NOTTINGHAM ADVISORS
ASSET MANAGEMENT

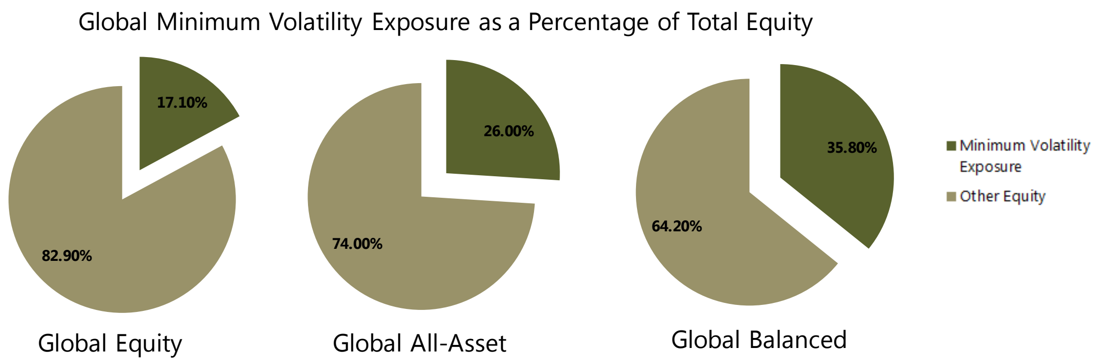
Reducing Portfolio Volatility and Adding Return
Using Global Minimum Volatility Strategies

Our Approach
Nottingham's investment philosophy is designed to deliver superior risk adjusted returns over a business cycle when compared to a strategy's respective benchmark. Our philosophy has been consistently implemented through a core- satellite, or strategic-tactical approach to portfolio construction. The core of an investment portfolio typically represents 75% of a portfolio's value and takes a long-term investment stance. The remaining 25% of the portfolio is tactical, or short-term in nature, designed to alter the risk-return profile in the near-term. Tactical trades can be thought of as alpha generators, risk reducers, or both.

Core Portfolio Implementation
The core of a portfolio is implemented using a three pronged approach made up of capitalization weighted (market cap weighted), single factor (Minimum Volatility), and multi-factor (Quality, Momentum, Value) exposures. These exposures are fine-tuned by Nottingham's Investment Policy Committee (IPC), aiming to reduce overall portfolio volatility, while still delivering an attractive return when compared to the overall market. Historically, the combination of these factors within the portfolio's core have led to better portfolio Sharpe Ratios (risk adjusted returns) when compared to the benchmark.

Minimum Volatility *in Practice*
Currently, Nottingham employs Minimum Volatility strategies on a global basis, with exposure to U.S. Large- and Small-Caps, as well as Developed International (EAFE) and Emerging Markets (EM). As part of our implementation process described above, our Global Equity, All-Asset, and Balanced strategies have had exposure to Minimum Volatility strategies on a global basis through the core of each respective equity allocation. Tactically speaking, Nottingham's IPC ***increased*** exposure to the Minimum Volatility exposure *multiple times* during the market's heyday earlier this summer. Specifically, we added U.S. Small-Cap Minimum Volatility exposure (with proceeds from ***reducing*** market cap weighted exposure) in June and August, just as the S&P Small-Cap 600 index was making all-time highs. Furthermore, the IPC again increased exposure to U.S. Large-Cap and Emerging Markets Minimum Volatility strategies. These tactical adjustments "dialed up" the Minimum Volatility factor with the short-term view that equity market volatility would increase, a decision that proved timely.

The below table summarizes exposure to the Minimum Volatility factor by strategy, as of December 31, 2018:



In each respective strategy, the strategy weight to Minimum Volatility exposures is the total weight of U.S. Large- and Small-Cap, Developed International (EAFE) and Emerging Markets (EM) exposures. Intuitively, as the strategies become more conservative (Global Equity is more aggressive than Global Balanced), the percentage of the equity exposure that Minimum Volatility makes up increases.

