CONTRIBUTOR

Andrew Innes
Associate Director
Global Research & Design
andrew.innes@spglobal.com

The Merits and Methods of Multi-Factor Investing

"If you choose not to decide, you still have made a choice." – Neil Peart

EXECUTIVE SUMMARY

With a wealth of smart beta indices to choose from, market participants may find it difficult to decide when each factor-based strategy is best suited to deliver returns. Is it wise to rely solely on the performance of one factor? If not, what multi-factor approaches could be considered and how effective are they?

- Single-factor equity strategies (namely quality, value, momentum, and low volatility) may have rewarded market participants with active returns over the long term, but each is susceptible to unique, cyclical drawdowns.
- Choosing and timing exposures to single factors requires considerable foresight (or luck) to navigate optimally between them.
- The low correlations between the active returns of each factor generate a diversification benefit in a multi-factor portfolio, which can result in more stable excess returns.
- Adopting a bottom-up, "stock-level,"[1] multi-factor selection process may increase overall exposures to the desired factors when compared with allocating to multiple single-factor portfolios (a top-down "index of indices" approach).[2]
- The historical risk/return characteristics of the S&P 500® Quality, Value & Momentum Multi-Factor Index compare favorably to the best-performing single factors over varying time horizons.
- For market participants wishing to avoid the risk in choosing between single-factor strategies, multi-factor indices may offer a viable alternative without compromising on performance.

[1] A "stock-level" approach consists of combining factor scores at the constituent level prior to selection. For example, all stocks within a top-quintile, stock-level, multi-factor index will each have a combination of desired factor characteristics.

[2] For instance, an "index of indices" portfolio may allocate equal weights (rebalanced semiannually) to each factor index: 25% to the S&P 500 Quality Index, 25% to the S&P 500 Enhanced Value Index, 25% to the S&P 500 Momentum, and 25% to the S&P 500 Low Volatility Index.

1. THE RISK OF CHOOSING BETWEEN SINGLE FACTORS

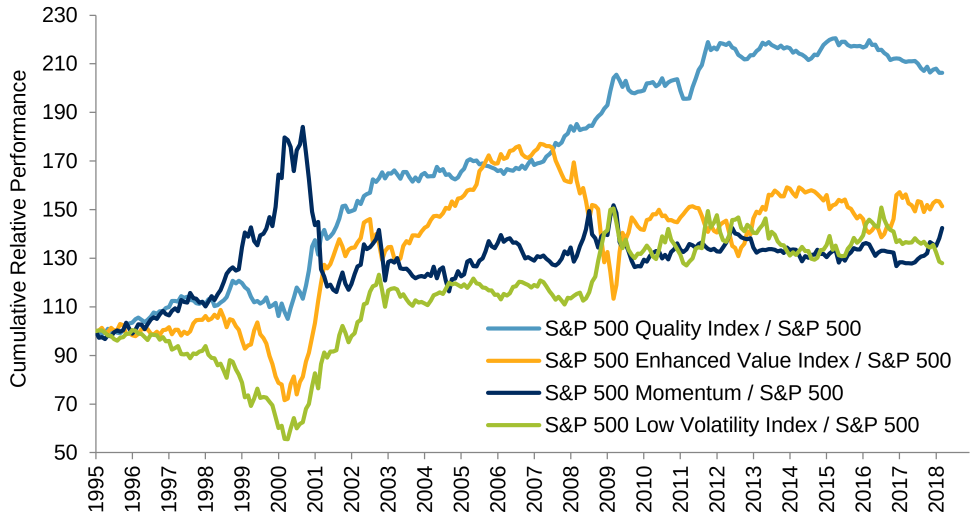
Given the unique cycles across the returns of single-factor strategies, how can those market participants without a factor view avoid putting all their eggs in the wrong basket?

1.1 The Cyclicality of S&P DJI's Single-Factor Indices

S&P DJI's single-factor index offerings include four key factors: quality, value, momentum, and low volatility.

Single-factor equity strategies have been widely adopted to harvest the unique risk premium of a particular systematic factor that could reward market participants over time. Out of the widely accepted equity factors extensively studied in academic literature,[3] S&P DJI's single-factor index offerings include four key factors: quality, value, momentum, and low volatility.[4] The application of these single-factor strategies in the form of simple, rules-based indices has enabled market participants to seek active returns while benefiting from the low-cost, transparent methodology of passive investing.[5]

Exhibit 1: The S&P 500 Single-Factor Indices Have Unique Active Returns[6]



Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1994, to March 29, 2018. Performance based on total return in USD. 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.

As seen in Exhibit 1, all of the long-term equity factors have distinct active returns that have all been susceptible to significant periods of underperformance relative to the S&P 500. Each factor exhibits unique

[3] For further details on factor theory, see Qian, E.E., Hua, R.H., Sorenson, E.H., (2007). Quantitative Equity Portfolio Management.

[4] For more information, see the S&P Quality Indices methodology, S&P Enhanced Value Indices methodology, S&P Momentum Indices methodology, and S&P Low Volatility Index methodology.

[5] For a thorough overview of equity factors and rationale, see our research paper, "The Story of Factor Based Investing" (Sunjiv Mainie, 2015).

[6] A full, comparable analysis of the S&P Europe 350 single- and multi-factor (concept) indices has been included in the Appendix.

cycles that can be attributed to the market environment[7] and corresponding stage in the economic cycle.[8] Therefore, single-factor strategies may be better suited to market participants with long time horizons, given their potential for long cyclical drawdowns. It is also worth noting that the active returns of each factor have varied greatly over the long term, and it may be incorrect to assume their relative strengths will continue indefinitely.

1.2 Using Multi-Factor Combinations to Diversify Risk

The returns of many of the established equity factors can be combined in an attempt to diversify the portfolio and provide more stable excess returns.

As the story of factor-based investing progresses, advocates of these systematic return drivers are increasingly looking to multi-factor combinations to seize upon the potential diversification benefits. In much the same way as combining different asset classes, each with its own risk/return profile, the returns of many of the established equity factors can be combined in an attempt to diversify the portfolio and provide more stable excess returns. Fortunately, most equity factor returns have low correlations, particularly in times of market stress.[9]

Thus, one can logically deduce that using multiple equity factors as building blocks when creating a combined diversified portfolio may allow market participants to increase the frequency of outperformance over shorter time horizons.

1.3 Introducing a Multi-Factor Index of Indices Approach

Until recently, market participants wishing to gain exposure to multiple factors and motivated by the diversification benefits of a combined approach have primarily done so by managing their allocations to a collection of single-factor strategies. This approach represents a multi-factor index of indices, in which each underlying index contains constituents chosen based only on a single factor. For our example below, we have created a multi-factor index of indices with equal weights between the S&P 500 Quality Index, S&P 500 Enhanced Value Index, S&P 500 Momentum, and S&P 500 Low Volatility Index (rebalanced semiannually). As each of the S&P 500 single-factor indices contains the top 100 stocks, our combined portfolio may contain up to 400 stocks (although there are generally substantially fewer, owing to crossover of constituents between the indices).

[7] Ung, Daniel and Priscilla Luk, "What Is In Your Smart Beta Portfolio? A Fundamental and Macroeconomic Analysis," 2016.

[8] Asness, C., "Changing Equity Risk Premia and Changing Betas over the Business Cycle and January," University of Chicago Working Paper (1992).

[9] To see more detail on the unique cycles and correlations between factors see our S&P Research paper "Blending Factors in Your Smart Beta Portfolio" (Cheng and Srivastava, 2016).

1.4 Multi-Factor Strategy Outperformed More Frequently Than Single-Factors

Exhibit 2 shows that the single-factor indices often outperformed the S&P 500 on a risk-adjusted basis over most time horizons during the period studied. However, the frequencies of risk-adjusted outperformance were notably lower for shorter holding periods, with frequencies less than 50% for the enhanced value and momentum factors over one- to five-year rolling windows. Interestingly, the outperformance frequencies varied greatly between the different factor indices. For example, across all the five-year investment windows, the quality and low volatility indices outperformed 91% and 88% of the time, respectively, while the enhanced value and momentum indices only outperformed 42% and 46% of the time, respectively. This suggests that market participants would have needed significant foresight when allocating tactically between the factors to ensure that they were exposed to the winning factors at the right time.

Market participants would have needed significant foresight when allocating tactically between the single-factors to ensure that they were exposed to the winning factors at the right time.

