

## Harnessing Multi-Factor Strategies Close to the Core

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### EXECUTIVE SUMMARY

Factors that outperform over time are also prone to extended periods of underperformance, which are difficult to time. For investors seeking exposure to factor risk premia but with greater diversification and reduced cyclicity, multi-factor strategies may be more suitable than single factors.

Accordingly, S&P DJI presents a new series of multi-factor indices, collectively known as the S&P QVM Top 90% Indices, covering the U.S. large-cap, mid-cap, and small-cap universes (S&P 500<sup>®</sup>, S&P MidCap 400<sup>®</sup>, and S&P SmallCap 600<sup>®</sup>, respectively). In this paper, we analyze the indices' methodology and performance characteristics. Multi-factor scores are based on the average of three separate factors: quality, value, and momentum (QVM). This new index series encompasses a high proportion of the universe, whereas existing multi-factor indices are typically more concentrated.

Different multi-factor strategies produce different outcomes and positioning. Construction matters. These new indices select constituents in the top 90% of the universe, ranked by their multi-factor score and weighted by float-adjusted market capitalization (subject to constraints).

The indices generated moderate outperformance by removing the lowest-ranked decile of stocks. This plus float-adjusted market cap weighting allows the indices to retain many of the core features of the benchmark. In summary, the key historical performance characteristics of the S&P QVM Top 90% Indices include:

- Moderate outperformance versus the benchmark;
- Low tracking error;
- Low turnover;
- Low active share; and
- Sector weights consistent with the benchmark.

### INTRODUCTION

With the rising adoption of factor indices, the traditional boundaries between passive and active investing have become increasingly blurred. For decades, institutional investors constructed portfolios from a combination of market-cap-weighted index funds and active funds. Now,

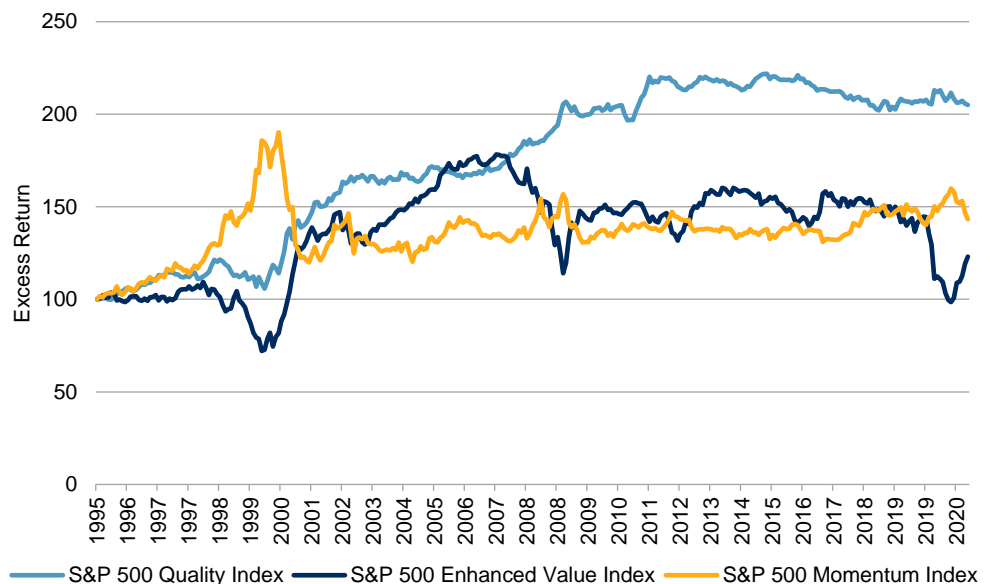
*Different multi-factor strategies produce different outcomes and positioning.*

factor-based investing straddles these two approaches and enables institutional and retail investors alike to implement active strategies through passive vehicles.

Single-factor equity strategies (quality, value, or momentum) have been widely adopted to harvest each factor risk premium that could reward market participants over the long term.<sup>1</sup> However, each factor is susceptible to periods of underperformance dependent on the market environment and economic cycle. This induces some market participants to attempt the notoriously difficult task of timing factors through tactical allocation strategies.

*Single-factor equity strategies have been widely adopted to harvest each factor risk premium.*

**Exhibit 1: Cumulative Excess Returns over the Benchmark**



Source: S&P Dow Jones Indices LLC. Data from March 31, 1995, to March 31, 2021. Index performance based on monthly 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.

*An alternative is to employ a transparent multi-factor strategy that aims to capture exposures across all targeted factors simultaneously.*

An alternative solution is to employ a transparent multi-factor strategy that aims to capture exposures across all targeted factors simultaneously.<sup>2</sup> Such a strategy exploits the potential diversification benefits by combining factor returns that have relatively low correlation to one another (see Exhibit 2). Subsequently, **the diversified factor exposures may provide more stable excess returns over shorter time horizons, while still capturing their average long-term risk premia. Importantly, this approach avoids the need to subjectively time factor exposures.**

<sup>1</sup> For further details on factor theory, see Qian, Edward E., R.H. Hua, and E. H. Sorenson. 2007. *Quantitative Equity Portfolio Management*.

<sup>2</sup> Innes, Andrew. 2018. [The Merits and Methods of Multi-Factor Investing](#). S&P Dow Jones Indices.

**Exhibit 2: Correlation of Excess Returns of S&P Quality, S&P Enhanced Value, and S&P Momentum Indices to Their Respective Benchmarks**

CORRELATION	QUALITY	VALUE	MOMENTUM
<b>S&amp;P 500</b>			
Quality	1.00	-0.06	-0.12
Value	-	1.00	-0.49
Momentum	-	-	1.00
<b>S&amp;P MIDCAP 400</b>			
Quality	1.00	-0.04	0.01
Value	-	1.00	-0.63
Momentum	-	-	1.00
<b>S&amp;P SMALLCAP 600</b>			
Quality	1.00	-0.25	0.19
Value	-	1.00	-0.53
Momentum	-	-	1.00

Source: S&P Dow Jones Indices LLC. Data from March 31, 1995, to March 31, 2021. Index performance based on monthly 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.

Exhibit 3 demonstrates the key differences between single-factor strategies and the multi-factor strategy in these indices. Here the full-year return of three single factor indices (S&P Quality, S&P Enhanced Value, and S&P Momentum), the S&P QVM Top 90% Multi-factor Index, and their respective benchmarks are ranked each year. Across all three universes (S&P 500, S&P MidCap 400, and S&P SmallCap 600), the wide variability in the calendar year performance rank of each single-factor strategy is evident. Conversely, the multi-factor strategy more consistently exhibits stable excess returns (higher performance rank) across most calendar years with respect to its benchmark.

