An Index Approach to Factor Investing in India

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Introduction

Interest in factor investment solutions have significantly risen in the past decade. In general, factor investing refers to an approach that targets stock characteristics that drive the difference in expected returns over the long term. Sometimes, factor investing is referred to as smart beta, or strategic beta, because the factor approach will deviate the underlying portfolio from the market portfolio (the market beta) in a systematic method. Some of the common factors that have been well documented in academic literature and adopted by the investment industry include low volatility, momentum, quality and value.[1] Most of the evidence has been strong and promising that those factors can generate excess returns over the historical sample periods. As of March 31, 2022, factor ETFs managed about USD 1.6 trillion assets globally, a 24.6% CAGR compared with the USD 178 billion 10 years ago.[2]

How did these factors perform in the Indian market? Can investors access factor performance through an indexing approach? What are some applications of factor indices in the Indian market? In this paper, we introduce the S&P BSE Factor Index Series, which implements the factor investing framework through an indexing approach to reflect the performance of the low volatility, momentum, quality and value factors.

[1] See, for example, Fama and French (2015), Ang, Hodrick, Xing and Zhang (2008), and Jegadeesh and Titman (1993).

[2] Morningstar.

In the following four sections, we provide brief descriptions of the S&P Dow Jones Indices (S&P DJI) approach to each of the common factors. We will then provide an extensive discussion on the performance of the four factor indices, and a potential approach to combining the four factor indices to form an alternative for core equity allocation.

In each of the introductory sections, we follow the same framework to present the factors. The underlying index universe to construct the S&P BSE Factor Index Series is the S&P BSE LargeMidCap, which is designed to represent the top 85% of the total market cap of the S&P BSE AllCap. The S&P BSE LargeMidCap was launched in 2015, with the first value available in September 2005, so we use back-tested historical data starting on Sept. 30, 2005, to study the full sample period performance of each factor. Every six months, at month-end in March and September, we sort the constituents of the S&P BSE LargeMidCap in order by each factor. We then form equal-weighted quintiles and market-cap-weighted quintiles from those sorted values, denoting Quintile 1 as the stocks with the highest exposure to the factor and Quintile 5 as the stocks with the lowest exposure. We are interested in whether Quintile 1 generates better performance than Quintile 5. The performance of Quintile 1 tends to be more important, especially for long-only investors. We analyze the performance from both the annualized compound return and the risk-adjusted return perspectives.

Low Volatility

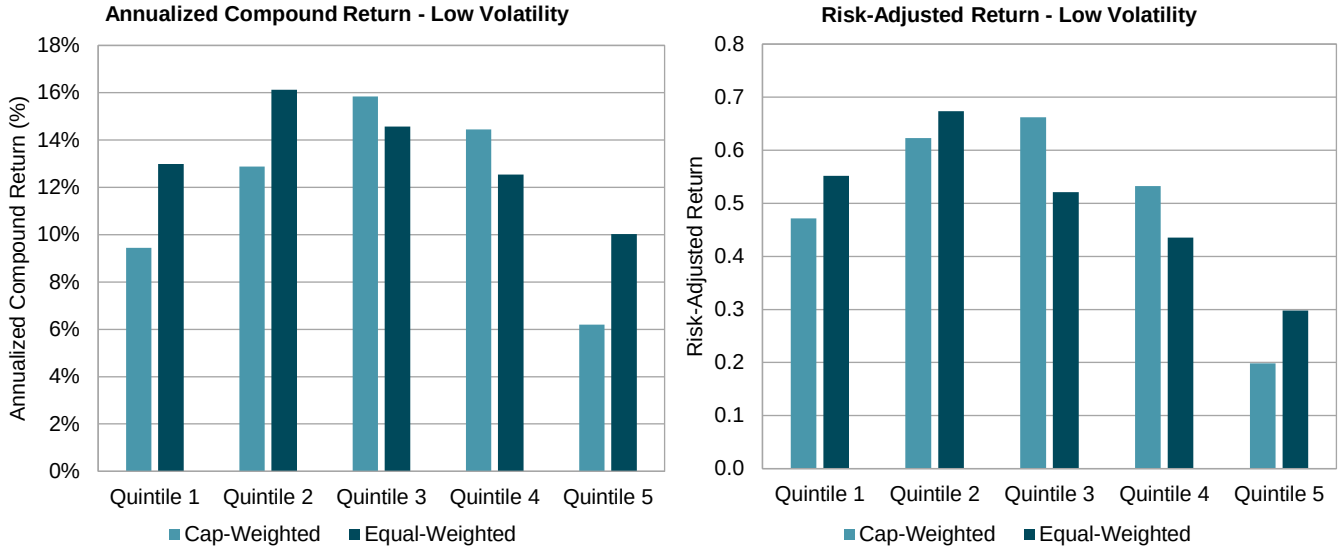
Conventional wisdom would suggest that higher risk would imply higher expected return. However, researchers found that lower-risk assets tend to outperform higher-risk assets over time in the equity market.[3] This is called the low volatility factor. It gained popularity after the 2008 Global Financial Crisis. The low volatility strategy tends to perform well in bear markets thanks to its defensive nature, while lagging during bull markets.