Exhibit 2: Frequency of Risk-Adjusted Outperformance to the S&P 500 Over Varying Time Horizons

ROLLING WINDOW	S&P 500 QUALITY INDEX	S&P 500 ENHANCED VALUE INDEX	S&P 500 MOMENTUM	S&P 500 LOW VOLATILITY INDEX	INDEX OF INDICES
1 Year	62.30%	45.10%	46.30%	56.30%	76.10%
3 Years	74.20%	41.80%	41.40%	78.30%	96.70%
5 Years	91.40%	42.30%	45.90%	87.70%	100.00%
10 Years	100.00%	49.40%	64.40%	100.00%	100.00%
15 Years	100.00%	74.00%	63.00%	100.00%	100.00%

Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Average of monthly rolling data from Dec. 31, 1994, to March 29, 2018. Performance based on total return in USD. Past performance is no guarantee of future results. The Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, S&P 500 Momentum and S&P 500 Low Volatility Index that is rebalanced semiannually. 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.

Fortunately, for those with an agnostic view regarding factors, the index of indices represents an alternative approach that fared as well as or better than the best-performing single factor over all horizons.[10] The diversification benefit of holding equal exposure between the four single-factor indices (rebalanced semiannually) contributed to its outperformance to the S&P 500 on a risk-adjusted basis 76% of the time over a one-year period and 97% of the time over a three-year period.

[10] Performance comparison between the index of indices and the best-performing single factor is made in terms of the frequency of outperformance of risk-adjusted returns, as shown in Exhibit 2.

2. FACTOR EXPOSURE DILUTIONS IN A MULTI-FACTOR INDEX OF INDICES

Since exposures to desired secondary factors could be weak, a multi-factor index of indices may experience factor exposure dilution.

The relative simplicity and lack of required factor view when adopting an equal-weighted, multi-factor index of indices approach may be compelling to market participants. However, combining single-factor indices to create a multi-factor index of indices results in a portfolio of stocks that are only selected based on their merits with regard to a single factor. Therefore, since their exposures to desired secondary factors could be relatively weak, the combined portfolio may suffer from a dilution effect in overall factor exposures.

2.1 Low Secondary Factor Exposures in Single-Factor Indices

There are several ways to measure the factor exposures within a portfolio; for instance, one could calculate the regression coefficients with respect to each of the desired factor returns. However, since our concern is focused on index construction, it seems prudent to measure factor exposures in terms of the factor scores[11] of the selected stocks—much like how the top quintile is selected in S&P DJI's factor indices methodology.

Exhibit 3 shows the relative factor exposures of each top-quintile S&P 500 single-factor portfolio, expressed in terms of their weighted-average factor scores.

Each top quintile portfolio generally had low secondary factor exposures.

Exhibit 3: Factor Scores of Top-Quintile, Single-Factor Portfolios

PORTFOLIO	WEIGHTED-AVERAGE PERCENTILE RANK OF FACTOR Z-SCORES (%)			
	QUALITY	ENHANCED VALUE	MOMENTUM	LOW VOLATILITY
Top Quintile S&P 500 Quality Index	90.0	32.0	58.0	63.0
Top Quintile S&P 500 Enhanced Value Index	42.0	91.0	40.0	51.0
Top Quintile S&P 500 Momentum	54.0	32.0	90.0	59.0
Top Quintile S&P 500 Low Volatility Index	57.0	44.0	57.0	91.0

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1994, to March 29, 2018. Factor z-scores are calculated semiannually according to S&P DJI's Single-Factor Index methodology and are expressed as a weighted average of their percentile ranks within the S&P 500. 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.

We can see that each top quintile portfolio generally had low secondary factor exposures. For instance, the top 100 stocks in the S&P 500 ranked in terms of their value score typically had below-average quality and momentum scores; their weighted-average ranks were at the 42nd

[11] To create comparable data sets, the fundamental data within a factor score is standardized into a z-score, defined as the number of standard deviations each value is from its population mean. Using this approach, for example, the z-score of the accruals ratio, leverage, and return on equity can be averaged to provide a single quality score for a stock.

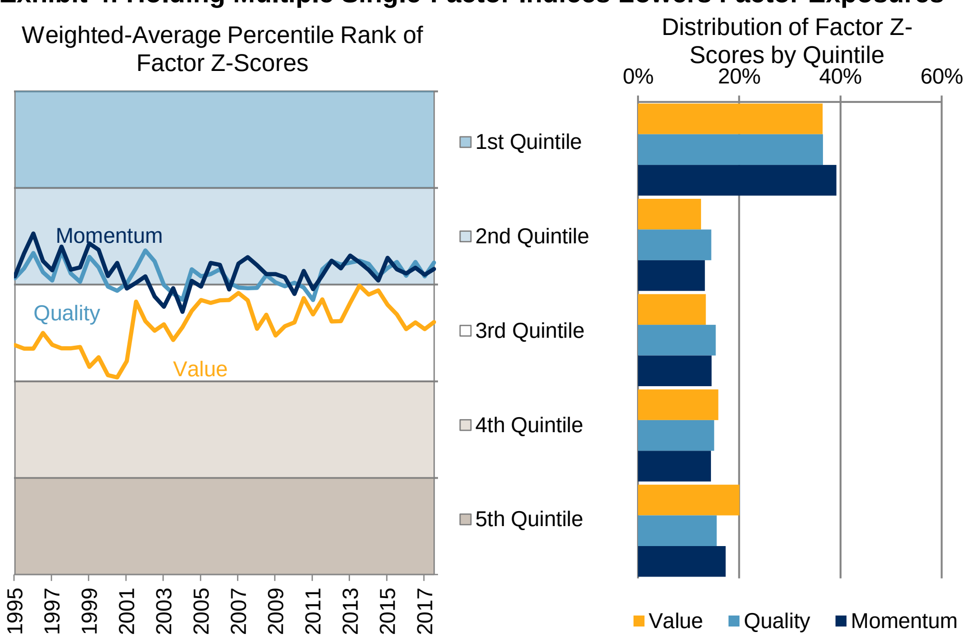
percentile and 40th percentile, respectively. Unsurprisingly, it is unlikely that the best value stocks in the S&P 500 (or elsewhere) would have already experienced considerable price momentum or be considered of the highest quality. Similar rationale can help us understand other low or negative correlations between the various factor combinations.

2.2 Diluted Net Exposures in a Multi-Factor Index of Indices

Exhibit 4 shows the weighted-average factor z-score percentiles for an index of indices containing quality, value, and momentum. The lines representing factor exposures of the combined portfolio over time indicate considerable factor exposure dilution compared with the top quintile offered by the respective single-factor indices (see Exhibit 3). The average exposures to the desired factors in a multi-factor index of indices are comparable to second and third quintile stocks. In terms of the frequency of distribution for each desired factor, fewer than 40% of the stocks selected are in the top quintile. The significant distribution of stocks in the lower quintiles may be affecting portfolio performance.

There is considerable factor exposure dilution in a multi-factor index of indices compared with the top quintile exposure offered by the respective single-factor index.

Exhibit 4: Holding Multiple Single-Factor Indices Lowers Factor Exposures



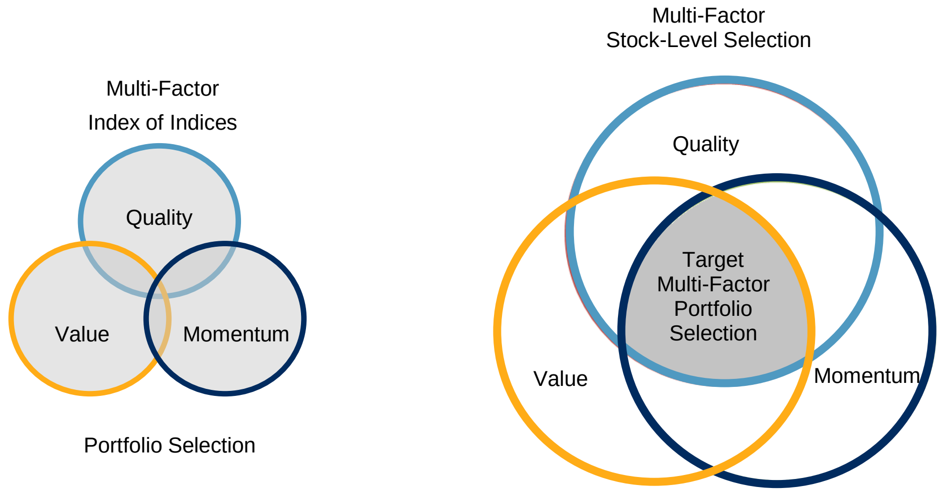
QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1994, to March 31, 2018. Factor z-scores are calculated semiannually according to S&P's Single-Factor Index methodology and are expressed as a weighted average of their percentile ranks within the S&P 500. The QVM Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum that is rebalanced semiannually. Charts are provided for illustrative purposes and reflect 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.

