

A Different Approach to Low Volatility:

Select the Best Securities First

Efram Slen and Richard Lin, Nasdaq Global Information Services

The goal of low-volatility investing is to minimize the impact of drawdowns that occur during periods of market turbulence or bear markets. By minimizing the performance drag caused by volatility, investors aim to compound returns at higher rates over the long term.

The Problem:

Some early iterations of low-volatility strategies accomplish this by simply screening for the least volatile stocks. The drawback of this approach is that these portfolios often have large sector and industry concentrations, making them less appealing to investors looking for diversified market exposure. In an attempt to address this shortcoming, a second generation of low-volatility strategies emerged. These strategies use a portfolio optimizer to construct a diversified low-volatility portfolio, rather than simply gravitating to low-volatility stocks. While this marked a step forward in the evolution of low-volatility investing, some of these strategies still lack a critical element – consideration of the fundamental profile of the stocks selected.

The Solution:

The Nasdaq Victory US Multi-Factor Minimum Volatility Index (the “Index”) attempts to enhance the methodology by including a multi-factor screening process that first narrows the investable universe to stocks believed to be more likely to outperform, then applies a portfolio optimizer to lower volatility and diversify the index. The combination seeks alpha from the multi-factor screen, and lower volatility stemming from the optimized portfolio construction. This results in a portfolio designed to participate in rising or bull markets, while outperforming during periods of heightened volatility or bear markets (best illustrated in the up/down market-capture ratio of the Index). Ultimately, the Index aims to provide superior risk-adjusted returns and a smoother path to long-term capital appreciation. The Index also differentiates its use of multiple factors by considering them in aggregate, with each security representing the appropriate exposure to all pertinent factors rather than a “bolt together” approach utilized by many other multi-factor approaches. The index launched on May 26, 2017, and has back-test data available beginning on April 20, 2001.

In this document we will describe the Index’s two-step approach. We will discuss the efficacy of multi-factor investing and how it is applied in this strategy. Next, we will explain how a portfolio optimizer reduces portfolio volatility, and how it is used in this approach to provide diversified market exposure. Finally, we will review historical performance of the Index, and compare it to a number of its more traditional low-volatility peers.

Index Highlights

- The Index offers a next-generation approach to low-volatility investing.
- It seeks to provide a smoother path to long-term capital appreciation.
- This rules-based, low-cost solution is designed to be used as a core portfolio holding, broad market replacement, or as a tactical component.
- The Index employs a two-step approach that aims to deliver superior risk-adjusted equity returns.
 - **STEP 1:** A multi-factor model is used to narrow the investment universe to companies that score well on the following attributes: quality, value, profitability, growth, and momentum.
 - **STEP 2:** A portfolio optimizer is used to minimize overall portfolio volatility by weighting stocks based on the correlation of assets and a series of constraints designed to help diversify the portfolio.
- The Index is reconstituted and rebalanced semiannually on the third Friday in April and October (using data from the end of March and September, respectively).

Index Methodology Explained

Eligibility Criteria

To be eligible for inclusion in the Nasdaq Victory Multi-Factor Minimum Volatility indexes, a security must first meet the following criteria:

- Be a member of its parent Nasdaq index:
 - The parent index for the Nasdaq Victory US Multi-Factor Minimum Volatility Index is the Nasdaq US Large Mid Cap Index.
 - The Nasdaq US Large Mid Cap Index is designed to track the performance of securities assigned to the United States that are included in the large/mid-cap segment. Securities eligible for the index are listed in the US on the Nasdaq or New York exchanges.
 - The number of securities in the index is close to 1,000 as of November 2019.
- One security per issuer is permitted (if an issuer has multiple securities, the security with the highest three-month average daily dollar trading volume will be selected for possible inclusion in the index).

Multi-Factor Investing

Prior to discussing the Index's multi-factor methodology, let's take a look at the basics of factor investing, and explain why we believe a multi-factor approach is superior to a single-factor approach.

Factor investing is not a new concept. In fact, in order to fundamentally assess any investment, multiple factors must be considered. For example: How attractively valued is the investment? How fast is it growing? Is it a high-quality investment? Is it profitable? What's different about factor investing today is the increased computing power, which enables true multi-factor analysis and ranking of ever larger investment universes. Many strategies in the marketplace take the approach of single-factor investing, or pairing just a few factors together in their stock selection methodology. We believe multi-factor is a more durable long-term approach. As can be seen in the quilt chart below, there's little consistency year-to-year in factor leadership. The top performing factor in one year might be the worst performing factor in the following year. Attempting to effectively time which factor to overweight in a given market environment is also very difficult to accomplish with consistency.