**Exhibit 3: Calendar Year Performance Rank of Single-Factor versus Multi-Factor Indices**

RANK	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>S&amp;P 500</b>																									
1st	M	V	M	M	V	V	Q	V	V	M	V	Q	Q	V	V	Q	V	V	Q	M	V	M	M	Q	M
2nd	Q	M	Q	500	Q	Q	M	Q	Q	V	Q	M	QVM	Q	M	QVM	M	Q	QVM	500	QVM	QVM	500	QVM	500
3rd	V	Q	QVM	QVM	QVM	QVM	QVM	500	M	QVM	QVM	QVM	M	500	500	500	QVM	QVM	500	QVM	500	500	QVM	500	Q
4th	QVM	QVM	500	Q	500	500	V	QVM	QVM	Q	500	500	500	QVM	Q	M	500	500	V	Q	Q	Q	Q	V	QVM
5th	500	500	V	V	M	M	500	M	500	500	M	V	V	M	QVM	V	Q	M	M	V	M	V	V	M	V
<b>S&amp;P MIDCAP 400</b>																									
1st	4	M	M	M	Q	V	M	V	V	M	V	M	QVM	V	M	Q	M	V	Q	M	V	Q	M	Q	M
2nd	QVM	V	QVM	Q	V	QVM	QVM	400	Q	QVM	QVM	Q	V	Q	Q	QVM	V	Q	400	Q	QVM	M	QVM	QVM	Q
3rd	V	Q	400	400	QVM	Q	V	QVM	QVM	V	400	QVM	400	QVM	400	V	400	QVM	M	QVM	400	QVM	400	400	QVM
4th	Q	QVM	Q	QVM	M	400	Q	Q	400	400	Q	400	Q	400	Q	400	QVM	400	QVM	400	Q	400	Q	V	400
5th	400	400	V	V	400	M	400	M	M	Q	M	V	M	M	V	M	Q	M	V	V	M	V	V	M	V
<b>S&amp;P SMALLCAP 600</b>																									
1st	V	V	M	Q	Q	V	V	V	Q	M	QVM	Q	V	V	V	Q	V	M	Q	Q	V	Q	Q	600	M
2nd	Q	M	Q	M	QVM	Q	M	Q	QVM	V	Q	M	QVM	Q	QVM	M	M	V	V	M	QVM	600	M	QVM	QVM
3rd	M	Q	QVM	600	600	QVM	Q	600	M	Q	600	600	600	QVM	600	V	QVM	600	QVM	QVM	600	QVM	QVM	M	Q
4th	QVM	QVM	600	QVM	V	600	QVM	QVM	V	QVM	V	QVM	Q	600	M	QVM	600	Q	600	600	Q	M	600	V	600
5th	600	600	V	V	M	M	600	M	600	600	M	V	M	M	Q	600	Q	QVM	M	V	M	V	V	Q	V

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 1995, to Dec. 31, 2020. Index 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.

## Exploiting the Complementary Nature of Quality, Value, and Momentum

*Quality, value, and momentum tend to have complementary reactions to different phases of the business cycle.*

Best practices dictate that factor combinations should always have an economic rationale. Quality, value, and momentum tend to have complementary reactions to different phases of the business cycle. The quality factor is designed to capture the indicators of higher-quality financials in companies.<sup>3</sup> It is often classified as a defensive factor, as it tends to outperform when the economy slows, implying that the earnings of high-quality stocks may be less vulnerable to a slowdown.<sup>4</sup> The value factor strives to identify companies that are undervalued by the market compared with their intrinsic value and peers.<sup>5</sup> It is characterized as pro-cyclical, which makes sense given that buying cheap, risky stocks is done with more confidence in a low-risk economy with strong growth prospects.<sup>6</sup> The momentum factor is based on the notion that stocks that have recently performed well on a relative basis will continue performing well in the near term.<sup>7</sup> It tends to benefit from continued trends and often pairs particularly well with value.<sup>8</sup>

*Quality is often classified as a defensive factor, while value is characterized as pro-cyclical, and momentum tends to benefit from continued trends.*

This multi-factor combination is further justified if the aggregate strategy is viewed in terms of a single synthetic stock with the attributes of all three factors simultaneously. An inexpensive stock is generally desirable, if it does not represent a value trap. Requiring that the stock has momentum may help avoid such traps and suggests that the market has become increasingly optimistic about the company's prospects. Therefore, the combination of value and momentum implies a stock with rising prospects that can be picked up while still at a relatively low multiple.

Additionally, narrowing the search to ensure the same company is of the highest quality can further reduce the value trap risk and indicate better growth prospects. High return on equity, a low accrual ratio, and a strong balance sheet with low leverage all indicate a company with an adequate margin of safety that is capable of meeting competitive challenges.

<sup>3</sup> Ung, Daniel, Priscilla Luk, and Xiaowei Kang. 2014. [Quality: A Distinct Equity Factor?](#) S&P Dow Jones Indices.

<sup>4</sup> Novy-Marx, Robert. 2012. [Quality Investing](#). University of Rochester Research Paper.

<sup>5</sup> Fama, Eugene F. and Kenneth R. French. 1996. [Multifactor Explanations of Asset Pricing Anomalies](#). Journal of Finance. 51, 55-84.

<sup>6</sup> Zhang, Lu. 2002. [The Value Premium](#). Simon School of Business Working Paper No. FR 02-19

<sup>7</sup> Carhart, Mark M. 2012. [On Persistence in Mutual Fund Performance](#). Journal of Finance 52: 57-82.

<sup>8</sup> Asness, Clifford S., Tobias J. Moskowitz, and Lasse H. Pedersen. 2012. [Value and Momentum Everywhere](#). Chicago Booth Research Paper No. 12-53.

*There is a sweet spot at which the benchmark's desirable characteristics are preserved...*

## Retaining Characteristics of the Core Benchmark

The extent to which a multi-factor index deviates from its market-cap-weighted benchmark can have a substantial impact on not only the returns but also the investability of any index-linked product. On one hand, greater deviations afford more opportunity to capture factor risk premia. On the other, the turnover and liquidity of such strategies may be adversely affected. Along with that comes the certainty of higher transaction costs in pursuit of uncertain factor returns.

**Clearly, there is a sweet spot at which the benchmark's desirable characteristics are preserved, while multi-factor exposures are also modestly incorporated to achieve risk and return objectives. It is precisely this balance that the S&P QVM Top 90% Indices seek to strike.** In doing so, the indices retain the necessary characteristics to be considered suitable candidates for a portfolio's core holding.