To evaluate its effectiveness in the Indian market, we sorted stocks into quintiles based on the trailing 12 months' daily return volatility. From Exhibit 1 we can observe the following.

- Quintile 1 outperformed Quintile 5 on annualized compound return and risk-adjusted return bases.
- Cap-weighted quintiles generated a slightly higher spread between Quintile 1 and Quintile 5 than the equal-weighted quintiles.
- The best-performing quintile was Quintile 3 on a cap-weighted basis and Quintile 2 on an equal-weighted basis. The quintile with the highest volatility (Quintile 5) showed an obvious underperformance compared with the rest of the quintiles.

[3] Ang, Andrew, Robert J. Hodrick, Yuhang Xing and Xiaoyan Zhang. "High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence." Journal of Financial Economics, Vol. 91, pp. 1-23, 2009.

Exhibit 1: Quintile Performance of S&P BSE LargeMidCap Stocks Sorted by Volatility



All quintiles are hypothetical.
Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. The S&P BSE LargeMidCap was launched April 15, 2015. All data prior to index launch date is back-tested hypothetical data. 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.

The S&P BSE Low Volatility Index is designed to measure the performance of the 30 least volatile companies in the S&P BSE LargeMidCap, as measured by trailing 12-month daily return volatility. Constituents are weighted by their inverse volatility, subject to a maximum weight of 5% for each security.

Exhibit 2 shows the index characteristics as of March 31, 2022, and the five-year quarterly average. We can see that compared with the S&P BSE LargeMidCap, the S&P BSE Low Volatility Index has:

- A lower weighted average market capitalization, indicating the index tilts toward smaller-cap companies in the S&P BSE LargeMidCap universe;
- A higher return on equity (ROE) and return on assets (ROA), indicating the index tilts toward more profitable companies;
- A lower historical three-year earnings per share (EPS) growth, indicating the index has weaker growth characteristics; and
- Similar valuation measures such as price/earnings (P/E), price/book (P/B), and price/sales (P/S), and a slightly higher dividend yield, indicating the index didn't deviate much from the underlying universe in terms of valuation.

