factor constraints in addition to ensuring index replicability and investability.

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Performance & --- implementation

MSCI World Factor Indexes

Over time, individual factors have delivered outperformance relative to the market.



- World
- World Enhanced Value
- World Quality
- World Equal Weighted
- World Minimum Volatility (USD)
- World Momentum
- World Growth Target
- World High Dividend Yield

The MSCI World Minimum Volatility (USD) Index has historically generated excess returns over the long run with a 1.16% annual return over the MSCI World Index since 1999 as represented above.

Long-term performance: May 1999 – December 2020



Although factor strategies have exhibited long-term outperformance, in the short-term, factor performance has been cyclical and has generated periods of underperformance.

How factors have performed:

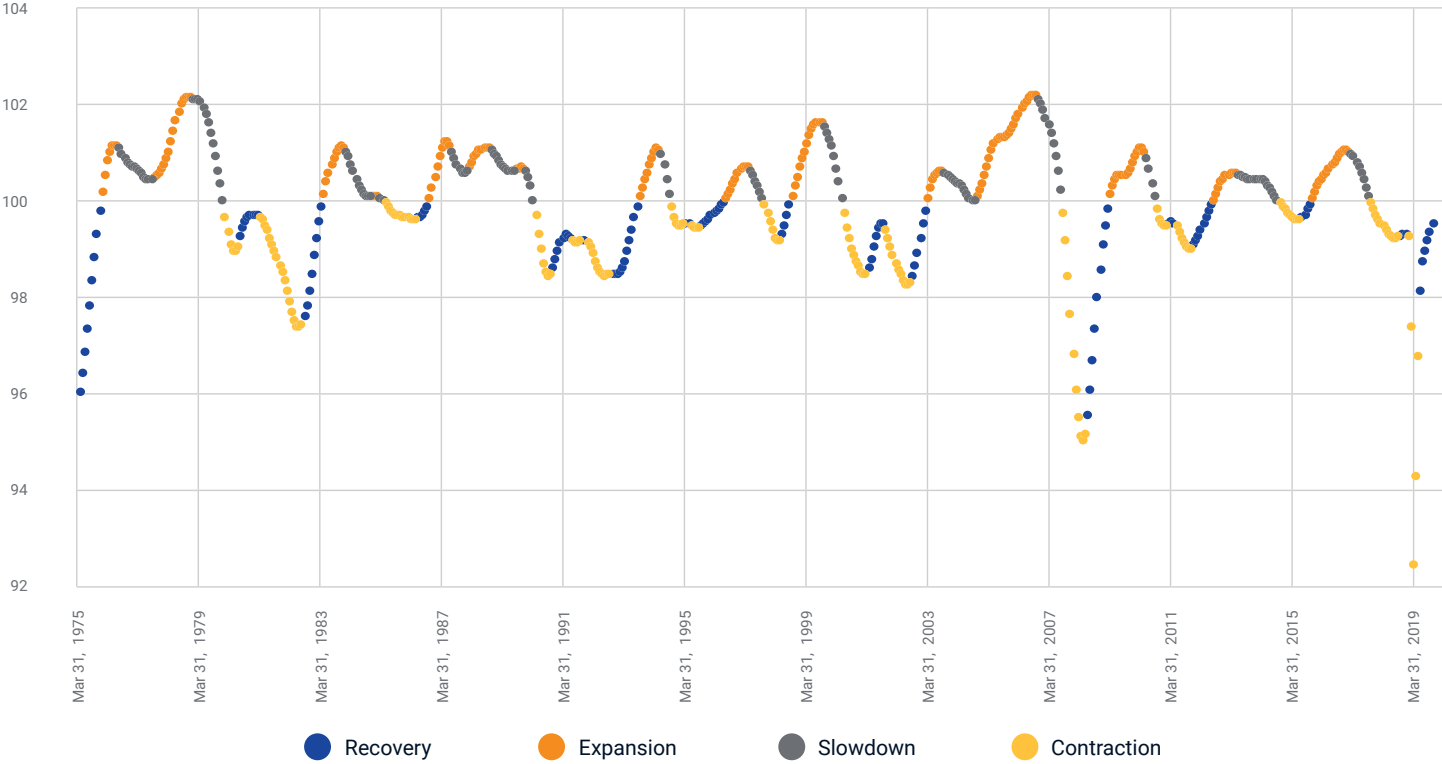
Volatility

| 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------|--------|--------|-------|-------|-------|-------|-------|--------|-------|-------|--------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| 1.5% | -4.5% | -9.6% | 56.7% | 28.6% | 28.4% | 31.0% | 19.9% | -29.2% | 42.0% | 18.2% | 8.0% | 16.7% | 32.7% | 12.1% | 5.8% | 10.3% | 32.6% | -1.4% | 36.7% | 28.7% |
| 1.2% | -8.0% | -9.8% | 50.4% | 24.1% | 17.2% | 28.9% | 16.8% | -33.5% | 41.9% | 9.1% | 4.8% | 16.5% | 30.7% | 9.0% | 4.5% | 9.4% | 26.6% | -2.4% | 28.4% | 22.7% |
| 0.3% | -10.0% | -13.6% | 40.1% | 21.3% | 15.2% | 22.1% | 11.4% | -37.8% | 33.8% | 7.2% | 4.8% | 15.0% | 30.3% | 7.0% | 4.2% | 8.9% | 26.6% | -5.1% | 28.3% | 18.1% |
| -2.1% | -11.5% | -14.4% | 33.8% | 20.8% | 12.5% | 21.8% | 10.3% | -39.9% | 33.5% | 11.4% | 4.4% | 14.8% | 27.7% | 5.5% | 1.2% | 8.9% | 23.9% | -6.7% | 27.4% | 16.5% |
| -10.2% | -12.1% | -15.1% | 30.5% | 20.0% | 10.0% | 21.2% | 9.6% | -40.3% | 31.9% | 9.3% | -5.0% | 14.7% | 27.4% | 4.6% | -0.3% | 8.2% | 23.1% | -8.2% | 24.5% | 10.1% |
| -12.5% | -16.5% | -16.5% | 26.0% | 19.3% | 8.5% | 20.7% | 7.3% | -41.9% | 30.8% | 12.3% | -5.4% | 13.7% | 26.5% | 4.6% | -1.0% | 8.2% | 22.9% | -8.5% | 24.3% | 3.3% |