*...while multi-factor exposures are also modestly incorporated to achieve risk and return objectives.*

Finally, the market universe to which a multi-factor strategy is applied matters. In general, the greater the opportunity set for selection, the higher the potential for factor-based investing to be effective. Having the S&P QVM Top 90% Indices available across the S&P 500, S&P MidCap 400, and S&P SmallCap 600 provides an expansive universe that covers the vast majority of U.S.-listed companies (with the added benefits of the profitability criteria of these underlying indices). In addition, having distinct indices for the large-, mid-, and small-cap spaces allows greater flexibility in managing allocations across these size segments.

## CONSTRUCTION APPROACH

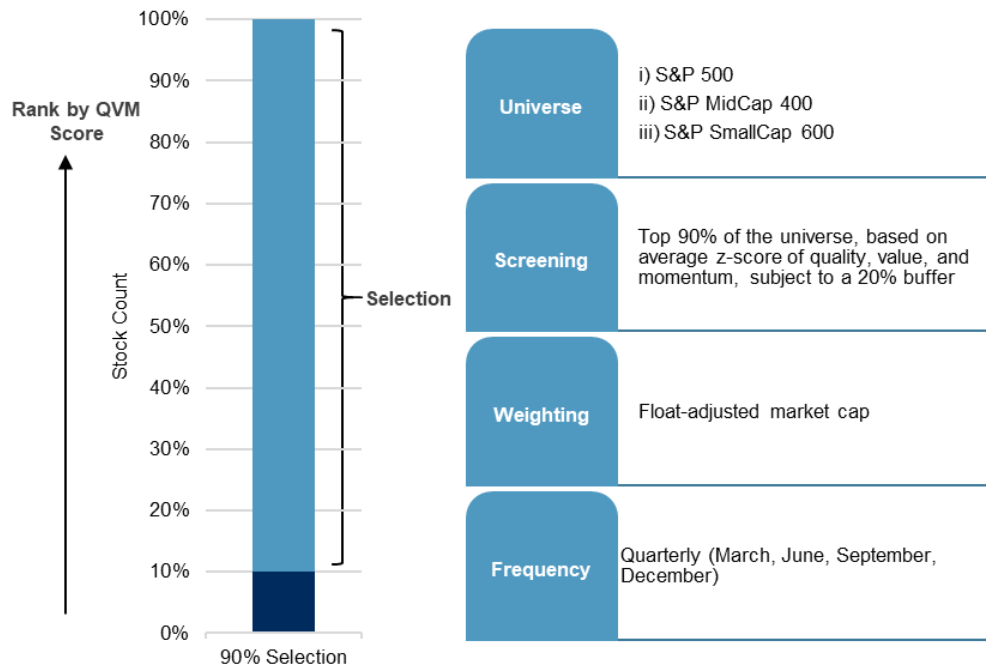
The objective of the S&P Quality, Value & Momentum Top 90% Multi-factor Indices<sup>9</sup> is to pursue modest multi-factor exposure while limiting active risks to retain the benefits of a core benchmark. To achieve this, a bottom-up approach to stock selection evaluates stocks based on their combined factor characteristics and removes the lowest decile. In contrast to a conventional, highly active factor strategy, which typically selects only the highest-scoring stocks, the emphasis of these indices is to avoid stocks with the most extreme signals of financial distress or unsustainability.

*It is precisely this balance that the S&P QVM Top 90% Indices seek to strike.*

<sup>9</sup> For more information, please see the [S&P Quality, Value & Momentum Top 90% Multi-factor Indices Methodology](#).

**Exhibit 4: High-Level Construction Methodology**

*The objective of the indices is to pursue modest multi-factor exposure while limiting active risks to retain the benefits of a core benchmark.*



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

There are three key advantages to this approach.

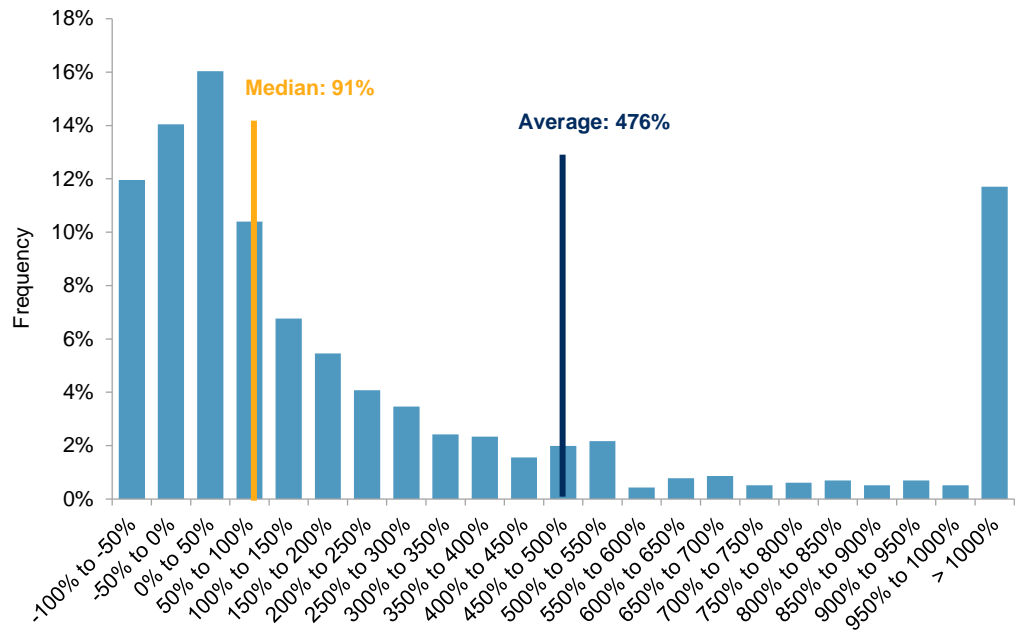
1. The **logic and efficiency** of removing only the lowest decile.
2. The benefits of **bottom-up** multi-factor selection (versus top-down).
3. The retention of **core benchmark characteristics** (diversification, investability, low turnover, and low sector biases).

*To achieve this, a bottom-up approach to stock selection evaluates stocks based on their combined factor characteristics and removes the lowest decile.*

**1. The Logic and Efficiency of Removing Only the Lowest Decile**

Equity returns have displayed a natural tendency toward a right skew in terms of their distribution; i.e., a relatively small number of stocks perform exceedingly well and raise the average return beyond the median.

**Exhibit 5: Distribution of Cumulative Returns for S&P 500 Constituents**



Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 1995, to March 31, 2021. Index performance based on total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

*Equity returns have displayed a natural tendency toward a right skew in terms of their distribution...*

*...i.e., a relatively small number of stocks perform exceedingly well and raise the average return beyond the median.*

This evidence supports the logic that it is more sensible to focus on excluding only the least desirable stocks than on picking the most desirable.<sup>10</sup> This can be justified by accepting that larger portfolios are more likely to include more of the relatively few stocks that are most responsible for elevating the average return. In contrast, a concentrated portfolio is more likely to do the opposite.