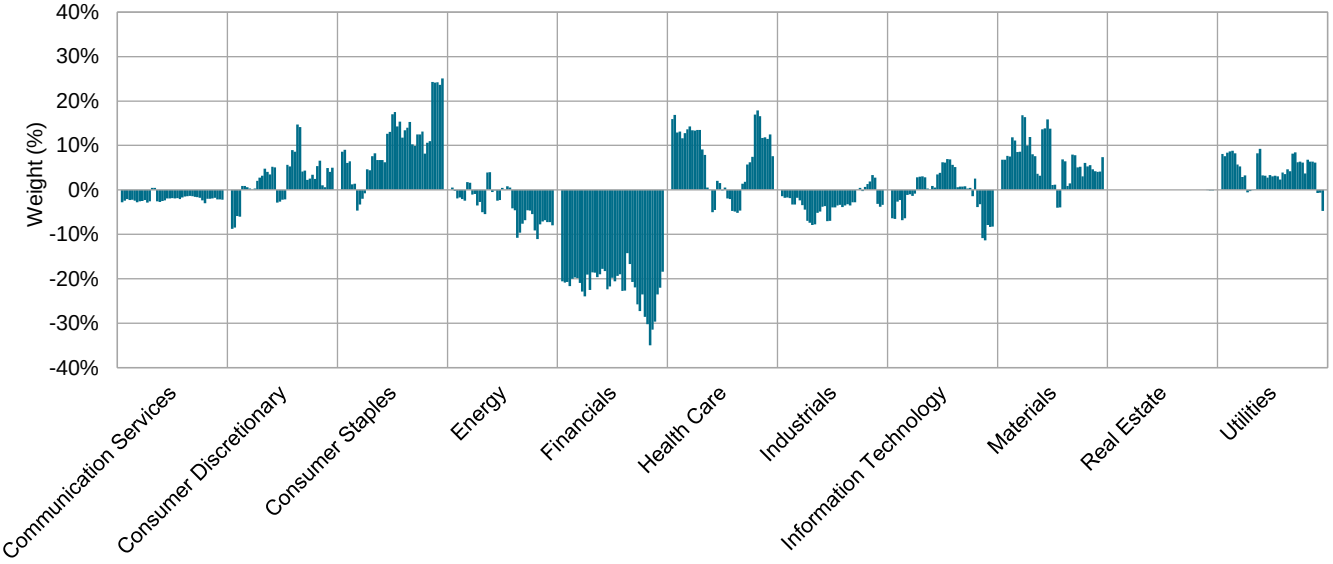
Exhibit 2: Characteristics of the S&P BSE Low Volatility Index

Index	Market Capitalization (INR Millions)	ROE (%)	ROA (%)	Historical 3-Year EPS Growth (%)	Dividend Yield (%)	P/E	P/B	P/S
YTD as of March 31, 2022								
S&P BSE LargeMidCap	4,859,354	17.34	8.70	19.36	1.13	21.31	3.36	2.44
S&P BSE Low Volatility Index	1,826,411	25.19	16.53	13.85	1.76	20.96	4.68	2.98
5-Year Quarterly Average								
S&P BSE LargeMidCap	3,000,821	17.78	9.05	13.02	1.16	21.95	2.84	1.92
S&P BSE Low Volatility Index	1,496,652	25.05	14.10	10.46	1.49	24.68	4.10	1.99

Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2017, to March 31, 2022. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

We then compared the GICS® sector breakdown of the S&P BSE Low Volatility Index to the S&P BSE LargeMidCap.[4] Exhibit 3 shows the historical relative overweight and underweight of GICS sectors in the S&P BSE Low Volatility Index. Under each of the GICS sector sections, it shows a time series with the relative weight of the sector in the S&P BSE Low Volatility Index to the S&P BSE LargeMidCap. We can see that most of the time, the S&P BSE Low Volatility Index underweighted Financials, Energy, Industrials and Communication Services, while overweighting Consumer Staples, Materials, Utilities, Health Care and Consumer Discretionary. The relative weight in Information Technology was not clear and consistent throughout history, which reflects the changing volatility dynamics within this sector.

Exhibit 3: Relative GICS Sector Weights of the S&P BSE Low Volatility Index



Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2012, to March 31, 2022. Chart is provided for illustrative purposes.

[4] The historical GICS sector breakdown of the S&P BSE LargeMidCap can be found in Exhibit 20 in the Appendix.