3. AN ALTERNATIVE MULTI-FACTOR APPROACH: STOCK-LEVEL SELECTION

Given that the negative correlation of factor scores appears to cause a degree of factor exposure dilution when adopting a multi-factor index of indices, we set out to examine whether there may be a more optimal approach to constructing a multi-factor index.

3.1 Target Multi-Factor Portfolio

Exhibit 5: A Stock-Level, Multi-Factor Index Targets "All-Rounders"



Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes.

A stock-level selection process selects stocks based on their multi-factor score and therefore targets a more concentrated portfolio of "all-rounders."

Exhibit 5 illustrates the alternative selection process involved in a stock-level multi-factor strategy. This "bottom-up" process involves combining individual factor scores for each stock to create a multi-factor score. The multi-factor score is then used to select a more concentrated portfolio of "all-rounders," characterized by exposures that are fairly evenly distributed across all of the desired return drivers. The intention of this approach is to mitigate the factor exposure dilution inherent in a multi-factor index of indices.

In Exhibit 5, we used the example of quality, value, and momentum, but the same approach is applicable to any combination of equity factors. The area labeled "Target Multi-Factor Portfolio" in Exhibit 5 represents stocks that have characteristics of all the desired factors. In practice, there are often only a few stocks with high scores across all of the desired factors, so a compromise must be made to select sufficient stocks to construct a multi-factor portfolio in this way. This compromise may involve lowering the selection criteria for each factor score. Alternatively, selecting the top quintile based on the average of the desired factor scores would seek to find the stocks with the best combined factor characteristics without explicitly choosing a minimum score for any one factor.

3.2 Aims of the S&P Dow Jones Multi-Factor Index

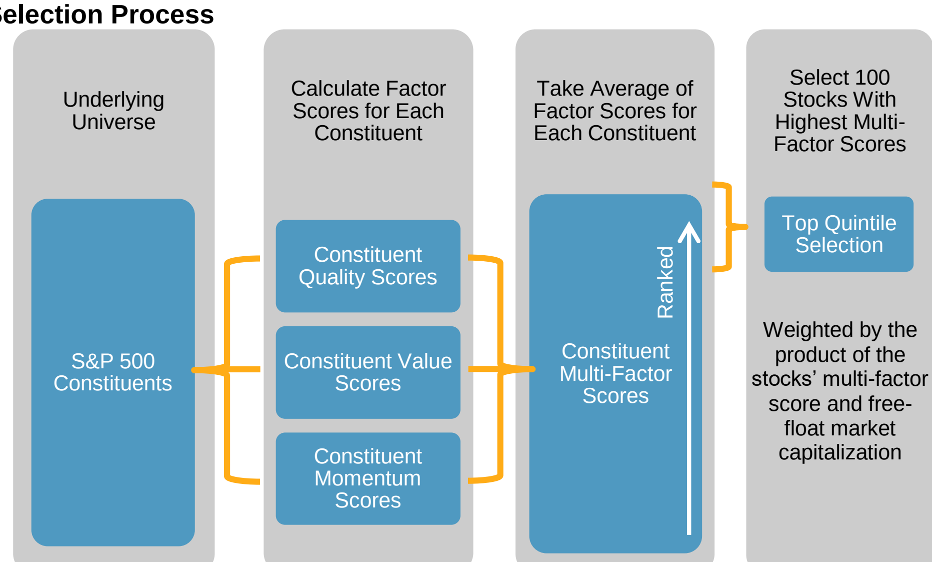
While there may be myriad approaches to effectively combine equity risk factors, our aim, in the absence of any tactical factor viewpoint, is to capture high factor exposures across a range of selected equity factors through a simple constituent-level selection approach. In doing so, we seek to measure and compare the factor score exposures to the original multi-factor index of indices approach, while ensuring reasonably fair exposure across the desired return drivers. Each approach will ultimately be judged most viable with respect to the market participants' objectives by comparing the portfolio's risk/return characteristics.

3.3 Introducing the S&P 500 Quality, Value & Momentum Multi-Factor Index

Can we improve on the multi-factor index of indices approach while maintaining its simplicity?

The S&P 500 Quality, Value & Momentum Multi-Factor Index is an example of a stock-level selection process. In general terms, this index takes an average of the standardized scores across all three factors for the S&P 500 and then selects the top quintile. The index is rebalanced semiannually and is weighted with respect to the product of its multi-factor score and its float market capitalization.[12]

Exhibit 6: S&P 500 Quality, Value & Momentum Multi-Factor Index Simplified Selection Process

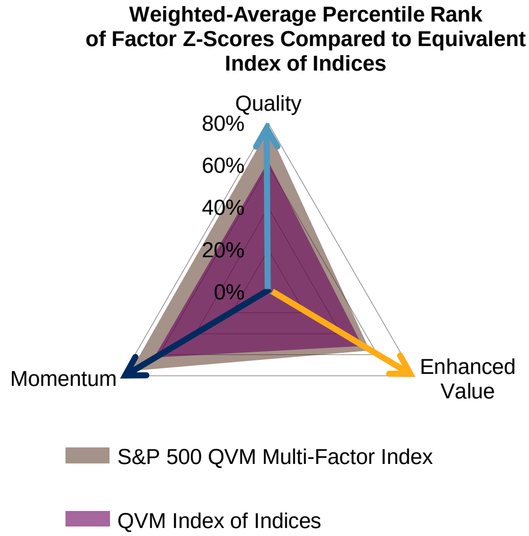


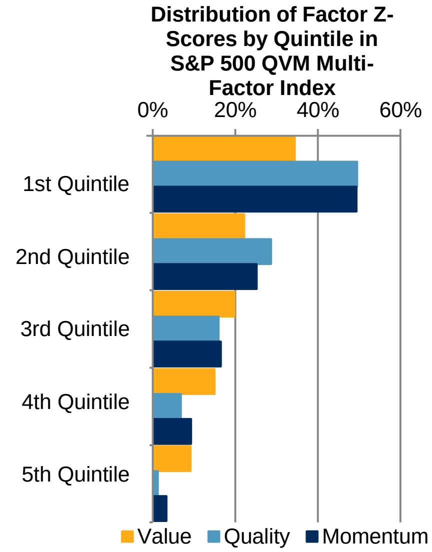
Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes.

[12] To see a more thorough overview of the methodology, please see the S&P 500 Quality, Value & Momentum Multi-Factor Index methodology.

There is an improvement in the number of higher-quintile z-scores across the desired factors when using a stock-level selection.

Exhibit 7: Improved Factor Exposures of the S&P 500 Quality, Value & Momentum Multi-Factor Index





QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1994, to March 29, 2018. Factor z-scores for the constituents of the S&P 500 Quality, Value & Momentum Multi-Factor Index are calculated semiannually according to S&P DJI's Single-Factor Index methodology and are expressed as a weighted-average of their percentile ranks within the S&P 500. The QVM Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum that is rebalanced semiannually. Charts are provided for illustrative purposes and reflect 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 7 shows the distribution of stocks selected in the S&P 500 Quality, Value & Momentum Multi-Factor Index in terms of their factor z-score percentile ranks. Compared with Exhibit 4, it is evident there is an improvement in the number of higher-quintile z-scores across the desired factors when using a stock-level selection process versus an index of indices approach. We also see a reduction in the number of lower-quintile z-scores being selected, compared with the index of indices.

To help quantify this observation, we took a weighted average of the factor z-score percentile ranks. The resultant values (representing factor exposures) are notably superior to an equivalent index of indices, with 77% for quality, 56% for enhanced value, and 76% for momentum (compared with 62%, 52%, and 63%, respectively, for the index of indices).