Factor Returns: Examining Best Practices for Smart Beta Exposure

* Market data thru 12/31/2019, cumulative returns use a start date of 12/29/2006

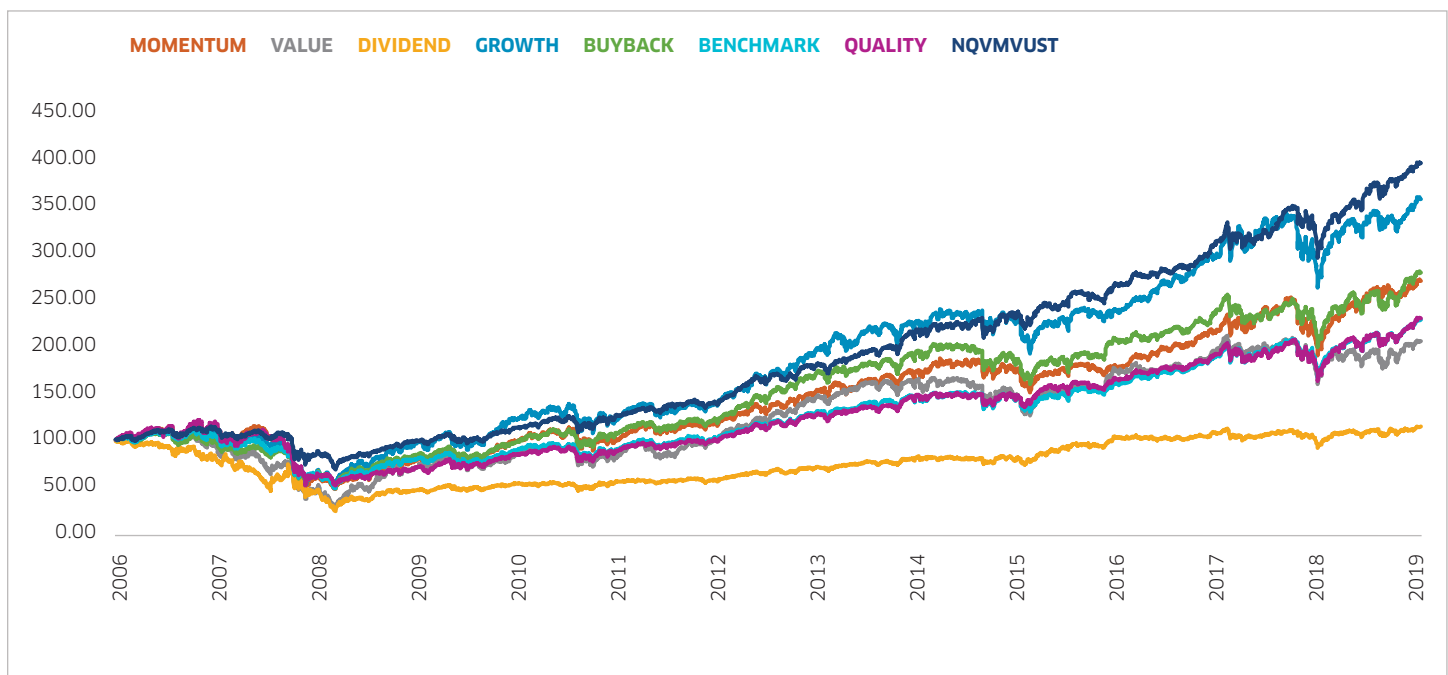
| 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Momentum 17.17 | Low Vol -21.41 | Value 49.26 | Growth 26.35 | Low Vol 12.08 | Value 22.97 | Value 45.53 | Low Vol 14.48 | Low Vol 1.61 | Dividend 26.82 | Growth 25.44 | Low Vol -2.28 | Momentum 32.78 |
| Quality 16.77 | BuyBack -34.26 | Growth 48.43 | Momentum 26.26 | BuyBack 9.07 | Momentum 17.16 | BuyBack 44.56 | Quality 14.06 | Growth 1.48 | Value 17.05 | Momentum 22.93 | Growth -4.94 | BuyBack 32.22 |
| Growth 5.80 | Benchmark -38.28 | Equal Weight 42.19 | Value 20.89 | Dividend 4.40 | Equal Weight 15.21 | Growth 42.65 | Dividend 13.92 | Momentum 0.75 | Equal Weight 13.05 | Benchmark 19.38 | Momentum -6.12 | Quality 31.50 |
| Benchmark 3.24 | Growth -39.23 | BuyBack 29.35 | Quality 19.79 | Quality 4.39 | Growth 13.96 | Equal Weight 33.63 | Growth 13.12 | Quality -0.64 | Quality 12.36 | Quality 17.16 | Benchmark -6.35 | Benchmark 28.79 |
| Low Vol 0.58 | Equal Weight -41.08 | Momentum 27.19 | Equal Weight 19.68 | Momentum 1.36 | Benchmark 13.47 | Momentum 31.27 | Equal Weight 12.35 | Benchmark -0.81 | BuyBack 11.00 | BuyBack 16.94 | Quality -8.67 | Growth 27.23 |
| Equal Weight -0.34 | Dividend -41.49 | Benchmark 23.49 | BuyBack 17.52 | Growth -0.01 | BuyBack 12.33 | Quality 29.84 | Momentum 12.03 | Dividend -1.11 | Benchmark 9.64 | Equal Weight 16.61 | Equal Weight -9.53 | Equal Weight 26.61 |
| BuyBack -2.48 | Momentum -46.35 | Low Vol 19.22 | Dividend 15.82 | Benchmark -0.20 | Quality 12.05 | Benchmark 29.69 | BuyBack 11.54 | Equal Weight -4.26 | Low Vol 7.80 | Value 15.11 | Dividend -11.06 | Low Vol 25.06 |
| Value -6.71 | Quality -46.41 | Quality 12.20 | Low Vol 13.36 | Equal Weight -2.18 | Low Vol 6.75 | Dividend 25.93 | Benchmark 11.29 | BuyBack -5.39 | Growth 3.56 | Low Vol 14.81 | BuyBack -11.59 | Value 21.83 |
| Dividend -18.94 | Value -49.76 | Dividend -1.77 | Benchmark 12.84 | Value -2.72 | Dividend 1.73 | Low Vol 19.80 | Value 10.43 | Value -10.48 | Momentum 1.52 | Dividend 5.20 | Value -14.23 | Dividend 19.89 |