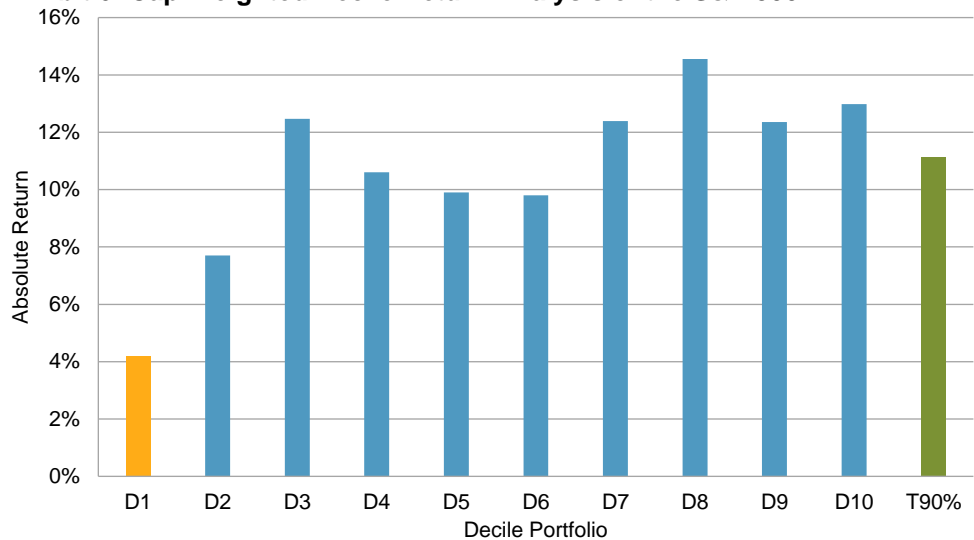
The multi-factor score may offer one such way to identify the least desirable stocks. Historically, removing the lowest-ranked decile has provided meaningful performance improvement over the long term. This is shown in Exhibit 6, which plots the cap-weighted return of each decile from March 1995 to March 2021. Here, stocks are ranked by their multi-factor score and placed into deciles (D1 = the lowest ranked, D10 = the highest ranked) and periodically rebalanced. For the S&P 500, the bottom decile (D1) exhibited the worst performance over the back-tested period.

*This evidence supports the logic that it is more sensible to focus on excluding only the least desirable stocks than on picking the most desirable.*

<sup>10</sup> Lazzara, Craig J. 2016. [The Consequences of Concentration: 4- More Underperformers](#). S&P Dow Jones Indices Indexology® Blog.

**Exhibit 6: Cap-Weighted Decile Return Analysis of the S&P 500**

*Historically, removing the lowest-ranked decile has provided meaningful performance improvement over the long term.*



All Decile Portfolios are hypothetical portfolios.  
 Source: S&P Dow Jones Indices LLC, FactSet. Data from March 17, 1995, to March 31, 2021. Index performance based on total return in USD. T90% represents the top 90% of stocks by return in the S&P 500. 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.

Furthermore, the decision to remove only the lowest decile resulted in improved returns to the benchmark at relatively low tracking error. Exhibit 7 plots the ratio between excess returns over the S&P 500 and its resultant tracking error for a series of hypothetical portfolios, each differentiated by the number of deciles removed. For example, T90% removes only the worst decile (ranked by multi-factor score), T80% removes the worst two deciles (the 20% lowest-ranked stocks), T70% removes the worst three deciles, and so on. The stocks in each portfolio are weighted by float market cap and are periodically rebalanced.

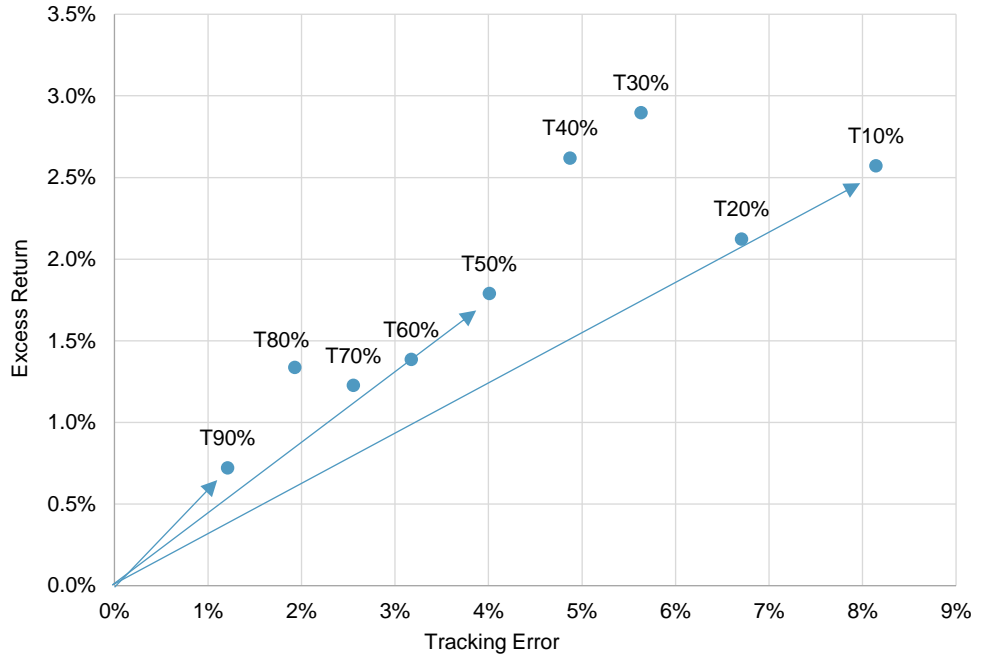
*The decision to remove only the lowest decile resulted in improved returns to the benchmark at relatively low tracking error.*

This ratio is referred to as the information ratio and conveys the efficiency of capturing factor risk premia per unit of active risk taken. Generally, as further deciles were removed from the back-tested strategy, the increase in tracking error was not often compensated with proportional gains in excess returns. Hence, the removal of only the bottom decile (the top 90% strategy) was often the most efficient. This is represented in Exhibit 7 as the slope of the line. Conveniently, it was also the least risky choice with respect to the benchmark (i.e., lowest tracking error), thereby making it arguably the most prudent choice given the uncertainty of factor returns.



**Exhibit 7: Declining Efficiency (Information Ratio) of Removing Increasingly More of Lowest Deciles from the S&P 500**

Generally, as further deciles were removed from the back-tested strategy, the increase in tracking error was not often compensated with proportional gains in excess returns.



All portfolios are hypothetical portfolios.  
 Source: S&P Dow Jones Indices LLC, FactSet. Data from March 17, 1995, to March 31, 2021. Index performance based on monthly 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.