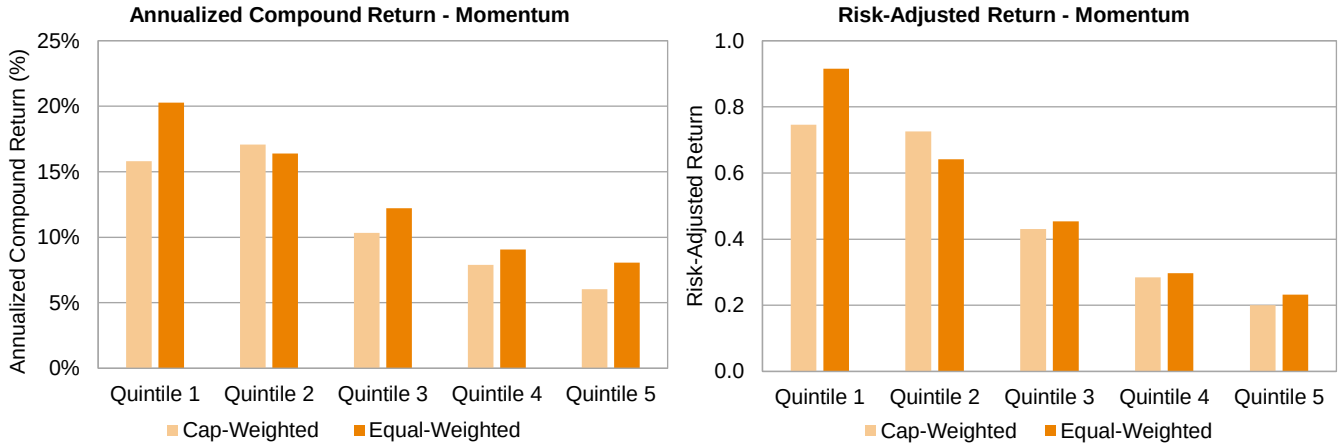
Momentum

The momentum factor was first documented by Jegadeesh and Titman in their 1993 paper: *Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency*. The momentum factor implies that stocks that have performed well in the past compared with their peers tend to continue to perform well in the coming near term, and vice versa. In general, the past performance refers to the one-year look-back window, skipping the most recent month to avoid the short-term reversal effect. Unlike other factors like quality, value and low volatility, the outperformance from the momentum factor tends to be short lived, thus the strategy would require a constant rebalancing to maintain the momentum exposure; however, that could result in an extra turnover cost.

To evaluate its effectiveness in the Indian market, we sorted stocks into quintiles based on the risk-adjusted performance for the past 12 months, skipping the most recent month. From Exhibit 4 we can observe the following.

- Quintile 1 outperformed Quintile 5 on annualized compound return and risk-adjusted return bases.
- Equal-weighted quintiles generated a slightly higher spread between Quintile 1 and the Quintile 5 than the cap-weighted quintiles. This could indicate that the momentum effect is stronger in the relatively smaller-cap space within the S&P BSE LargeMidCap.
- From Quintile 1 to Quintile 5, the performance is almost a monotonic decreasing relationship. This is promising evidence to indicate that in the Indian market, the stronger a group of stocks' momentum characteristics, the better that group's historical performance.

Exhibit 4: Quintile Performance of S&P BSE LargeMidCap Stocks Sorted by Momentum



All quintiles are hypothetical.
Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. The S&P BSE LargeMidCap was launched April 15, 2015. All data prior to index launch date is back-tested hypothetical data. 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.

The S&P BSE Momentum Index is designed to measure the performance of the 30 companies in the S&P BSE LargeMidCap that exhibit the most persistence in their relative performance based on their momentum scores, which are calculated using the risk-adjusted return from the past 12 months, skipping the most recent month. Constituents are weighted by the product of their momentum score and float-adjusted market capitalization, subject to a maximum weight of the lower of 5% and three times its float-adjusted market capitalization weight in the index.

Exhibit 5 shows the index characteristics as of March 31, 2022, and the five-year quarterly average. We can see that compared with the S&P BSE LargeMidCap, the S&P BSE Momentum Index has:

- A lower weighted average market capitalization, indicating the index tilts toward smaller-cap companies in the S&P BSE LargeMidCap universe;
- A slightly higher ROE and ROA, indicating the index had a small tilt toward more profitable companies;
- A higher historical three-year EPS growth, indicating the index has a strong growth characteristic; and
- Higher valuation measures such as P/E, P/B, and P/S, and a slightly lower dividend yield, indicating the index tends to tilt toward companies with higher valuations. This makes sense because momentum tends to be positively correlated with valuation; the higher the momentum (past performance) is, the higher the valuation would be, given that price is in the numerator of the valuation metrics.