LEGEND OF RETURN FACTORS AND PROXY INVESTMENTS

| | | | |
|--|--|---|---|
| Momentum | | Dividend Achiever | |
| PowerShares DWA Momentim Portfolio (PDP) <i>Inception: 03/01/2007</i> | <i>Seeks excess return through stocks with trends of strong relative past performance</i> | PowerShares Dividend Achievers Port. (PEY) <i>Inception: 12/09/2004</i> | <i>Seeks excess return through stocks with high dividend yields and/or history of raising dividends</i> |
| Value | | Growth | |
| Guggenheim S&P 500 Pure Value ETF (RPV) <i>Inception: 03/01/2006</i> | <i>Seeks excess return through stocks with low prices relative to a fundamental value</i> | Guggenheim S&P 500 Pure Growth ETF (RPG) <i>Inception: 03/01/2006</i> | <i>Seeks excess return through stocks with above-average fundamental growth metrics</i> |
| Low Volatility | | BuyBack Achievers | |
| PowerShares S&P 500 Low Vol. Portfolio (SPLV) <i>Inception: 05/05/2011</i> | <i>Seeks excess return through stocks with lower than average market volatility</i> | PowerShares BuyBack Achievers Port. (PKW) <i>Inception: 12/20/2006</i> | <i>Seeks excess return through companies executing high corporate stock buyback programs</i> |
| Benchmark | | Quality | |
| SPDR S&P 500 ETF (SPY) <i>Inception: 01/22/1993</i> | <i>A market capitalization weighted index comprised of approximately 500 US large cap stocks</i> | PowerShares S&P 500 Quality Portfolio (SPHQ) <i>Inception: 12/06/2005</i> | <i>Seeks excess return through companies with relatively low debt and/or stable earnings growth metrics</i> |
| Equal Weight | | | |
| Guggenheim S&P 500 Equal Weight ETF (RSP) <i>Inception: 12/09/2004</i> | <i>An equal weighted index comprised of approximately 500 US large cap stocks</i> | | |

A multi-factor approach attempts to outperform over the long term by providing diversified factor exposure. The chart below shows how the Nasdaq Victory US Multi-Factor Minimum Volatility Index (NQVMVUST) has performed vs. a number of popular smart beta factor ETFs during the allotted time frame 12/29/2006 - 12/31/19. The factors in the study are as follows: Momentum (PDP), Value (RPV), Dividend (PEY), Growth (RPG), Low Volatility (SPLV), Buyback (PKW), Benchmark (SPY), and Quality (SPHQ). Both the table and chart below illustrate that multi-factor was the clear winner, with the highest absolute and risk-adjusted returns.

| | MOMENTUM | VALUE | DIVIDEND ACHIEVERS | GROWTH | BUYBACK | BENCHMARK | QUALITY | NQVMVUST |
|------------------------------|----------|-------|-----------------------|--------|---------|-----------|---------|----------|
| Cumulative Return | 168% | 105% | 16% | 253% | 176% | 127% | 129% | 291% |
| Annualized Return | 7.9% | 5.7% | 1.1% | 10.2% | 8.1% | 6.5% | 6.6% | 11.0% |
| Annualized Volatility | 21% | 25% | 24% | 21% | 19% | 19% | 19% | 15% |



The Index's Multi-Factor Methodology

The objective of the multi-factor model is to narrow the Nasdaq US Large Mid Cap Index from approximately 1,000 constituents to a refined list of stocks with a higher likelihood of outperforming over a longer time horizon. Alternative low-volatility strategies apply the portfolio optimizer to the entire starting universe; however, in this approach only the narrowed list of attractive companies is included in the optimization. It is this element of the process that differentiates this Index from other low-volatility strategies.

The multi-factor model ranks stocks by calculating a composite score for each security, comprised of its quality, profitability, valuation, growth, and momentum scores. After composite scores are calculated for each eligible security in the universe (all 1,000), the securities are placed into five evenly distributed quintiles, with the highest ranking 20% in quintile 1, the next highest 20% in quintile 2, and so on until the worst-ranked securities are in quintile 5. During portfolio optimization (which will be described in greater detail later), only stocks in quintile 1 can be purchased or added to. If an existing position in the Index falls to quintile 2, the optimizer is permitted to hold the position at its current weight, but cannot add to it. Stocks in quintiles 3, 4, and 5 may not be held in the Index.