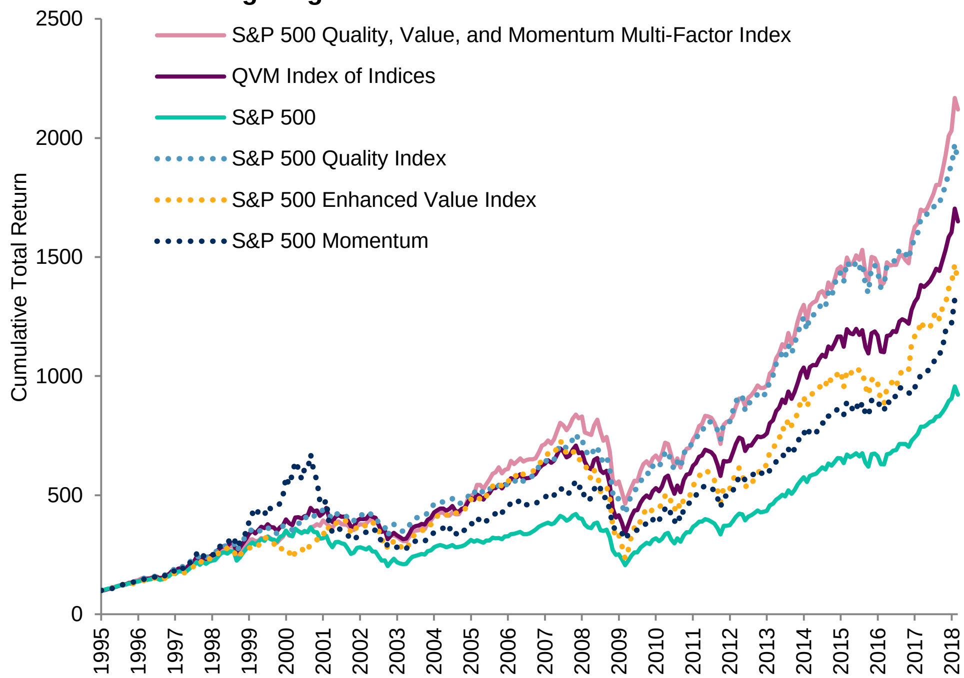
It is worth noting that the value factor was relatively under-represented, due to it having a more negative correlation in z-scores with quality and momentum (see Exhibit 3). Alternative index construction methods that seek to balance this exposure would ultimately have to make further compromises in selecting lower-percentile stocks for quality and momentum.

4. RISK/RETURN COMPARISON OF MULTI-FACTOR APPROACHES

To analyze the impact of the two approaches to constructing multi-factor indices, we compared the risk/return characteristics of each. To represent our stock-level selection index, we used the S&P 500 Quality, Value & Momentum Multi-Factor Index. An equal-weighted portfolio (rebalanced semiannually) consisting of the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum (referred to as "QVM Index of Indices") was used as an equivalent index of indices approach.

For market participants wishing to avoid the risk in choosing between single-factor strategies, multi-factor indices may offer a viable alternative without compromising on performance.

Exhibit 8: S&P 500 Quality, Value & Momentum Index Compares Favorably to the Best-Performing Single-Factor Index



QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1994, to March 29, 2018. Index performance based on total return in USD. 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum that is rebalanced semiannually.

4.1 Comparison of Portfolio Risk/Return Characteristics

To eliminate any concerns about choosing an arbitrary start date to calculate each portfolio's risk/return characteristics, we instead used rolling 5-, 10-, and 15-year windows over the full available back-tested history, starting on Dec. 31, 1994. This also allows us to appreciate the impact of the investment time horizon on the results.

The risk-adjusted returns for the S&P 500 Quality, Value & Momentum Multi-Factor Index were greater than those of the index of indices and the single-factor indices.

Exhibit 9: S&P 500 Single and Multi-Factor Portfolio Risk/Return Characteristics Comparison

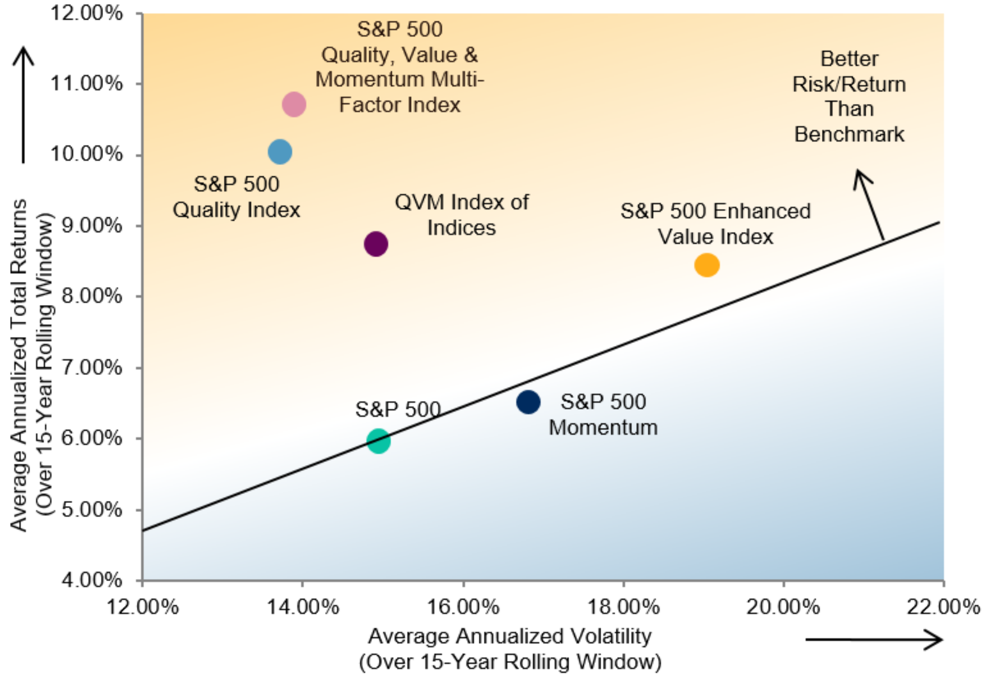
ROLLING WINDOW	S&P 500	S&P 500 QUALITY INDEX	S&P 500 ENHANCED VALUE INDEX	S&P 500 MOMENTUM	QVM INDEX OF INDICES	S&P 500 QUALITY, VALUE & MOMENTUM MULTI-FACTOR INDEX
AVERAGE TOTAL RETURNS (%, ANNUALIZED)						
5 Years	7.36	11.28	9.86	8.42	10.26	11.71
10 Years	5.70	9.71	7.98	6.39	8.42	10.62
15 Years	5.96	10.02	8.43	6.51	8.72	10.68
AVERAGE VOLATILITY (%, ANNUALIZED)						
5 Years	13.35	12.65	16.46	15.03	13.49	12.82
10 Years	14.41	13.45	18.04	16.24	14.46	13.58
15 Years	14.95	13.72	19.05	16.84	14.93	13.90
AVERAGE RISK/RETURN (ANNUALIZED)						
5 Years	0.58	0.87	0.63	0.58	0.76	0.91
10 Years	0.38	0.70	0.42	0.38	0.55	0.75
15 Years	0.39	0.71	0.42	0.39	0.56	0.75
AVERAGE TRACKING ERROR TO S&P 500 (%, ANNUALIZED)						
5 Years	-	4.84	9.69	8.91	3.39	6.25
10 Years	-	4.80	9.93	9.11	3.47	6.60
15 Years	-	5.01	10.00	9.33	3.59	6.82
AVERAGE INFORMATION RATIO TO S&P 500 (ANNUALIZED)						
5 Years	-	0.65	0.29	0.07	0.69	0.53
10 Years	-	0.73	0.24	0.04	0.67	0.62
15 Years	-	0.69	0.27	0.03	0.70	0.59
MAXIMUM DRAWDOWN (MONTHS)						
Full Period	-	39	70	154	51	51
ONE-WAY TURNOVER (%, APPROXIMATE)						
Full Period	-	63	33	116	72	98

QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Rolling window data is the average of annualized figures on a monthly basis from Dec. 31, 1994, to March 29, 2018. Performance based on total return in USD. 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum that is rebalanced semiannually.

A stock-level multi-factor selection process may help reduce factor exposure dilutions and harvest more of the desired factors' collective risk premia.

It is evident from Exhibit 9 that the risk-adjusted returns for the S&P 500 Quality, Value & Momentum Multi-Factor Index were greater than those of the QVM Index of Indices for all the rolling time horizons analyzed. Over a 15-year rolling window, the risk-adjusted return figures were 0.75 and 0.56, respectively. These results help support the view that a stock-level multi-factor selection process may reduce dilution of desired factor exposures compared with an index of indices approach, potentially allowing investors to harvest more of the factors' collective risk premia.