Exhibit 5: Characteristics of the S&P BSE Momentum Index

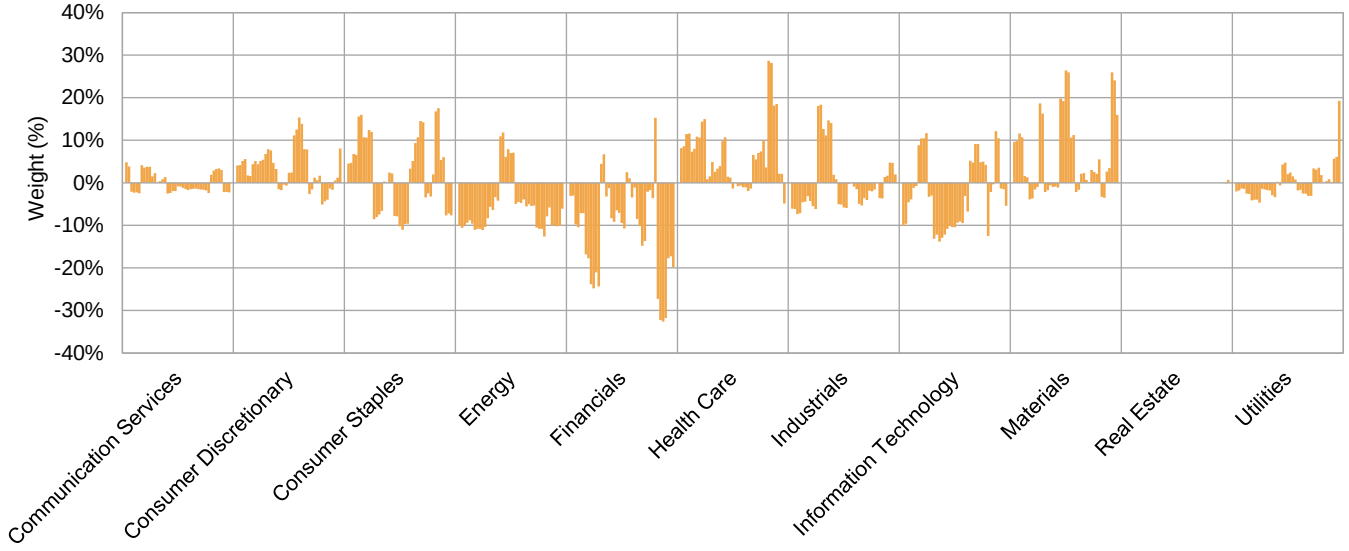
Index	Market Capitalization (INR Millions)	ROE (%)	ROA (%)	Historical 3-Year EPS Growth (%)	Dividend Yield (%)	P/E	P/B	P/S
YTD as of March 31, 2022								
S&P BSE LargeMidCap	4,859,354	17.34	8.70	19.36	1.13	21.31	3.36	2.44
S&P BSE Momentum Index	2,077,413	16.57	8.13	24.73	1.12	17.45	3.34	1.57
5-Year Quarterly Average								
S&P BSE LargeMidCap	3,000,821	17.78	9.05	13.02	1.16	21.95	2.84	1.92
S&P BSE Momentum Index	1,649,337	19.86	10.18	17.62	0.95	25.86	4.21	2.51

Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2017, to March 31, 2022. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Exhibit 6 shows the historical relative overweight and underweight of GICS sectors in the S&P BSE Momentum Index compared with the S&P BSE LargeMidCap. Unlike low volatility, value or quality, we can't identify any clear sector deviation patterns for the momentum factor. The only conclusion we might be able to draw is that most of the time, the S&P BSE Momentum Index overweighted Consumer Discretionary and underweighted Financials and

Energy. The unclear sector allocation pattern makes sense because momentum is a factor purely based on price movement and unrelated to stock fundamentals.

Exhibit 6: Relative GICS Sector Weights of the S&P BSE Momentum Index



Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2012, to March 31, 2022. Chart is provided for illustrative purposes.

Quality

Unlike low volatility and momentum, there's a lack of consensus on the definition of the quality factor. Profitability, earnings stability and financial leverage are all some ways to measure a company's quality. The idea of the quality factor is to identify companies with high profitability, a strong balance sheet and low financial leverage. Those companies tend to manage capital effectively and be able to generate robust cash flow in the long run.

At S&P DJI, we use a three-pronged approach to measure a company's quality.