The chart below shows the factors and weights used in the Multi-Factor Model to calculate the composite scores.

| PRIMARY FACTORS | SUB-FACTORS AND WEIGHT | SEEKS TO IDENTIFY |
|-----------------|------------------------|-------------------|
| Quality | Stability | 10% |
| | EPS Quality | 10% |
| | Credit/Leverage | 10% |
| Profitability | Profitability | 10% |
| | Capital Spending | 10% |
| Value | Valuation | 20% |
| Growth | Growth | 10% |
| | Capital Deployment | 10% |
| Momentum | Momentum | 10% |

Companies in the financial sector use a slightly different calculation methodology. It is well-documented that analyzing cash flow metrics for financial companies poses many challenges, creating a less reliable picture of their true operating performance. For this reason, slight adjustments are made to the model for calculating the composite scores of financial companies. The model and weights applied to companies in the financial sector are reflected in the chart below.

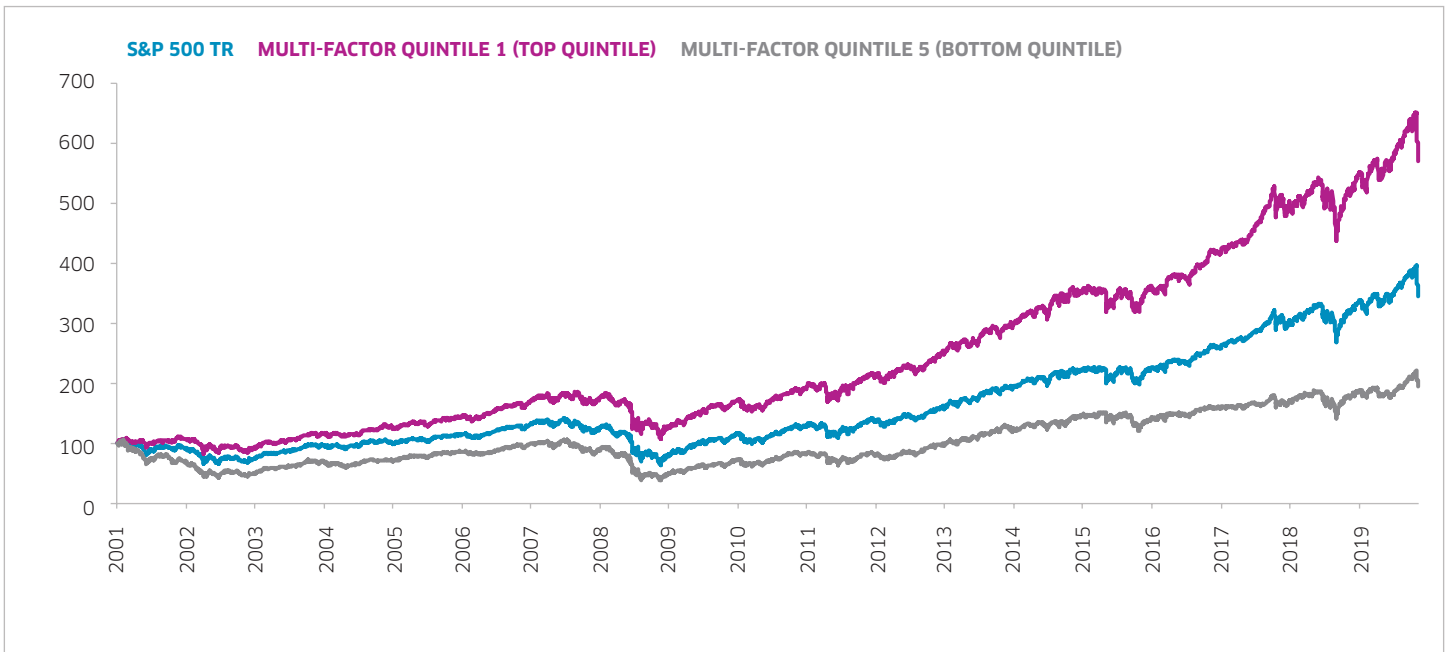
| PRIMARY FACTORS | SUB-FACTORS AND WEIGHT | SEEKS TO IDENTIFY |
|-----------------|------------------------|-------------------|
| Quality | EPS Quality | 14.3% |
| | Credit/Leverage | 14.3% |
| Profitability | Profitability | 14.3% |
| Value | Valuation | 28.6% |
| Growth | Capital Deployment | 14.3% |
| Momentum | Momentum | 14.3% |

Multi-Factor Model Performance Stats: April 20, 2001 – February 28, 2020

We will start by looking at individual quintile performance and compare it to the S&P 500 Total Return Index. The intention behind this analysis is to show that quintile 1 securities perform the best, while securities ranked in quintile 5 perform the worst. While not shown, performance for Multi-Factor Quintiles 2, 3, and 4 all fall in between Multi-Factor Quintiles 1 and 5.