| -12.9% | -19.4% | -19.4% | 25.9% | 15.2% | 8.3% | 19.1% | 6.4% | -42.4% | 17.2% | 12.8% | -9.3% | 13.3% | 22.9% | 3.4% | -2.4% | 5.1% | 19.2% | -11.8% | 24.0% | 1.0% |
| -18.9% | -20.5% | -19.5% | 22.0% | 12.7% | 6.0% | 16.8% | 6.1% | -42.6% | 14.8% | 16.5% | -11.0% | 8.9% | 19.4% | 3.3% | -2.7% | 4.7% | 18.0% | -13.4% | 19.8% | -3.3% |

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The analysis and observations in this report are limited solely to the period of the relevant historical data, backtest or simulation. Past performance – whether actual, back tested or simulated – is no indication or guarantee of future performance. None of the information or analysis herein is intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision or asset allocation and should not be relied on as such. The time periods covered in the charts in this paper were dictated by the data available when we conducted the simulations which produced them. There are frequently material differences between backtested or simulated performance results and actual results subsequently achieved by any investment strategy.

Macro effects on factor performance



In general, factor performance has been cyclical in nature. Individual factors have been shown to outperform during different macroeconomic environments.

Conclusion ---

Minimum volatility is one of the few factors that have performed well in turbulent markets, serving as a means of capital preservation. Moreover, over long periods of time, this defensive strategy has produced a premium over the market, contravening one of the most basic theories in finance – that one should not be rewarded with greater returns for taking less than market risk.

While naïve minimum volatility indexes may have unintended exposures to other factors, optimization based minimum volatility strategies have been calibrated to achieve targeted levels of country, sector and style exposure without significantly increasing volatility risk itself. The MSCI USA Minimum Volatility Indexes aim to reflect the performance characteristics of a minimum volatility strategy by optimizing towards the lowest absolute risk within a given set of constraints to minimize unintended risks and exposures.



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