## 2. The Benefits of Bottom-Up Multi-Factor Selection

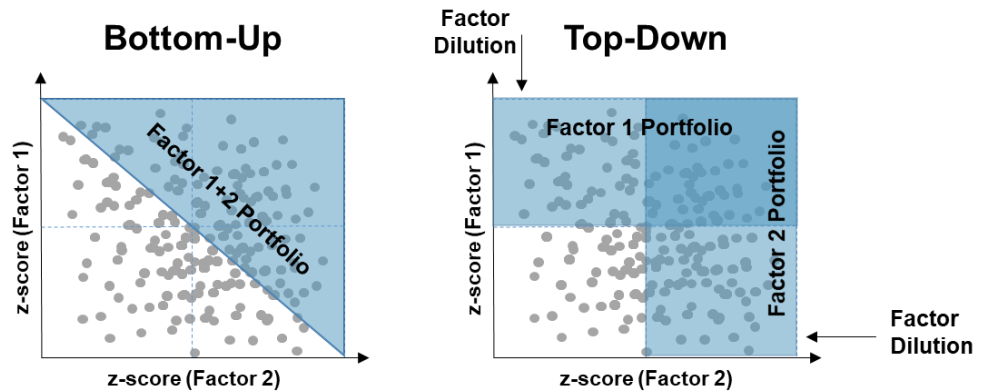
The removal of only the bottom decile (the top 90% strategy) was often the most efficient.

Bottom-up multi-factor stock selection considers all targeted factors simultaneously for each stock, as opposed to selecting each stock on the merits of each factor independently (top-down).<sup>11</sup>

A bottom-up approach, as employed in the S&P QVM Top 90% Indices, better avoids the weaknesses of top-down selection—factor “traps” and factor dilution. This is illustrated in Exhibit 8, where both selection methods are compared. The dots represent a hypothetical universe of stocks plotted based on their respective scores to two factors, and the shaded regions reflect the selected portfolio.

<sup>11</sup> Innes, Andrew, Akash Jain, and Lalit Ponnala. 2021. [Exploring Techniques in Multi-Factor Index Construction](#). S&P Dow Jones Indices.

**Exhibit 8: Illustration of Factor Dilution in Top-Down Approach**



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

*The top-down approach displays an increased likelihood of selecting stocks that score highly with respect to one factor, yet score low with respect to another.*

The top-down approach displays an increased likelihood of selecting stocks that score highly with respect to one factor, yet score low with respect to another. These may represent potential factor traps. For instance, a value trap would be an inexpensive yet undesirable company, with cheap valuations (high value) simply because of falling market expectations (low momentum). Similarly, high momentum can be problematic when accompanied by deteriorating fundamentals, suspect quality, and excessive valuations.

*These may represent potential factor traps.*

Additionally, these same stocks introduce another problem: factor dilution. Factor exposures can be canceled out by offsetting exposures of each independent single-factor selection. For example, a high momentum stock with expensive valuation combined with an inexpensive stock with low momentum could perfectly offset each other. The result would be zero aggregate factor exposure to both value and momentum.

Conversely, a bottom-up approach selects the stocks with the highest cumulative score for both factors 1 and 2 and can therefore alleviate the issues discussed in top-down methods.

**3. The Retention of Core Benchmark Characteristics**

The preservation of the strategies' similarity with their benchmark allows the benefits of a core holding to be retained. With 90% of the underlying index remaining and weighted by float-adjusted market capitalization, the strategy exhibits similar weights to the core benchmark. The indices therefore have high diversification, high investability, low turnover and associated trading costs, and low active sector biases.

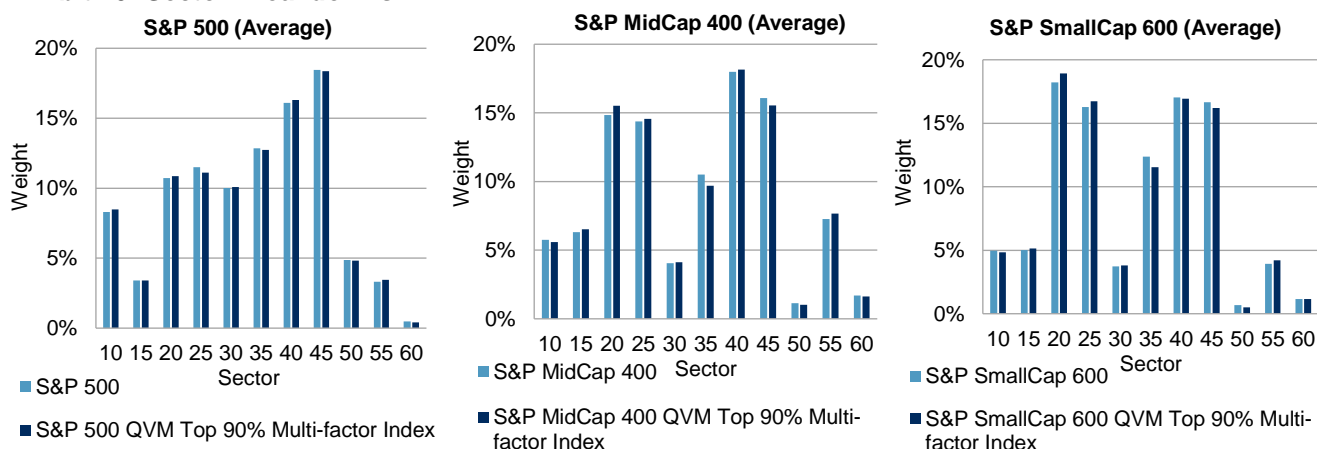
*A bottom-up approach selects the stocks with the highest cumulative score for both factors 1 and 2 and can therefore alleviate the issues with top-down methods.*

**Exhibit 9: Investability Characteristics of Top 90% Indices Compared with Benchmarks**

CATEGORY	S&P 500 QVM TOP 90% MULTI-FACTOR INDEX	S&P MIDCAP 400 QVM TOP 90% MULTI-FACTOR INDEX	S&P SMALLCAP 600 QVM TOP 90% MULTI-FACTOR INDEX
Target Stock Count	450	360	540
Tracking Error From Inception (%)	1.21	1.35	1.10
Average Active Share (%)	8.04	9.48	8.61
Average Annual Turnover (%)	22.65	30.95	32.25

Source: S&P Dow Jones Indices LLC. Data from March 1995 to June 2021. Index performance based on monthly 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.

**Exhibit 10: Sector Breakdowns**



Source: S&P Dow Jones Indices LLC. Data from March 17, 1995, to March 31, 2021. Past performance is no guarantee of future results. 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.