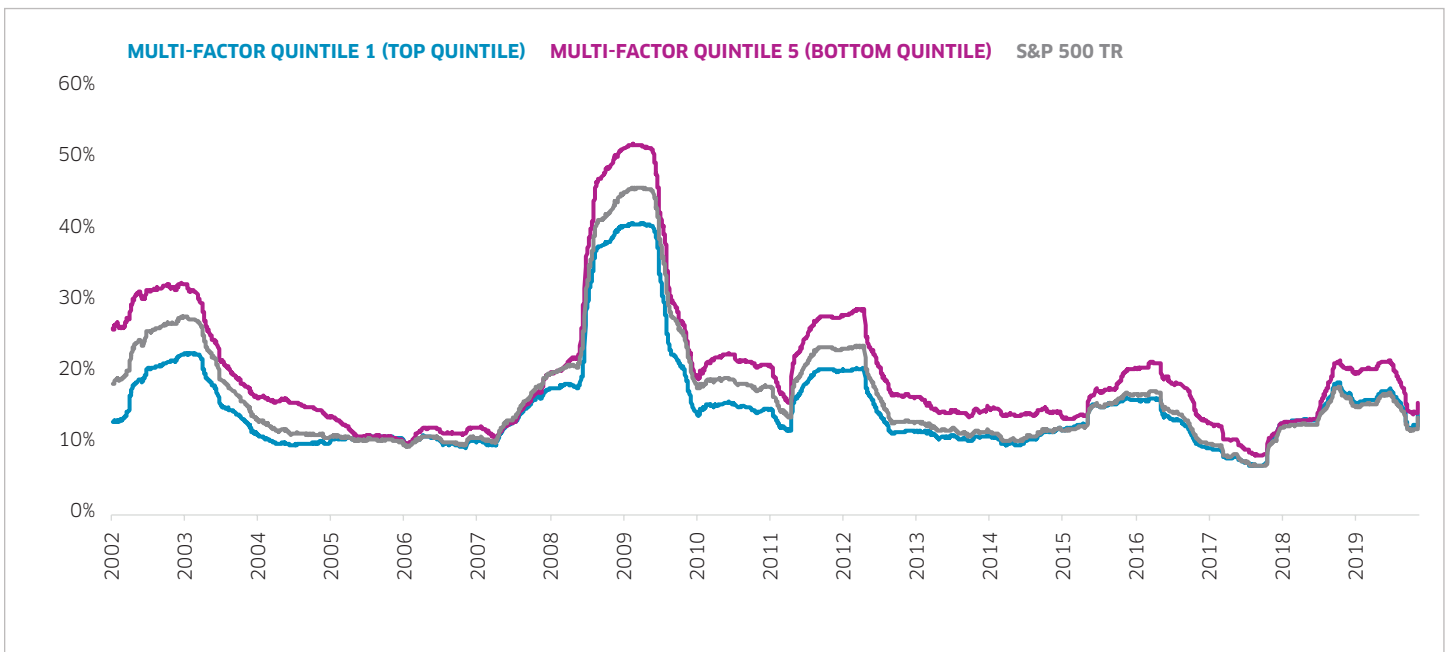
The table below confirms the benefits of the multi-factor quintile ranking approach. The top quintile provides significant outperformance versus the bottom quintile and the S&P 500 Total Return Index.

| | S&P 500 TR | MULTI-FACTOR QUINTILE 1 | MULTI-FACTOR QUINTILE 5 |
|-------------------|------------|-------------------------|-------------------------|
| Cumulative Return | 246% | 471% | 96.0% |
| Annualized Return | 6.8% | 9.7% | 3.6% |
| Volatility | 19% | 16% | 22% |



To complete our analysis, the chart below confirms the outperformance of the top quintile is achieved with lower volatility than quintile 5 and the S&P 500. This provides additional evidence that selecting a “better basket” of securities to create a low-volatility solution is quite compelling.

Stock Selection Results - Trailing Volatility



Optimization

Allocation Optimization

As we’ve already discussed, prior to inputting securities into the optimization framework, we first run the multi-factor screening process.

After the assets for the Index have been selected, there is still more work to do. The Index must determine what

percentage of the total holdings should be allocated to each stock. An analysis of the relationships between the holdings can enable us to further reduce the volatility of the portfolio by carefully setting the allocation to each stock. The process of selecting these allocations to minimize volatility is called *portfolio optimization*.

It isn't necessarily obvious why one set of allocations would provide lower volatility than another. One reason is that the daily movements of certain stocks might be inversely correlated, meaning that on any particular day they tend to move in different directions: when one goes up, the other goes down. It is advantageous to include stocks like this in a portfolio because they can dampen each other's volatility. Most financial analysts agree that a lower volatility portfolio is also a lower risk portfolio, so minimizing volatility can reduce the overall risk of an Index.

The Objective Function

The optimizer works by choosing a set of candidate allocations to each stock, evaluating the resulting candidate portfolio, then adjusting the allocations and reevaluating. The process repeats until a certain objective is attained. This adjusting and testing is conducted thousands of times until the most favorable, or *optimal*, result is reached.

The goal for the optimizer is defined by the *objective function*. The objective function is an equation we can use to evaluate the quality of the portfolio. For the Index, our objective function is a sum of two components: volatility and turnover. Turnover refers to the degree to which the portfolio is moved from one set of assets to another during a rebalancing period. One hundred percent turnover would imply all assets are sold and an entirely new set of positions are entered. Significant turnover can result in higher transaction costs and tax implications that reduce the performance of the portfolio.

Overall, we seek to minimize the sum of volatility and turnover. The degree to which one factor predominates over the other depends on the importance of the weights that we set. We have determined these weights over thousands of simulations aimed at finding the optimal risk-adjusted return.

At each rebalancing period, we apply the optimizer to the list of assets in the existing portfolio (and the new quintile 1) to find the set of allocations that minimizes the sum of volatility and turnover. We determine these weights over thousands of simulations aimed at finding the optimal risk-adjusted return.