Exhibit 10: S&P 500 Single- and Multi-Factor Average Risk/Return



QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Rolling window data is the average of annualized figures on a monthly basis from Dec. 31, 1994, to March 29, 2018. Index performance based on total return in USD. 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum that is rebalanced semiannually.

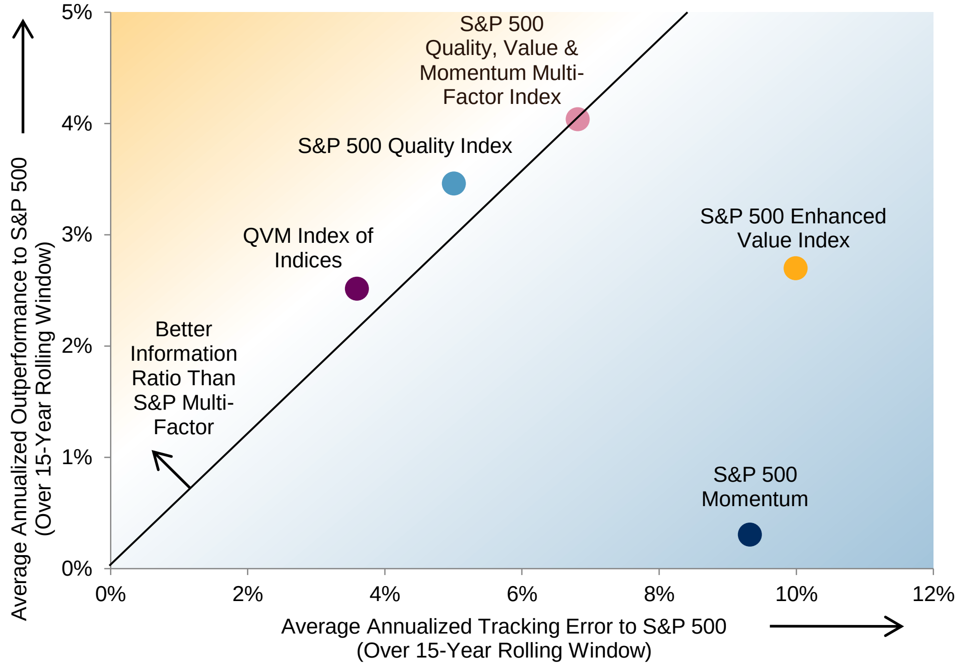
In Exhibit 10, the diagonal line represents all points with risk-adjusted returns equal to the S&P 500. Points further above the diagonal line exhibit progressively better risk-adjusted returns compared with the S&P 500.

The compromise in achieving these superior risk-adjusted returns, however, has been increased tracking error to the benchmark. As the S&P 500 Quality, Value & Momentum Multi-Factor Index aims to select only the top quintile of stocks with the best combined factor characteristics, it is ultimately a far more concentrated portfolio than its index of indices counterpart. Therefore, the resultant index suffers from inferior information ratios compared with the index of indices, due to its relatively high tracking error.

Exhibit 11 shows the information ratios for the various single-factor and multi-factor indices over the rolling 15 year window. The diagonal line represents all points with equal information ratios to the S&P 500 Quality, Value & Momentum Multi-Factor Index.

The S&P 500 Quality, Value & Momentum Multi-Factor Index has inferior information ratios to the index of indices approach due to its relatively high tracking error.

Exhibit 11: S&P 500 Single- and Multi-Factor Average Information Ratios



QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Rolling window data is the average of annualized figures on a monthly basis from Dec. 31, 1994, to March 29, 2018. Performance based on total return in USD. 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum that is rebalanced semiannually.

In addition, it is clear the S&P 500 Quality Index competed equally well over all time horizons in terms of risk-adjusted returns and tracking error compared with both multi-factor indices. However, one could argue that holding only this single factor as opposed to other less-successful factors over this period would have required considerable foresight and skill. Therefore, depending on the investment objectives of market participants without a factor viewpoint, one of the multi-factor index approaches could have provided a viable alternative.

4.2 Multi-Factor Performance in Various Factor Regimes

Exhibit 12 further illustrates the benefits of combining multiple factors and highlights the improved historical performance of our stock-level approach. Although the S&P 500 Quality, Value & Momentum Multi-Factor Index only outperformed the benchmark in 21% of the months in which none of the corresponding single-factor indices outperformed, these periods represent a mere 8% of the total back-test.

In periods when two or three of the single-factors outperformed the S&P 500, the multi-factor index outperformed in 66% and 83% of the months, respectively.

Exhibit 12: S&P 500 Quality, Value & Momentum Multi-Factor Index Relative Performance to S&P 500 in Various Single-Factor Regime Combinations

REGIMES	0 FACTORS OUTPERFORM	1 FACTOR OUTPERFORMS	2 FACTORS OUTPERFORM	3 FACTORS OUTPERFORM
Number of Months (since Dec. 31, 1994)	21	94	122	42
% of Months (of total back-test)	8	34	44	15
% of Months S&P 500 Quality, Value & Momentum Multi-Factor Index Outperforms (hit rate)	19	51	66	83
Average Monthly S&P 500 Quality, Value & Momentum Multi-Factor Index Outperformance (%)	-0.91	-0.34	0.58	1.59
Average Monthly Single-Factor Index Outperformance (%; index of indices approach)	-0.86	-0.35	0.47	1.23

QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Rolling window data is the average of annualized figures on a monthly basis from Dec. 31, 1994, to March 29, 2018. Performance based on total return in USD. 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum that is rebalanced semiannually.

More importantly, in periods when two or three of the single factors outperformed the S&P 500 (representing 59% of the back-test), the multi-factor index outperformed in 66% and 83% of the months, respectively. The average monthly outperformance of the S&P 500 Quality, Value & Momentum Multi-Factor Index in those periods was superior to achieving an average of the single-factor returns.

4.3 Analysis of Active Sector Exposures

To assess the differences in sector diversification between the two multi-factor approaches, Exhibit 13 shows their average active sector exposures to the S&P 500. The single-factor indices' average active sector exposures are also given for comparison.

The index of indices approach has the lowest average magnitude of active sector bets between all of the factor portfolios. This finding aligns with the low tracking error of the index of indices portfolio owing to its relatively high number of constituents.

The diversification benefits of a multi-factor stock-level approach may help lower the peak active sector bets compared with the worst-offending single-factor portfolios.

Exhibit 13: S&P 500 Single and Multi-Factor Indices Average Active Sector Exposure Relative to the S&P 500 (%)

SECTOR	S&P 500 QUALITY INDEX	S&P 500 ENHANCED VALUE INDEX	S&P 500 MOMENTUM	QVM INDEX OF INDICES	S&P 500 QUALITY, VALUE & MOMENTUM MULTI-FACTOR INDEX
Energy	-1.30	0.60	-0.70	-0.40	3.30
Materials	0.50	1.80	-0.70	0.60	0.50
Industrials	1.10	-4.30	-1.10	-1.50	0.80
Consumer Staples	7.50	-3.10	-0.10	1.30	4.40
Consumer Discretionary	1.90	3.50	3.00	2.70	4.20
Health Care	5.10	-5.50	0.40	0.00	-1.60
Financials	-12.00	17.00	-4.00	0.20	-1.80
Information Technology	4.10	-14.40	3.30	-2.60	-9.50
Telecommunication Services	-3.00	-0.90	-0.80	-1.60	-1.20
Utilities	-2.70	5.60	0.50	1.00	0.90
Average Magnitude	3.90	5.70	1.40	1.20	2.80

QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Average sector exposures are calculated on a semiannual basis from Dec. 31, 1994, to March 29, 2018. Performance based on total return in USD. 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P 500 Quality Index, S&P 500 Enhanced Value Index, and S&P 500 Momentum that is rebalanced semiannually.

Comparing the stock-level, multi-factor approach to other top quintile single-factor portfolios, it is evident that the average magnitude of its active sector bets are lower than the S&P 500 Quality Index and S&P 500 Enhanced Value Index; the S&P 500 Momentum, however, is more sector-neutral to the benchmark.