## HISTORICAL PERFORMANCE CHARACTERISTICS

### Long-Term Investing through the Cycle

Exhibit 11 shows the back-tested risk/return statistics for each of the S&P QVM Top 90% Indices using March 1995 as their common start date. Looking across the capitalization range, each of the indices outperformed their respective benchmark over the long term, both on an absolute and risk-adjusted basis.

Since the start of the back-tested period, the large-, mid-, and small-cap S&P QVM Top 90% Indices beat their benchmarks by 72, 110, and 109 bps per year, respectively. This represents meaningful outperformance when viewed in the context of low tracking error.

Over more recent time periods, outperformance remained significant for the mid- and small-cap versions. However, the large-cap index underperformed over the one-, three-, and five-year horizons—although not materially so and with slightly less volatility than the benchmark.

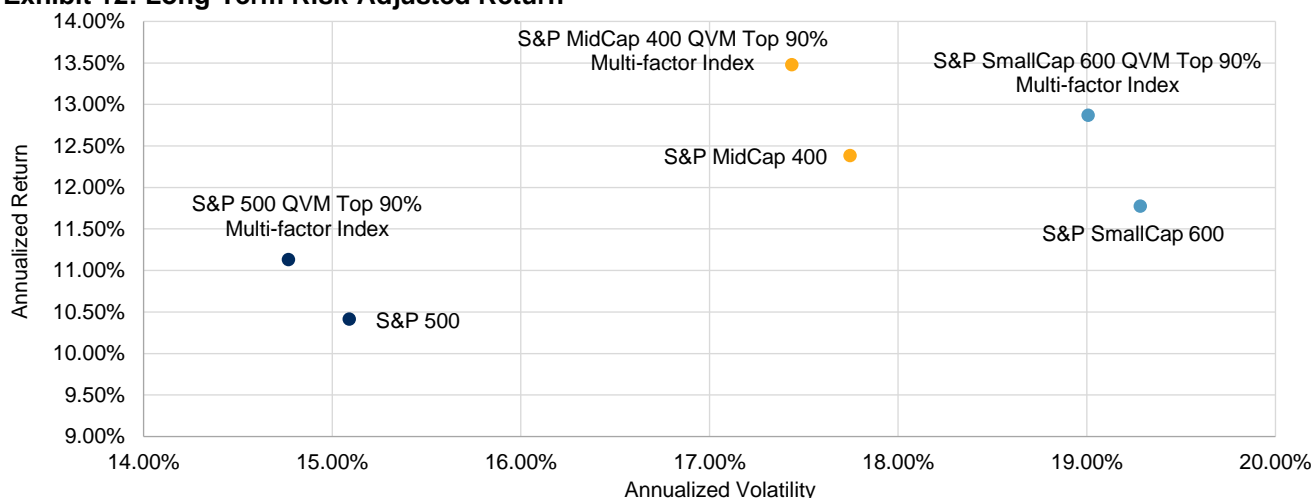
Similar conclusions can be drawn on a risk-adjusted basis, as each version consistently beat its respective benchmark. The improvements can primarily be attributed to enhanced returns, because the volatility profiles tended to remain in line with the benchmark, albeit slightly lower over the long term.

**Exhibit 11: Risk/Return Statistics**

PERIOD	LARGE CAP		MID CAP		SMALL CAP	
	S&P 500	S&P 500 QVM TOP 90% MULTI-FACTOR INDEX	S&P MIDCAP 400	S&P MIDCAP 400 QVM TOP 90% MULTI-FACTOR INDEX	S&P SMALLCAP 600	S&P SMALLCAP 600 QVM TOP 90% MULTI-FACTOR INDEX
<b>ANNUALIZED RETURN (%)</b>						
1-Year	56.40	56.27	83.53	85.72	95.42	99.93
3-Year	16.74	16.63	13.38	14.68	13.68	15.17
5-Year	16.30	16.29	14.37	15.58	15.60	16.41
10-Year	13.91	13.94	11.92	12.60	12.97	13.52
20-Year	8.47	9.00	10.63	11.71	11.07	12.06
Since Inception	10.41	11.13	12.38	13.48	11.78	12.87
<b>ANNUALIZED VOLATILITY (%)</b>						
1-Year	17.33	16.90	17.63	17.71	19.54	19.84
3-Year	18.40	18.37	23.72	23.43	26.16	25.93
5-Year	14.89	14.87	19.05	18.85	21.58	21.43
10-Year	13.58	13.53	16.87	16.84	18.74	18.63
20-Year	14.86	14.55	17.66	17.51	19.33	19.06
Since Inception	15.09	14.77	17.75	17.44	19.28	19.01
<b>RISK-ADJUSTED RETURN</b>						
1-Year	3.25	3.33	4.74	4.84	4.88	5.04
3-Year	0.91	0.91	0.56	0.63	0.52	0.58
5-Year	1.09	1.10	0.75	0.83	0.72	0.77
10-Year	1.02	1.03	0.71	0.75	0.69	0.73
20-Year	0.57	0.62	0.60	0.67	0.57	0.63
Since Inception	0.69	0.75	0.70	0.77	0.61	0.68

Source: S&P Dow Jones Indices LLC. Data from March 17, 1995, to March 31, 2021. Index performance based on monthly 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.

**Exhibit 12: Long-Term Risk-Adjusted Return**



Source: S&P Dow Jones Indices LLC. Data from March 17, 1995, to March 31, 2021. Index performance based on monthly 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.

Tracking error is an important consideration when selecting an investment strategy and deciding how to position it in a portfolio. One of the defining characteristics of the S&P QVM Top 90% Indices has been their low tracking error during the back-tested period, a feature that may be expected to continue going forward.

The full-period tracking error for the [S&P 500 QVM Top 90% Multi-factor Index](#) was 1.21% versus the S&P 500 and remained below 1% for the other time periods shown in Exhibit 13. Similarly, the mid-cap and small-cap versions were quite low for the full period, at 1.35% and 1.10%, respectively.

As expected, tracking error increased during stress periods when equity market volatility rose and dispersion was high. Exhibit 14 charts the 36-month rolling tracking error for each of the capitalization ranges. It is easy to identify the three elevated periods, the largest occurring during the bursting of the tech bubble in the early 2000s.