Constraints

There are some limits to the adjustments the optimizer can make to the portfolio. These limits are called *constraints*. Overall, the optimization portion of the Index is intended to ensure that the Index tracks the performance of the Nasdaq US Large Mid Cap Index but with lower volatility. In order to help ensure the Nasdaq Victory US Multi-Factor Minimum Volatility Index does not diverge too significantly from the performance of the Nasdaq US Large Mid Cap Index, we limit the degree to which allocations can differ from the index. You can see the allocation constraint maximum differences listed in the Index Rebalancing section. These constraints help mitigate significant idiosyncratic or sector risk.

As the optimizer seeks to minimize the objective function (volatility and turnover), it must not violate any of these constraints. The result is a portfolio that seeks to minimize risk in three ways: low volatility, low turnover, and limited exposure to sector and individual stock risk.

Index Rebalancing

The Index is reconstituted and rebalanced semiannually on the third Friday in April and October (using data from the end of March and September, respectively).

The Index employs a modified market capitalization weighting methodology. At each semiannual evaluation, the Index is rebalanced using an optimization process. The following constraints are applied:

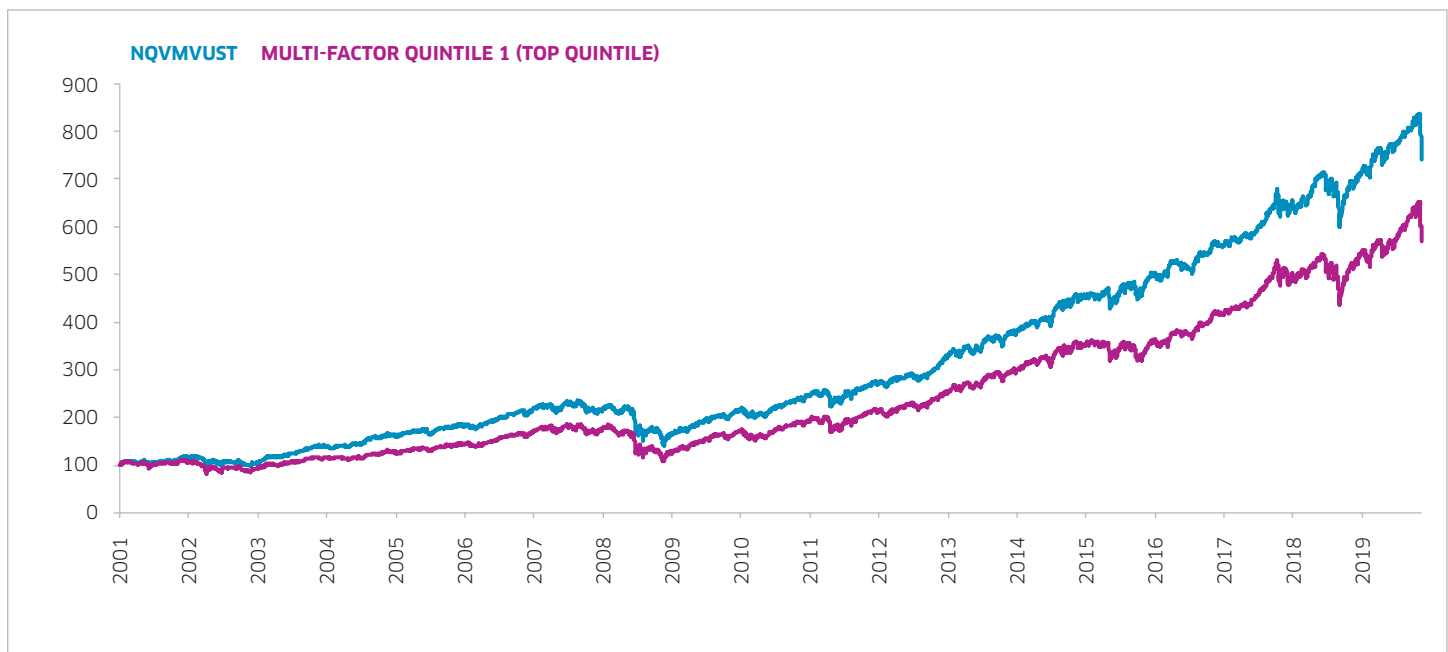
- Securities that are in the first quintile are eligible for purchase.
- Securities that are in the second quintile are only eligible for inclusion if they were in the Index during the prior period, and their weights cannot increase as of the Index Evaluation reference date.
- Industry weights must be +/- 5.0% of the parent Nasdaq index.
- Growth, Value and Size style factors are constrained to +/- 0.5 standard deviations of the parent Nasdaq index.

- The maximum individual security weight is 2.5% greater than the weight of the security in its parent Nasdaq index at time of initial inclusion and 3% greater than the weight of the security in its parent Nasdaq index if it is already a component in the Index.
- The maximum individual security weight is 50 times the weight of the security in its parent Nasdaq Index.
- Individual security weights are additionally constrained to a maximum weight as defined by the security's liquidity (20-day ADDTV/\$500 million).
- The minimum individual security weight is 0.25%.