The results demonstrate that the diversification benefits of a multi-factor, stock-level approach may help lower the peak active sector bets compared with the worst-offending single-factor portfolios. However, active sector exposures could still be significant, and market participants may want to consider whether they are comfortable with these over/underweight allocations.

For instance, our stock-level, multi-factor strategy had an average underweight sector exposure of 9.5% in information technology and average overweight exposures to consumer staples and consumer discretionary stocks of approximately 4% each during the period studied. These allocations may also vary greatly through time, as the index attempts to capture the highest factor-combinations in whichever sectors they may appear.

5. CONCLUSION

Low correlations between factor returns generate a diversification benefit in a multi-factor portfolio, resulting in more stable excess returns.

Market participants seeking to target the systematic equity risk premia associated with single factors should understand that historical performances for each factor have been cyclical and have experienced long drawdowns relative to the market. The active returns of each factor have generally displayed low or negative correlations, as they respond differently to the market environment and economic cycles. Hence, market participants adopting a multi-factor approach may reap considerable diversification benefits. Alternatively, market participants wishing to be selective about single equity factors may want to either have long investment horizons or high conviction in their decisions.

As an alternative to choosing between equity factors, multi-factor portfolios can be constructed to diversify factor risk. Market participants considering multi-factor investing should explore the differences between the index of indices approach and the stock-level multi-factor approach. Our analysis shows that those wishing to minimize tracking error relative to the benchmark could have experienced higher probabilities of risk-adjusted outperformance over varying time horizons with a multi-factor index of indices approach. However, since exposure to desired secondary factors could be weak in each single-factor index, a multi-factor index of indices may experience some factor exposure dilution.

The factor exposure dilutions inherent when simply holding multiple single-factor indices may be alleviated by opting to combine factor scores at the stock-level. The back-test of the S&P 500 Quality, Value & Momentum Multi-Factor Index has demonstrated superior risk-adjusted returns of 0.75 over the average of the 15-year rolling windows compared to 0.56 for the hypothetical index of indices approach. This supports the view that the stock-level index construction approach may help reduce factor exposure dilutions, but it may come with the cost of increased tracking error (increased to 6.8% from 3.6% for the index of indices).

For market participants without a factor viewpoint, both multi-factor approaches offered a viable alternative to the best-performing single-factor index.

For market participants without a factor viewpoint, both multi-factor approaches offered a viable alternative to the best-performing single-factor index. With both options offering a balanced exposure across multiple factors, the choice could be simplified to whether one wishes to maximize risk-adjusted returns on an absolute basis or relative to the benchmark. Ultimately, the decision between a multi-factor index of indices or our stock-level selection approach depends on the market participant's investment objectives.

In conclusion, multi-factor indices may help market participants avoid the potential pitfalls of choosing and timing factors without necessarily missing the upside that the best factor choice may have provided.

5.1 Future Innovations in Multi-Factor Indices

The rising popularity and appeal of factor-based indices is pushing innovation within the space of multi-factor investing.

The rising popularity and appeal of factor-based indices is pushing innovation within the space of multi-factor investing. Along with expanding the multi-factor index range to encompass even more regions, different factor combinations could also be applied. These could even extend to non-traditional equity factors, such as incorporating ethical and sustainability investment themes in the environmental, social, and governance (ESG) field.[13]

Other areas of progress could include sector-neutral, multi-factor indices that aim to match their sector exposures with that of the corresponding benchmark. Risk model-based optimization methods could also be employed to minimize (or target) tracking error while maximizing exposure to the desired factors.

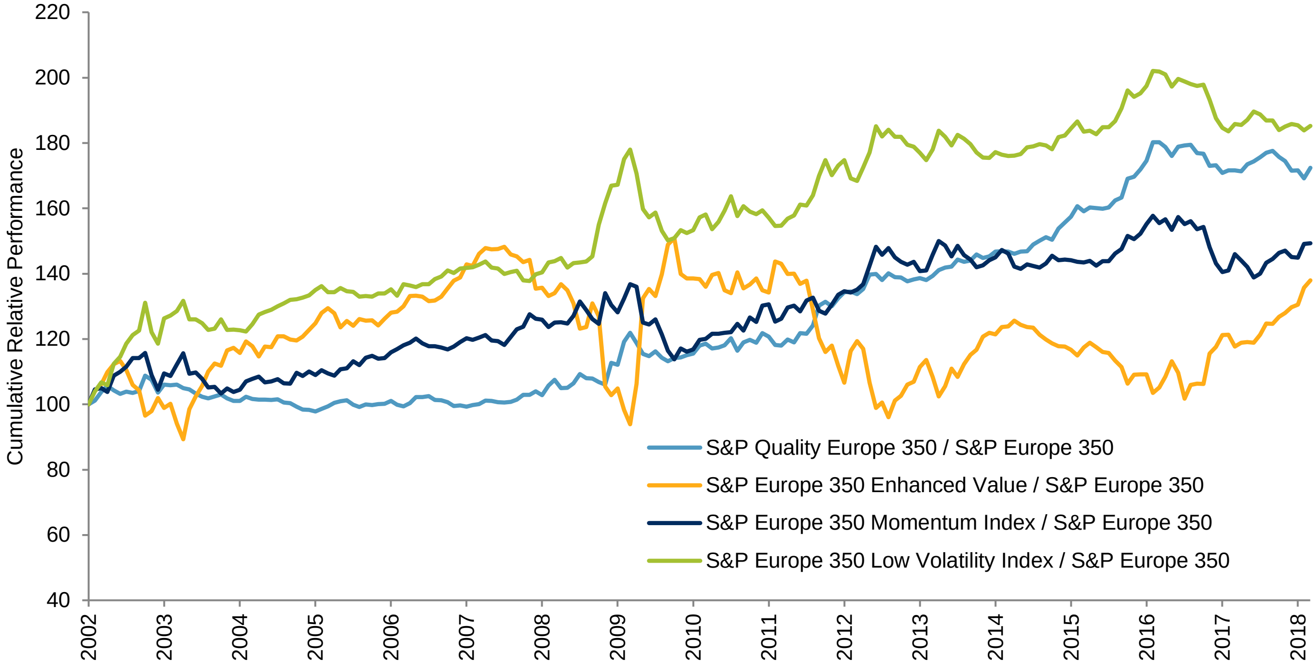
Advancements are also likely in strategies that isolate the factor risk premium. Market risk is a considerable portion of the overall risk in each of the multi-factor strategies discussed so far. However, the multi-factor risk premium can be isolated by taking a long position in the top quintile of multi-factor stocks and a short position in the lowest quintile. Alternatively, the overall market can be used for the short position, with its exposure matched to the beta of the long portfolio.

As awareness of the potential benefits of multi-factor indices continues to grow, along with the needs of market participants, we can expect ever more interesting and useful index strategies within this area.

[13] For more information on ESG factors, see S&P DJI's "Understanding ESG Investing" by Emily Ulrich (2016).

APPENDIX: COMPARABLE ANALYSIS FOR S&P EUROPE 350 SINGLE-FACTOR AND MULTI-FACTOR INDICES

Exhibit 14: Cumulative Relative Performance of S&P Europe 350 Single-Factor Indices