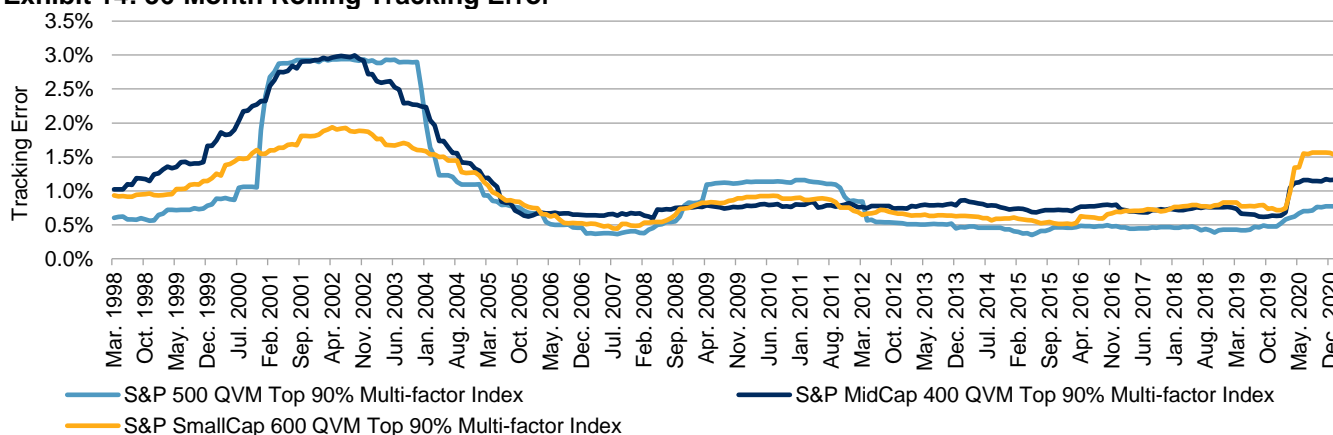
The related information ratios are quite attractive, which is not surprising given the realized excess returns and low levels of tracking error. While compelling for all three of the S&P QVM Top 90% Indices, the information ratio increased as market cap decreased—it was highest for the small-cap and lowest for the large-cap index.

**Exhibit 13: Tracking Error and Information Ratio**

PERIOD	S&P 500 QVM TOP 90% MULTI-FACTOR INDEX		S&P 400 QVM TOP 90% MULTI-FACTOR INDEX		S&P 600 QVM TOP 90% MULTI-FACTOR INDEX	
	TRACKING ERROR	INFORMATION RATIO	TRACKING ERROR	INFORMATION RATIO	TRACKING ERROR	INFORMATION RATIO
1-Year	0.95%	-0.13	1.39%	1.57	2.22%	2.03
3-Year	0.77%	-0.14	1.26%	1.04	1.54%	0.97
5-Year	0.64%	-0.01	1.07%	1.12	1.32%	0.61
10-Year	0.56%	0.05	0.93%	0.73	1.02%	0.54
20-Year	0.86%	0.61	1.10%	0.98	1.03%	0.96
Inception	1.21%	0.59	1.35%	0.81	1.10%	1.00

Source: S&P Dow Jones Indices LLC. Data from March 17, 1995, to March 31, 2021. Index performance based on monthly 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.

**Exhibit 14: 36-Month Rolling Tracking Error**



Source: S&P Dow Jones Indices LLC. Data from March 17, 1995, to March 31, 2021. Index performance based on monthly 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.

### Examination of Performance during 2020

*In 2020, the large-cap S&P QVM Top 90% Index underperformed the S&P 500 in terms of full-year returns and maximum drawdown, although only by a small margin.*

Looking more closely at the performance during 2020, Exhibits 15 and 16 show the quarterly and full-year returns, as well as the maximum drawdowns for the S&P QVM Top 90% Indices. In line with their respective benchmarks, each index reclaimed its COVID-19-related drawdowns and finished the year positive by a double-digit margin.

The large-cap S&P QVM Top 90% Index underperformed the S&P 500 both in terms of full-year returns and maximum drawdown, although only by a small margin. This was mostly driven by the underperformance of the value factor and the delayed inclusion of some of the large tech stocks.

In contrast, the mid-cap and small-cap versions finished the year with notable outperformance, beating their benchmarks by 3.7% and 3.8%, respectively. Furthermore, both indices recorded lower maximum drawdowns than their benchmarks.

*The mid- and small-cap versions finished the year with notable outperformance, beating their benchmarks by 3.7% and 3.8%, respectively.*

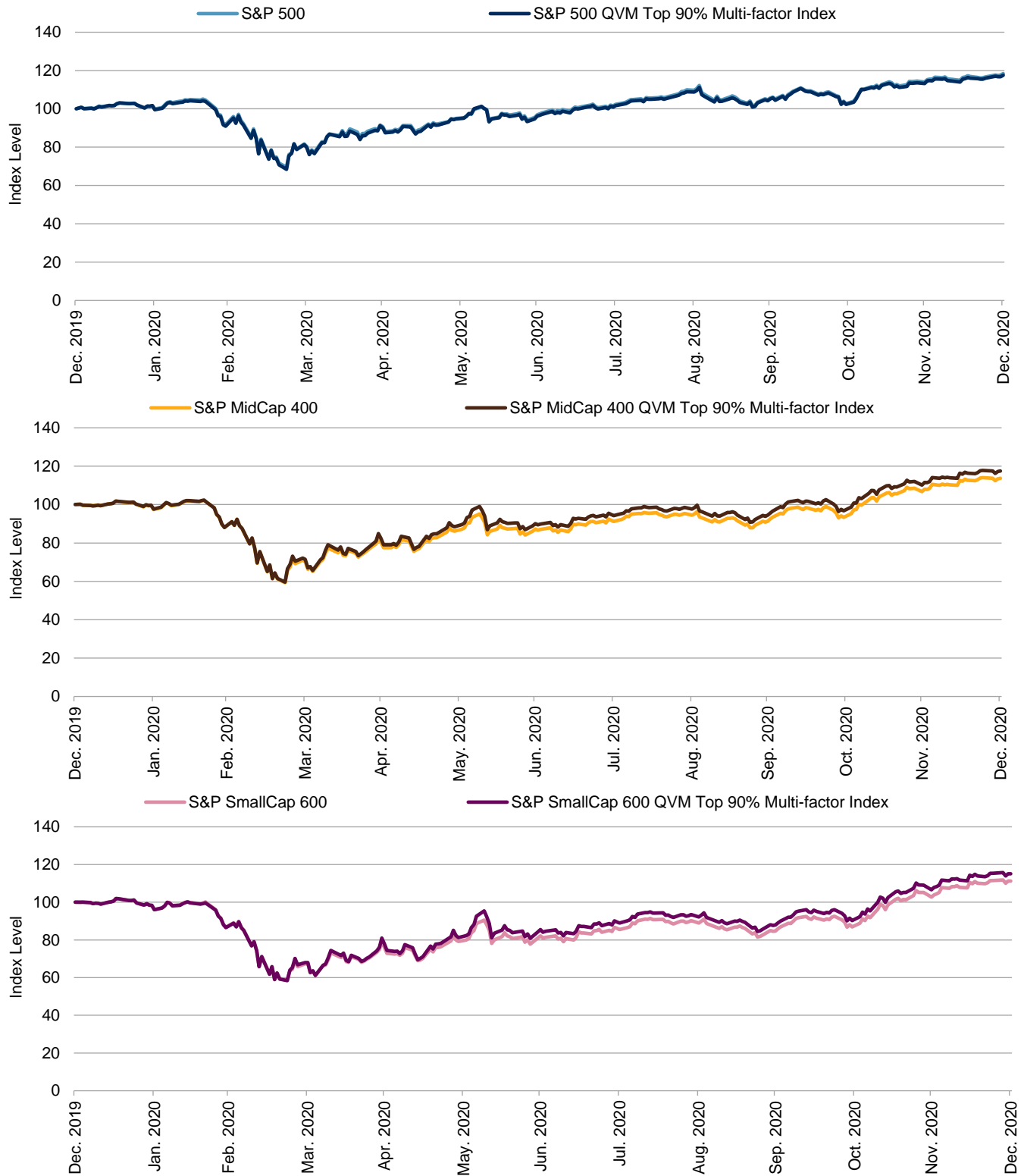
**Exhibit 15: Return Analysis during 2020**