Importance of Optimization: Additional Comparisons

Optimizing the multi-factor model not only serves to reduce volatility, but it also helps generate even stronger returns. An additional comparison that demonstrates the added benefit of the optimization process can be seen below. For the period between April 2001 and February 2020, the NQVMVUST Index provided significant outperformance (+642%) vs. a market-cap-weighted basket of multi-factor quintile 1 stocks (+471%). Even more impressive is that it did so with lower volatility (14% vs. 16%). Remember that the multi-factor-ranked quintile 1, as a stand-alone model, outperformed the S&P 500; the optimized multi-factor model – the Nasdaq Victory US Multi-Factor Minimum Volatility Index – outperformed even the best of the quintiles during this period.

| | NQVMVUST | MULTI-FACTOR QUINTILE 1 |
|-------------------|----------|-------------------------|
| Cumulative Return | 642% | 471% |
| Annualized Return | 11.2% | 9.7% |
| Volatility | 14% | 16% |

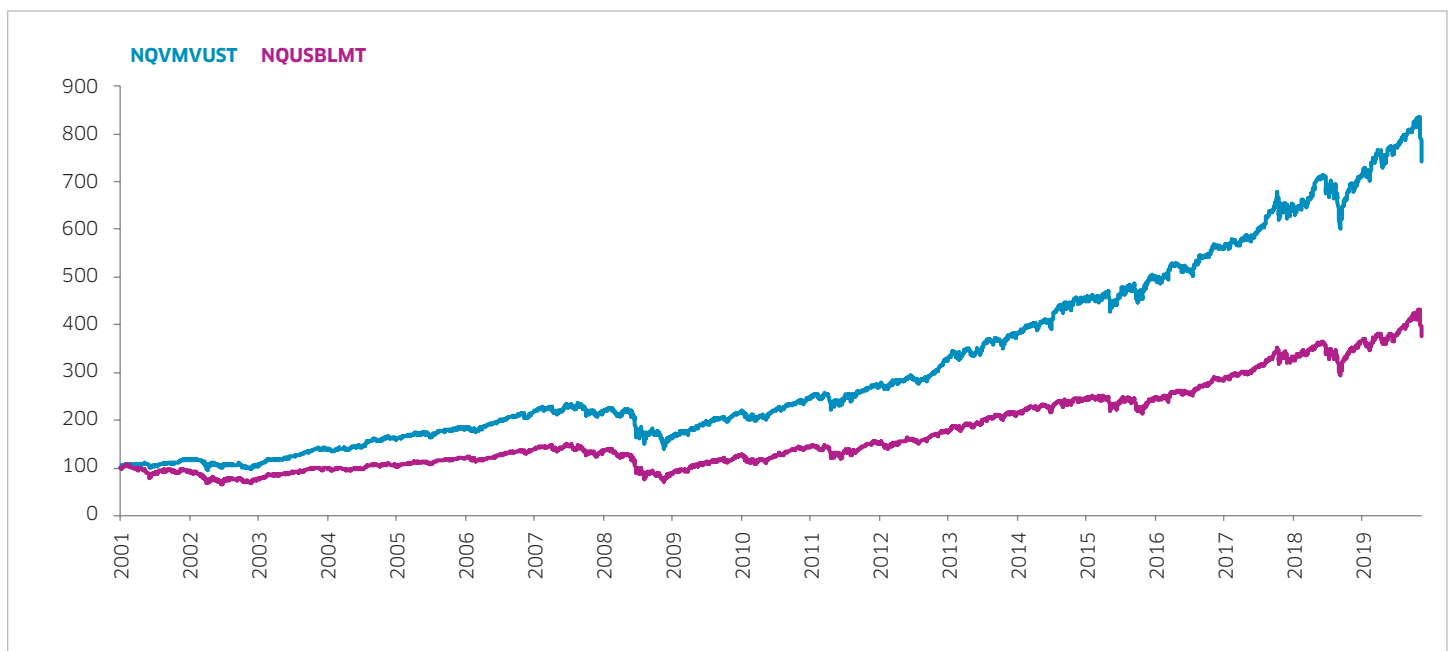


Index Performance:

Performance History: April 20, 2001 – February 28, 2020

Let's begin by taking a look at the overall performance between the Nasdaq Victory US Multi-Factor Minimum Volatility Total Return Index (NQVMVUST) and the Nasdaq US Large Mid Cap Total Return Index (NQUSBLMT) through February 28, 2020. Over the time frame studied, the Nasdaq Victory Multi-Factor Minimum Volatility Index returned 642% on a cumulative basis with 11.2% annualized return and 14% annualized volatility, which as we can see not only vastly outperformed NQUSBLMT, but did so with lower volatility.

| | NQVMVUST | NQUSBLMT |
|-------------------|----------|----------|
| Cumulative Return | 642% | 278% |
| Annualized Return | 11.2% | 7.3% |
| Volatility | 14% | 18% |