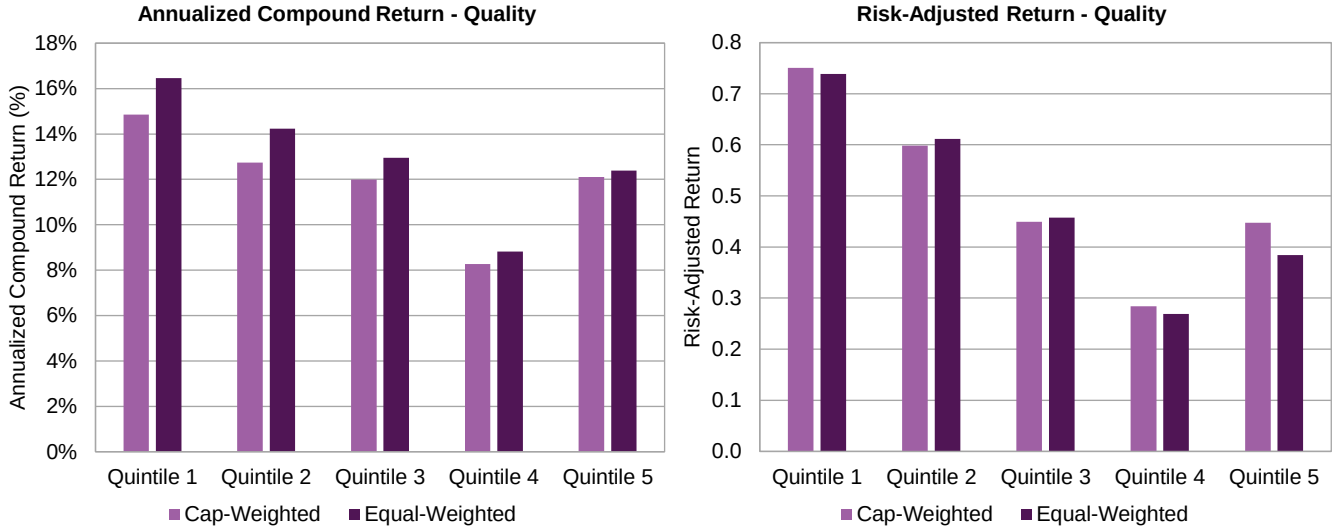
1. **ROE**: Calculated as a company's trailing 12-month EPS divided by its latest book value per share.
2. **Balance Sheet Accruals Ratio**: Defined as the change of a company's net operating assets over the past year divided by its average net operating assets over the past two years.
3. **Financial Leverage Ratio**: Calculated as a company's latest total debt divided by its book value.[5]

[5] For the quintile performance of individual quality metrics, please see Exhibit 21 in the Appendix.

To evaluate its effectiveness in the Indian market, we sorted stocks into quintiles based on the combination of these three metrics. From Exhibit 7, we can observe the following.

- Quintile 1 outperformed Quintile 5 on annualized compound return and risk-adjusted return bases.
- Equal-weighted quintiles generated a slightly higher spread between Quintile 1 and Quintile 5 than the cap-weighted quintiles. This could indicate the quality effect was stronger in the relatively smaller-cap space.
- From Quintile 1 to Quintile 4, the performance had a monotonic decreasing relationship. The performance of Quintile 5 was similar to that of Quintile 3. Even though Quintile 5 outperformed Quintile 4, the evidence is still promising to indicate the existence of a quality factor premium in the Indian market.

Exhibit 7: Quintile Performance of S&P BSE LargeMidCap Stocks Sorted by Quality



All quintiles are hypothetical.
Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. The S&P BSE LargeMidCap was launched April 15, 2015. All data prior to index launch date is back-tested hypothetical data. 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.

The S&P BSE Quality Index is designed to measure the performance of the 30 highest quality companies in the S&P BSE LargeMidCap based on their quality scores, which follow a similar calculation as previously explained. Constituents are weighted by the product of their quality score and float-adjusted market capitalization. The index is subject to a security cap and a sector cap. The maximum weight of each security is the lower of 5% and 20 times its float-adjusted market capitalization weight in the eligible index universe, and each security's weight is floored at 0.05%. The maximum weight of any given common India industry classification structure macro-economic indicator is 30%.