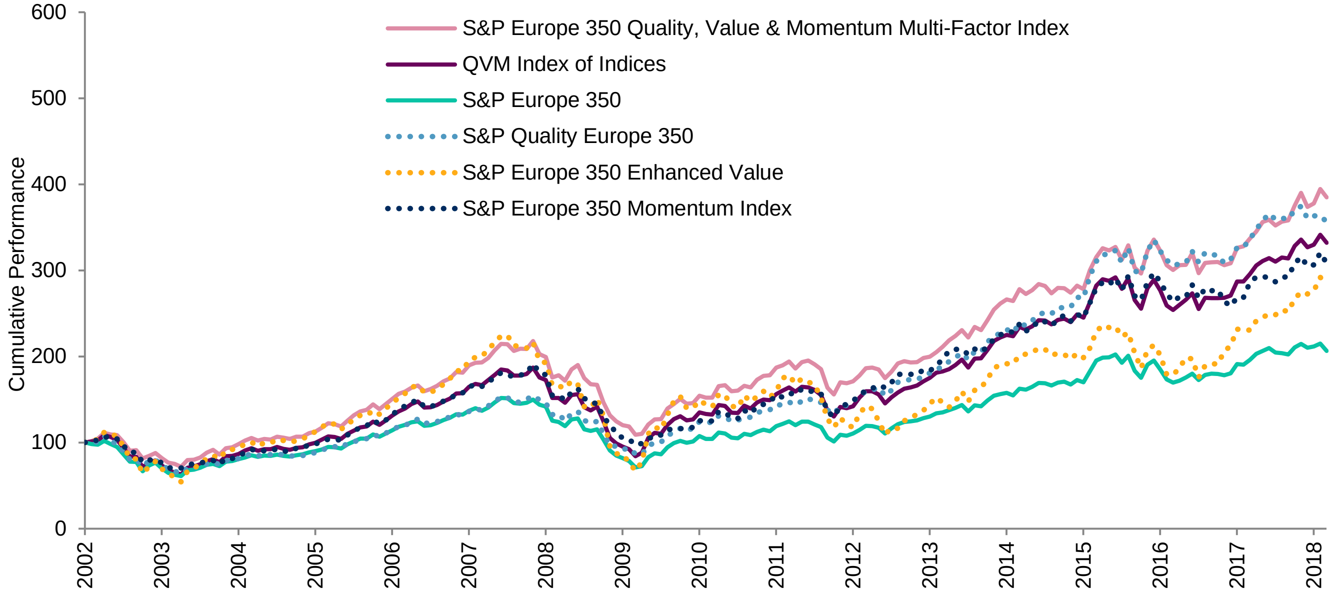
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2001, to March 29, 2018. Performance based on total return in EUR. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 15: Frequency of Risk-Adjusted Outperformance to S&P Europe 350 Over Varying Time Horizons

ROLLING WINDOW	S&P QUALITY EUROPE 350	S&P EUROPE 350 ENHANCED VALUE	S&P EUROPE 350 MOMENTUM INDEX	S&P EUROPE 350 LOW VOLATILITY INDEX	INDEX OF INDICES
1 Year	73.90%	42.40%	60.90%	69.60%	90.80%
3 Years	82.50%	33.80%	75.00%	98.80%	100.00%
5 Years	96.30%	30.10%	94.90%	100.00%	100.00%
10 Years	100.00%	0.00%	100.00%	100.00%	100.00%
15 Years	100.00%	0.00%	100.00%	100.00%	100.00%

Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2001, to March 29, 2018. Performance based on total return in EUR. 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. The Index of Indices is an equal-weight hypothetical index that includes the S&P Quality Europe 350, S&P Europe 350 Enhanced Value, and S&P Europe 350 Momentum Index, rebalanced semiannually.

Exhibit 16: Cumulative Total Return Performance of S&P Europe 350 Single and Multi-Factor Indices



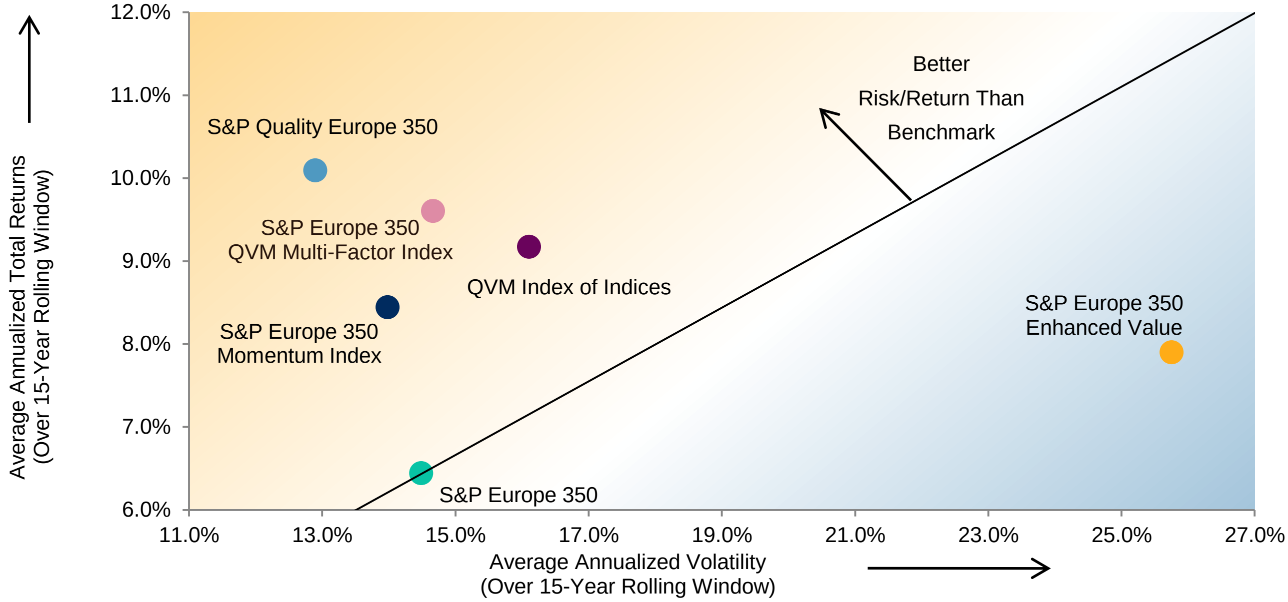
QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2001, to March 29, 2018. Performance based on total return in EUR. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The QVM Index of Indices is an equal-weight portfolio that includes the S&P Quality Europe 350, S&P Europe 350 Enhanced Value, and S&P Europe 350 Momentum Index, rebalanced semiannually.

Exhibit 17: S&P Europe 350 Single and Multi-Factor Portfolio Risk/Return Characteristics Comparison

ROLLING WINDOW	S&P EUROPE 350	S&P QUALITY EUROPE 350	S&P EUROPE 350 ENHANCED VALUE	S&P EUROPE 350 MOMENTUM INDEX	QVM INDEX OF INDICES	S&P EUROPE 350 QUALITY, VALUE & MOMENTUM MULTI-FACTOR INDEX
AVERAGE TOTAL RETURNS (ANNUALIZED) (%)						
5 Year	6.33	10.84	6.58	9.00	9.13	9.39
10 Year	5.21	9.88	4.63	7.92	7.85	8.13
15 Year	6.44	10.09	7.90	8.44	9.17	9.60
AVERAGE VOLATILITY (ANNUALIZED) (%)						
5 Year	13.12	11.86	22.05	12.86	14.40	13.51
10 Year	13.83	12.44	23.93	13.50	15.33	14.16
15 Year	14.49	12.90	25.75	13.99	16.11	14.67
AVERAGE RETURN/RISK (ANNUALIZED)						
5 Year	0.52	0.94	0.34	0.70	0.66	0.71
10 Year	0.35	0.75	0.17	0.55	0.47	0.54
15 Year	0.44	0.77	0.31	0.61	0.57	0.65
AVERAGE TRACKING ERROR TO S&P EUROPE 350 (ANNUALIZED) (%)						
5 Year	-	4.81	14.31	6.90	3.26	4.22
10 Year	-	5.12	15.60	7.18	3.42	4.31
15 Year	-	4.78	14.09	7.01	3.24	4.38
AVERAGE INFORMATION RATIO TO S&P EUROPE 350 (ANNUALIZED)						
5 Year	-	0.81	0.15	0.34	0.91	0.67
10 Year	-	0.79	0.05	0.31	0.81	0.63
15 Year	-	0.65	0.18	0.22	0.85	0.66
MAXIMUM DRAWDOWN (MONTHS)						
Full Period	-	51.00	91.00	63.00	65.00	70.00