PERIOD	LARGE-CAP		MID-CAP		SMALL-CAP	
	S&P 500	S&P 500 QVM TOP 90% MULTI-FACTOR INDEX	S&P MIDCAP 400	S&P MIDCAP 400 QVM TOP 90% MULTI-FACTOR INDEX	S&P SMALLCAP 600	S&P SMALLCAP 600 QVM TOP 90% MULTI-FACTOR INDEX
<b>RETURNS (%)</b>						
Q1 2020	-19.6	-20.0	-29.7	-28.5	-32.6	-31.9
Q2 2020	20.5	20.3	24.1	26.1	21.9	25.6
Q3 2020	8.9	9.3	4.8	4.8	3.2	2.9
Q4 2020	12.1	11.8	24.4	24.3	31.3	31.0
Full-Year 2020	18.4	17.5	13.7	17.4	11.3	15.1
<b>MAXIMUM DRAWDOWN (%)</b>						
Full-Year 2020	-33.79	-34.36	-42.02	-41.73	-44.41	-44.04

Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2019, to Dec. 31, 2020. Index 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.

*Furthermore, both indices recorded lower maximum drawdowns than their benchmarks.*

**Exhibit 16: Returns versus Benchmark**



Source: S&P Dow Jones Indices LLC. Data from Dec. 31, 2019, to Dec. 31, 2020. Index performance based on total return in USD. All indices rebased to 100 on Dec. 31, 2019. Past performance is no guarantee of future results. 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.

## CONCLUSION

*Quality, value, and momentum have been shown to be complementary in terms of how each one reacts to different phases of the business cycle.*

In review, the S&P QVM Top 90% Indices remove constituents ranked in the lowest decile of their respective universe and are weighted by float-adjusted market capitalization. The constituents are ranked using a multi-factor score, which is based on the average of three separate factors: quality, value, and momentum.

These three factors have been shown to be complementary in terms of how each one reacts to different phases of the business cycle. This was evidenced by their low-to-negative historical correlation and the historical ability of the multi-factor indices to offer more stable excess return patterns than single-factor indices.

*The S&P QVM Top 90% Indices displayed high factor efficiency by delivering moderate outperformance versus the benchmark at relatively low levels of tracking error.*

The analysis on skewed equity returns showed that it was more logical to remove only the least desirable companies to improve the chances of retaining the highest-performing companies. The lowest-ranked decile by multi-factor score was shown to be an effective method of identifying these least desirable companies due to the decile's poor historical performance and economic rationale. This ultimately led the S&P QVM Top 90% Indices to display high factor efficiency by delivering moderate outperformance versus the benchmark at relatively low levels of tracking error, as evidenced by the realized information ratios.

Furthermore, using a bottom-up construction approach has been deemed superior, since it selects constituents in the context of the overall portfolio and reduces the probability of choosing those that rank extremely low on one or more metrics.

Over the period analyzed, the indices' tracking error, turnover, and active share remained relatively low, and sector weights were largely in line with the benchmark. This suggests that the S&P QVM Top 90% Indices may be suitable for those seeking a multi-factor index that can be positioned as a core holding.

*The indices' tracking error, turnover, and active share remained relatively low, and sector weights were largely in line with the benchmark.*



## PERFORMANCE DISCLOSURE/BACK-TESTED DATA

The S&P MidCap 400 Quality Index, S&P MidCap 400 Enhanced Value Index, and S&P MidCap 400 Momentum Index were launched November 13, 2017. The S&P SmallCap 600 Quality Index was launched March 6, 2017. The S&P 500 Quality Index was launched July 8, 2014. The S&P 500 Momentum Index was launched November 18, 2014. The S&P 500 Enhanced Value Index was launched April 27, 2015. The S&P SmallCap 600 Enhanced Value was launched January 4, 2018. The S&P SmallCap 600 Momentum Index was launched January 4, 2018. The S&P 500 Quality, Value & Momentum Top 90% Multi-factor Index, S&P MidCap 400 Quality, Value & Momentum Top 90% Multi-factor Index, and S&P SmallCap 600 Quality, Value & Momentum Top 90% Multi-factor Index were launched April 5, 2021. 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. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. Complete index methodology details are available at [www.spglobal.com/spdji](http://www.spglobal.com/spdji). Past performance of the Index is not an indication of future results. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results. Please refer to the methodology for the Index 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. Back-tested performance is for use with institutions only; not for use with retail investors.

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 to a fixed value for calculation purposes. The Launch Date designates the date when 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 data feed 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.

Typically, when S&P DJI creates back-tested index data, S&P DJI uses actual historical constituent-level data (e.g., historical price, market capitalization, and corporate action data) in its calculations. As ESG investing is still in early stages of development, certain datapoints used to calculate S&P DJI's ESG indices may not be available for the entire desired period of back-tested history. The same data availability issue could be true for other indices as well. In cases when actual data is not available for all relevant historical periods, S&P DJI may employ a process of using "Backward Data Assumption" (or pulling back) of ESG data for the calculation of back-tested historical performance. "Backward Data Assumption" is a process that applies the earliest actual live data point available for an index constituent company to all prior historical instances in the index performance. For example, Backward Data Assumption inherently assumes that companies currently not involved in a specific business activity (also known as "product involvement") were never involved historically and similarly also assumes that companies currently involved in a specific business activity were involved historically too. The Backward Data Assumption allows the hypothetical back-test to be extended over more historical years than would be feasible using only actual data. For more information on "Backward Data Assumption" please refer to the [FAQ](#). The methodology and factsheets of any index that employs backward assumption in the back-tested history will explicitly state so. The methodology will include an Appendix with a table setting forth the specific data points and relevant time period for which backward projected data was used.

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