Exhibit 8 shows the index characteristics as of March 31, 2022, and the five-year quarterly average. We can see that compared with the S&P BSE LargeMidCap, the S&P BSE Quality Index has:

- A lower weighted average market capitalization, indicating the index has a tilt toward smaller-cap companies in the S&P BSE LargeMidCap universe;
- A much higher ROE and ROA, indicating the index has a strong tilt toward more profitable companies, as this is one of the target metrics of the quality factor;
- A similar historical three-year EPS growth, indicating the index has a similar growth characteristic as the underlying universe; and
- Slightly lower valuation measures such as P/E, P/B, and P/S, and a higher dividend yield, indicating the index tends to tilt toward companies with lower valuations.

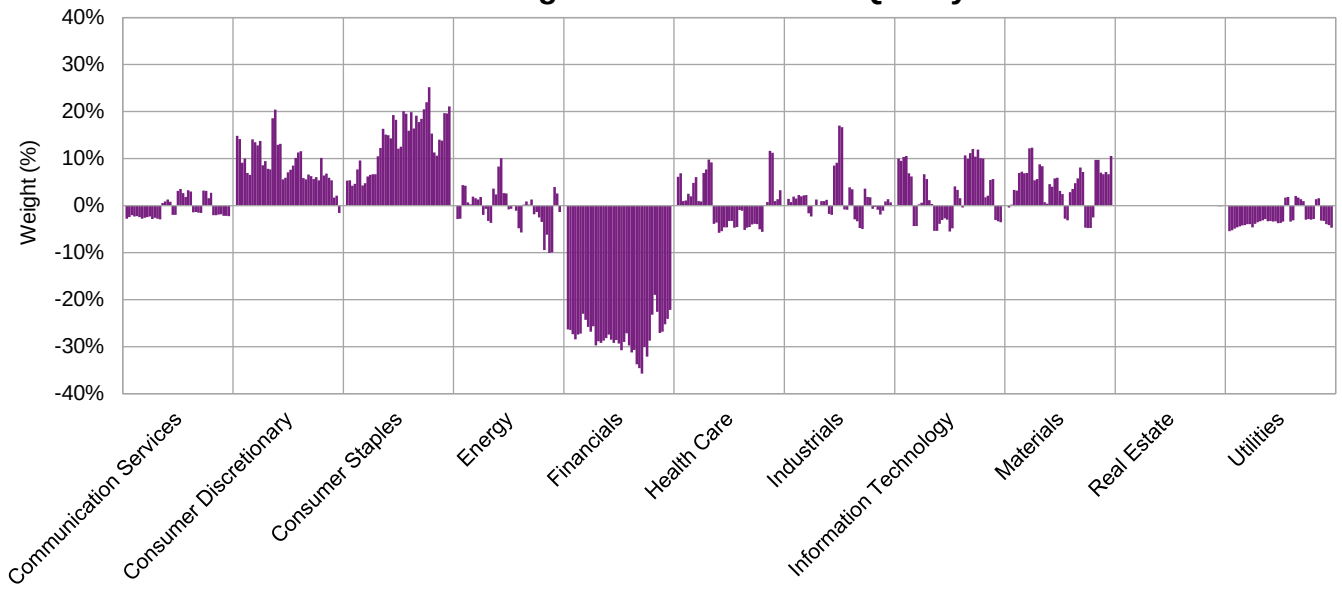
Exhibit 8: Characteristics of the S&P BSE Quality Index

Index	Market Capitalization (INR Millions)	ROE (%)	ROA (%)	Historical 3-Year EPS Growth (%)	Dividend Yield (%)	P/E	P/B	P/S
YTD as of March 31, 2022								
S&P BSE LargeMidCap	4,859,354	17.34	8.70	19.36	1.13	21.31	3.36	2.44
S&P BSE Quality Index	1,847,909	32.36	17.98	18.86	2.80	12.02	3.03	1.65
5-Year Quarterly Average								
S&P BSE LargeMidCap	3,000,821	17.78	9.05	13.02	1.16	21.95	2.84	1.92
S&P BSE Quality Index	1,430,210	31.15	17.39	14.21	1.76	23.69	4.98	1.89

Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2017, to March 31, 2022. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Exhibit 9 shows the historical relative overweight and underweight of GICS sectors in the S&P BSE Quality Index compared with the S&P BSE LargeMidCap. We can see that most of the time, the S&P BSE Quality Index underweighted Financials and Utilities, while overweighting Consumer Staples, Consumer Discretionary and Materials. The relative weight in Communication Services, Energy, Health Care, Industrials and Information Technology all seem to fluctuate throughout the history.