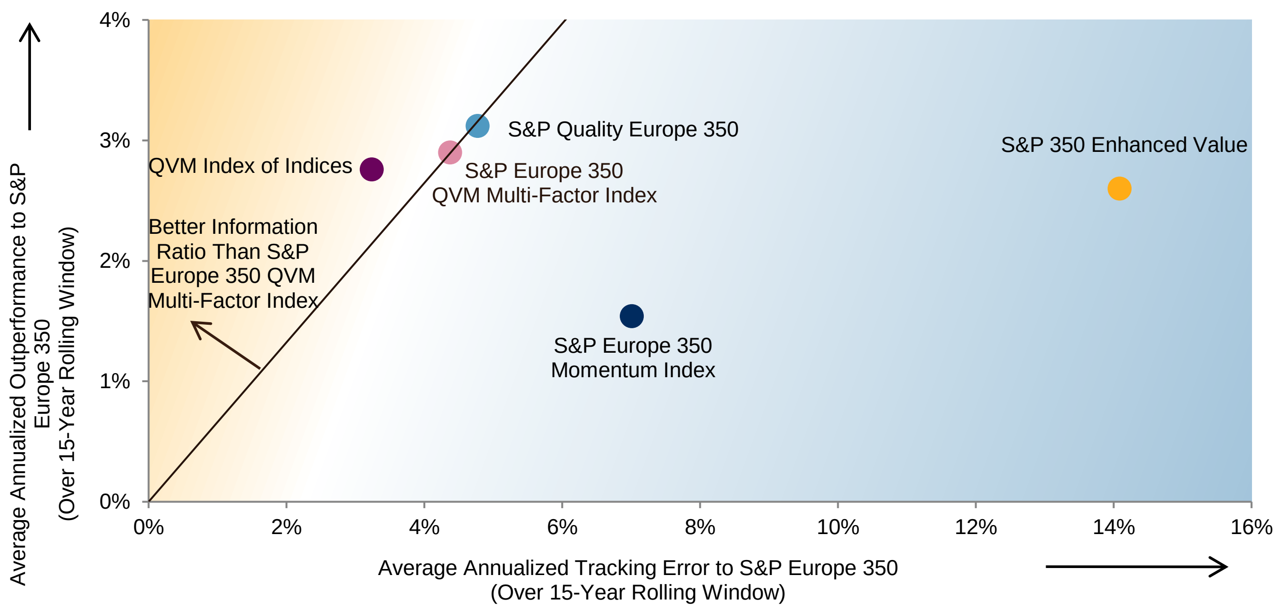
QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Rolling window data is the average of annualized figures on a monthly basis from Dec. 31, 2001, to March 29, 2018. Performance based on total return in EUR. Past performance is no guarantee of future results. Table is 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P Quality Europe 350, S&P Europe 350 Enhanced Value, and S&P Europe 350 Momentum Index, rebalanced semiannually.

Exhibit 18: S&P Europe 350 Single and Multi-Factor Average Return/Risk



QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2001, to March 29, 2018. Performance based on total return in EUR. 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P Quality Europe 350, S&P Europe 350 Enhanced Value, and S&P Europe 350 Momentum Index, rebalanced semiannually. The S&P Europe QVM Multi-Factor Index represents the S&P Europe Quality, Value & Momentum Multi-Factor Index.

Exhibit 19: S&P Europe 350 Single and Multi-Factor Average Information Ratios



QVM Index of Indices is a hypothetical portfolio.
Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2001, to March 31, 2018. Performance based on total return in EUR. 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. The QVM Index of Indices is an equal-weight portfolio that includes the S&P Quality Europe 350, S&P Europe 350 Enhanced Value, and S&P Europe 350 Momentum Index, rebalanced semiannually. The S&P Europe QVM Multi-Factor Index represents the S&P Europe Quality, Value & Momentum Multi-Factor Index.

S&P DJI RESEARCH CONTRIBUTORS		
Charles Mounts	Global Head	charles.mounts@spglobal.com
Jake Vukelic	Business Manager	jake.vukelic@spglobal.com
GLOBAL RESEARCH & DESIGN		
AMERICAS		
Aye M. Soe, CFA	Americas Head	aye.soe@spglobal.com
Dennis Badlyans	Associate Director	dennis.badlyans@spglobal.com
Phillip Brzenk, CFA	Director	phillip.brzenk@spglobal.com
Smita Chirputkar	Director	smita.chirputkar@spglobal.com
Rachel Du	Senior Analyst	rachel.du@spglobal.com
Bill Hao	Director	wenli.hao@spglobal.com
Qing Li	Director	qing.li@spglobal.com
Berlinda Liu, CFA	Director	berlinda.liu@spglobal.com
Ryan Poirier, FRM	Senior Analyst	ryan.poirier@spglobal.com
Maria Sanchez	Associate Director	maria.sanchez@spglobal.com
Kelly Tang, CFA	Director	kelly.tang@spglobal.com
Peter Tsui	Director	peter.tsui@spglobal.com
Hong Xie, CFA	Director	hong.xie@spglobal.com
APAC		
Priscilla Luk	APAC Head	priscilla.luk@spglobal.com
Utkarsh Agrawal, CFA	Associate Director	utkarsh.agrawal@spglobal.com
Liyu Zeng, CFA	Director	liyu.zeng@spglobal.com
Akash Jain	Associate Director	akash.jain@spglobal.com
EMEA		
Sunjiv Mainie, CFA, CQF	EMEA Head	sunjiv.mainie@spglobal.com
Leonardo Cabrer, PhD	Senior Analyst	leonardo.cabrer@spglobal.com
Andrew Innes	Associate Director	andrew.innes@spglobal.com
INDEX INVESTMENT STRATEGY		
Craig J. Lazzara, CFA	Global Head	craig.lazzara@spglobal.com
Fei Mei Chan	Director	feimei.chan@spglobal.com
Tim Edwards, PhD	Managing Director	tim.edwards@spglobal.com
Anu R. Ganti, CFA	Director	anu.ganti@spglobal.com
Hamish Preston	Senior Associate	hamish.preston@spglobal.com
Howard Silverblatt	Senior Index Analyst	howard.silverblatt@spglobal.com

PERFORMANCE DISCLOSURE

The S&P 500 Quality Index was launched on July 8, 2014. The S&P 500 Enhanced Value Index was launched on April 27, 2017. The S&P 500 Low Volatility Index was launched on April 4, 2011. The S&P 500 Momentum was launched on November 18, 2014. The S&P 500 Quality, Value & Momentum Multi-Factor Index was launched on January 30, 2017. The S&P Quality Europe 350 was launched on July 8, 2014. The S&P Europe 350 Momentum Index was launched on November 18, 2014. The S&P Europe 350 Enhanced Value was launched on April 27, 2015. The S&P Europe 350 Low Volatility Index was launched on July 9, 2012. The S&P Europe 350 Quality, Value & Momentum Multi-Factor Index was launched on April 26, 2017. 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

It is not possible to invest directly in an index. Exposure to an asset class represented by an index is available through investable instruments based on that index. S&P Dow Jones Indices does not sponsor, endorse, sell, promote or manage any investment fund or other investment vehicle that is offered by third parties and that seeks to provide an investment return based on the performance of any index. S&P Dow Jones Indices makes no assurance that investment products based on the index will accurately track index performance or provide positive investment returns. S&P Dow Jones Indices LLC is not an investment advisor, and S&P Dow Jones Indices makes no representation regarding the advisability of investing in any such investment fund or other investment vehicle. A decision to invest in any such investment fund or other investment vehicle should not be made in reliance on any of the statements set forth in this document. Prospective investors are advised to make an investment in any such fund or other vehicle only after carefully considering the risks associated with investing in such funds, as detailed in an offering memorandum or similar document that is prepared by or on behalf of the issuer of the investment fund or other vehicle. Inclusion of a security within an index is not a recommendation by S&P Dow Jones Indices to buy, sell, or hold such security, nor is it considered to be investment advice.

These materials have been prepared solely for informational purposes based upon information generally available to the public and from sources believed to be reliable. No content contained in these materials (including index data, ratings, credit-related analyses and data, research, valuations, model, software or other application or output therefrom) or any part thereof (Content) may be modified, reverse-engineered, reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of S&P Dow Jones Indices. The Content shall not be used for any unlawful or unauthorized purposes. S&P Dow Jones Indices and its third-party data providers and licensors (collectively "S&P Dow Jones Indices Parties") do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Dow Jones Indices Parties are not responsible for any errors or omissions, regardless of the cause, for the results obtained from the use of the Content. THE CONTENT IS PROVIDED ON AN "AS IS" BASIS. S&P DOW JONES INDICES PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT'S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Dow Jones Indices Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs) in connection with any use of the Content even if advised of the possibility of such damages.

S&P Dow Jones Indices keeps certain activities of its business units separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain business units of S&P Dow Jones Indices may have information that is not available to other business units. S&P Dow Jones Indices has established policies and procedures to maintain the confidentiality of certain non-public information received in connection with each analytical process.

In addition, S&P Dow Jones Indices provides a wide range of services to, or relating to, many organizations, including issuers of securities, investment advisers, broker-dealers, investment banks, other financial institutions and financial intermediaries, and accordingly may receive fees or other economic benefits from those organizations, including organizations whose securities or services they may recommend, rate, include in model portfolios, evaluate or otherwise address.