Minimum Volatility *in Practice – Q4 2018 (As of December 31)*

The fourth quarter has been full of equity market volatility as many of the high growth, momentum oriented, technology companies that powered the market's recent rally faltered. Shares of Facebook, Apple, Amazon, Netflix, Google (collectively "FAANG") have tumbled, with all companies down more than -20% from their respective 52-week highs. Globally, equity markets sold off in tandem, with the selloff not specific to the United States.

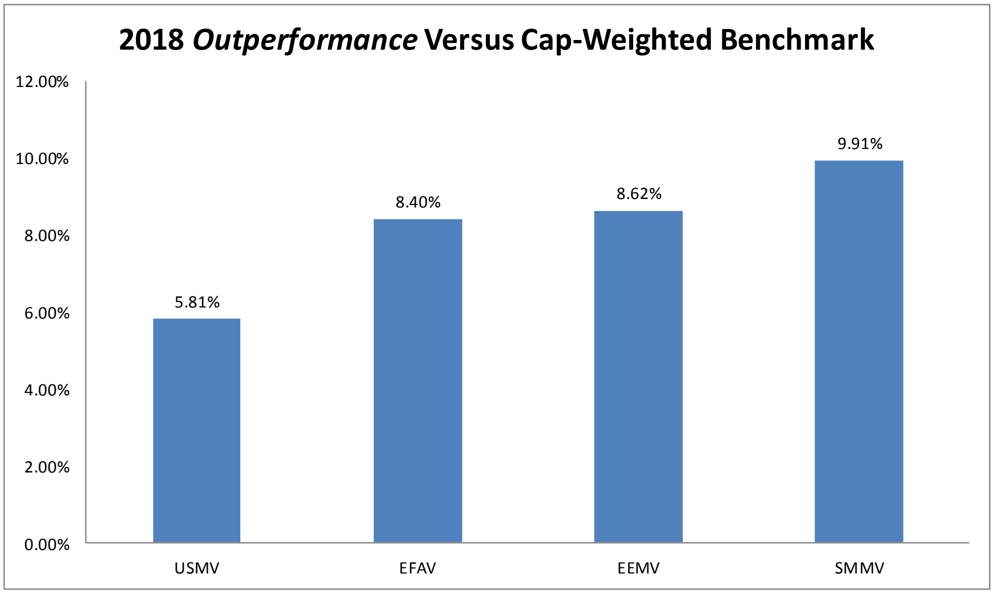
During this period, Minimum Volatility strategies held up exceptionally well, outperforming their market cap weighted counterparts and more importantly reducing risk. Risk reduction can take many forms: standard deviation (a measure of volatility), beta (a measure of sensitivity to market movements), and max drawdown (peak to trough decline). Bottom line: managing risk through Minimum Volatility factor strategies can lead to better investor outcomes, whether measured by Sharpe Ratio (return per unit of risk) or peace of mind.

Time Period: 10/1/2018 to 12/31/2018

ETF Names (Symbols)	**Return**	**Standard Deviation**	**Sharpe Ratio**	**Beta**	**Max Drawdown**
iShares Edge MSCI Min Vol USA ETF (USMV)	-7.56%	21.19%	-2.22	0.71	-12.37%
SPDR S&P 500 ETF (SPY)	-13.49%	28.54%	-2.93	1.00	-19.21%
Difference	*5.93%*				*6.84%*
iShares Edge MSCI Min Vol EAFE ETF (EFAV)	-7.51%	12.31%	-3.94	0.64	-8.89%
iShares Core MSCI EAFE ETF (IEFA)	-13.03%	17.71%	-4.71	1.00	-14.87%
Difference	*5.52%*				*5.98%*
iShares Edge MSCI Min Vol Emerging Markets ETF (EEMV)	-4.46%	16.09%	-1.80	0.66	-8.61%
iShares Core MSCI Emerging Markets ETF (IEMG)	-7.34%	23.07%	-1.96	1.00	-10.85%
Difference	*2.88%*				*2.24%*
iShres Edge MSCI Min Vol USA Small Cap ETF (SMMV)	-10.76%	19.78%	-3.42	0.62	-14.73%
iShares Core S&P Small Cap ETF (IJR)	-20.10%	30.10%	-4.29	1.00	-24.97%
Difference	*9.34%*				*10.24%*

Source: Morningstar Direct, Nottingham Advisors. Daily total returns.