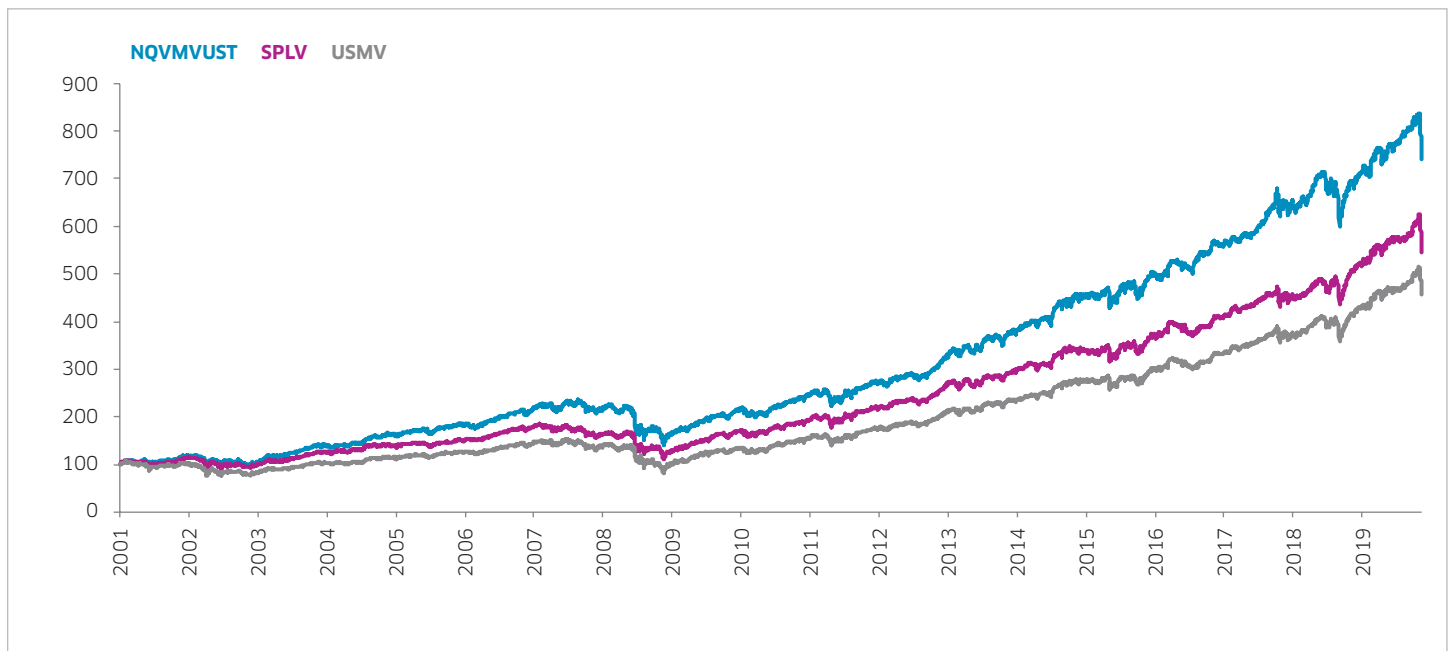
Performance Stats: April 20, 2001 – February 28, 2020

| | NQVMVUST | NQUSBLMT |
|--------------|----------|----------|
| Beta | 0.71 | |
| Correlation | 0.94 | |
| Sharpe Ratio | 0.81 | 0.40 |

Performance History – Peer Comparison: April 20, 2001 – February 28, 2020

Finally, let's compare the NQVMVUST Index to two other popular low-volatility indexes currently in the marketplace: the S&P 500 Low Volatility Total Return Index (SPLV) and the MSCI USA Minimum Volatility Gross Total Return Index (USMV). Yet again, the unique combination of quintile ranking and optimization generated impressive outperformance during the same time frame, with higher absolute returns than both competitor indexes, and comparable volatility.

| | NQVMVUST | SPLV | USMV |
|-------------------|----------|------|------|
| Cumulative Return | 642% | 447% | 357% |
| Annualized Return | 11.2% | 9.4% | 8.4% |
| Volatility | 14% | 14% | 15% |



Conclusion:

The Nasdaq Victory US Multi-Factor Minimum Volatility Index was designed to improve upon existing low-volatility strategies in the marketplace. Rather than selecting and weighting securities based solely on their volatility, or using a one-step volatility optimizer on the entire US equity market, the Index employs a two-step approach that is right there in the index name. In the first step, a multi-factor ranking process selects the highest-scoring securities in the US. In the second step, an optimization process determines weights that seek to minimize volatility while also meeting other constraints that keep the index strongly correlated with the overall market. As shown in the graphics, the multi-factor model alone produced better performance with lower volatility than the S&P 500. After running the securities with their multi-factor composite scores through the optimizer, the historical results show how applying an optimization process allowed for even better performance while limiting volatility.

Market participants can gain exposure to this Index through the VictoryShares US Multi-Factor Minimum Volatility ETF (VSMV).

Nasdaq® is a registered trademark of Nasdaq, Inc. The information contained above is provided for informational and educational purposes only, and nothing contained herein should be construed as investment advice, either on behalf of a particular security or an overall investment strategy. Neither Nasdaq, Inc. nor any of its affiliates make any recommendation to buy or sell any security or any representation about the financial condition of any company. Statements regarding Nasdaq-listed companies or Nasdaq proprietary indexes are not guarantees of future performance. Actual results may differ materially from those expressed or implied. Past performance is not indicative of future results. Investors should undertake their own due diligence and carefully evaluate companies before investing. **ADVICE FROM A SECURITIES PROFESSIONAL IS STRONGLY ADVISED.**