Finally, while minimizing losses and mitigating risk are always important, the ultimate benefit of such strategies is typically seen over long periods of time. While we like to think of time horizon as a business cycle (5-7 years on average), we can look at calendar year 2018 to demonstrate the benefits of multiple periods of severe volatility in a short amount of time (the S&P 500 for example has suffered multiple declines ranging from 5-10%). Globally, max drawdowns approached or exceeded 20%. The below chart highlights the outperformance of Minimum Volatility ETFs when compared to their cap weighted benchmarks:



Source: Morningstar Direct, Nottingham Advisors. Time period: 1/1/2018-12/31/2018. Daily total return .

Outperformance calculated by subtracting the total return of each minimum volatility ETF and its respective capitalization weighted ETF. USMV compared to SPY ETF, EFAV compared to IEFA ETF, EEMV compared to IEMG ETF, and SMMV compared to IJR ETF.

In summary, while the data can be evaluated over short periods of time, the ultimate benefits of exposure to the Minimum Volatility factor are most pronounced over longer periods of time. As shown over the past five years in the table below, Minimum Volatility strategies have ***consistently*** reduced risk in client portfolios, while keeping up with markets when they rally.

Time Period: 1/1/2014 to 12/31/2018

ETF Names (Symbols)	**Return**	**Standard Deviation**	**Sharpe Ratio**	**Beta**	**Max Drawdown**
iShares Edge MSCI Min Vol USA ETF (USMV)	10.34%	12.86%	1.10	0.75	-12.81%
SPDR S&P 500 ETF (SPY)	8.39%	15.89%	0.75	1.00	-19.33%
Difference	*1.95%*				*6.52%*
iShares Edge MSCI Min Vol EAFE ETF (EFAV)	4.86%	11.71%	0.56	0.72	-12.00%
iShares Core MSCI EAFE ETF (IEFA)	1.02%	14.98%	0.11	1.00	-21.77%
Difference	*3.84%*				*9.77%*
iShares Edge MSCI Min Vol Emerging Markets ETF (EEMV)	1.75%	13.09%	0.18	0.74	-29.36%
iShares Core MSCI Emerging Markets ETF (IEMG)	1.61%	16.77%	0.16	1.00	-34.39%
Difference	*0.14%*				*5.03%*

Time Period: Since Inception (9/8/2016) to 11/30/2018

ETF Name (Symbol)	**Return**	**Standard Deviation**	**Sharpe Ratio**	**Beta**	**Max Drawdown**
iShres Edge MSCI Min Vol USA Small Cap ETF (SMMV)	8.34%	12.36%	0.84	0.60	-15.42%
iShares Core S&P Small Cap ETF (IJR)	5.83%	18.72%	0.43	1.00	-27.34%
Difference	*2.51%*				*11.92%*

Source: Morningstar Direct, Nottingham Advisors. Annualized daily total returns.

In fact, as the data show, exposure to the minimum volatility factor globally has achieved a double benefit – outperformance versus the market cap weighted benchmark ***AND*** lower volatility. Moreover, these factors produced additional portfolio benefits such as a lower standard deviation, market beta, and max drawdown. In the U.S. Small-Cap Min Vol (SMMV) space, the limited track record (just over two years) shows similar, if not more profound results.

Bottom Line: Minimum Volatility strategies have consistently offered a smoother investor experience, better risk adjusted returns, and peace of mind for advisors and their clients.

To learn more about how minimum volatility strategies are used within Nottingham's global portfolios, or how these types of strategies can be used to customize portfolios for specific client needs, please give our office a call.

I look forward to speaking with you soon.

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