Exhibit 9: Relative GICS Sector Weights of the S&P BSE Quality Index



Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2012, to March 31, 2022. Chart is provided for illustrative purposes.

Value

The value factor is probably one of the most well-documented and studied factors in the investment industry. It refers to the idea that companies with lower valuations tend to generate higher expected returns relative to companies with higher valuations. The idea of value investing goes back to the book *Security Analysis* by Benjamin Graham in 1934. When designing the S&P BSE Value Index methodology, we combined multiple valuation metrics in order to provide a more robust strategy. The following three metrics are used in the S&P BSE Value Indices.

1. **Book-to-Price**: Calculated as a company's latest book value per share divided by price.
2. **Earnings-to-Price**: Calculated as a company's latest earnings per share divided by price.
3. **Sales-to-Price**: Calculated as a company's latest sales per share divided by price.

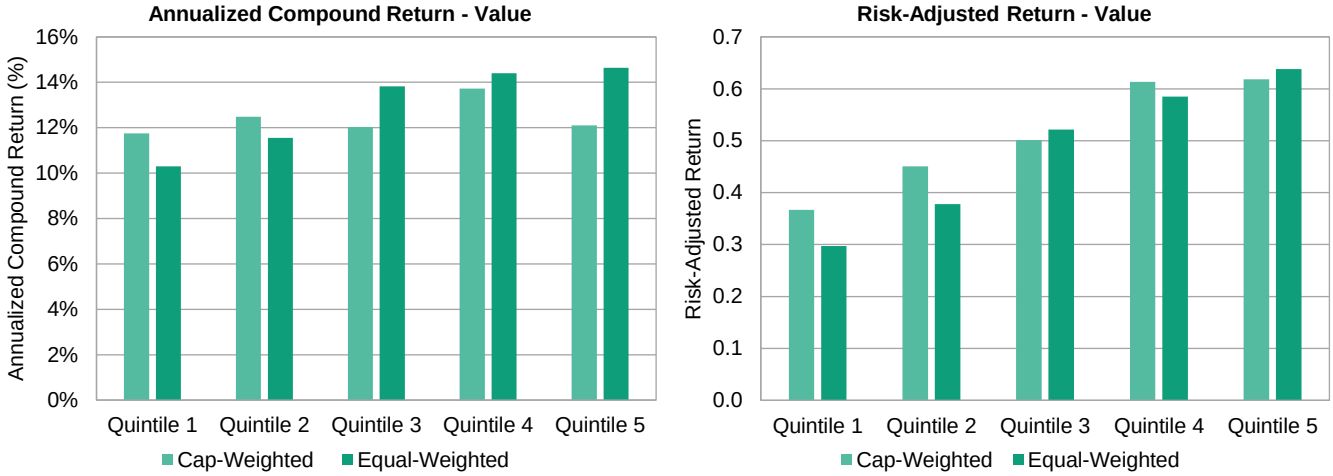
To evaluate value's effectiveness in the Indian market, we sorted stocks into quintiles based on the combination of these three metrics. Surprisingly, since 2005, we didn't see the value factor work in the Indian market. From Exhibit 10, we can observe the following.[6]

– Quintile 1 underperformed Quintile 5 on annualized compound return and risk-adjusted return bases. The spread between Quintile 1 and Quintile 5 was larger in the equal-weighted version than in the cap-weighted version.

[6] For the quintile performance of individual valuation metrics, please see Exhibit 22 in the Appendix.

– From Quintile 1 to Quintile 5, the performance almost had a monotonic increasing relationship. This was the opposite of what we expected to see.

Exhibit 10: Quintile Performance of S&P BSE LargeMidCap Stocks Sorted by Value



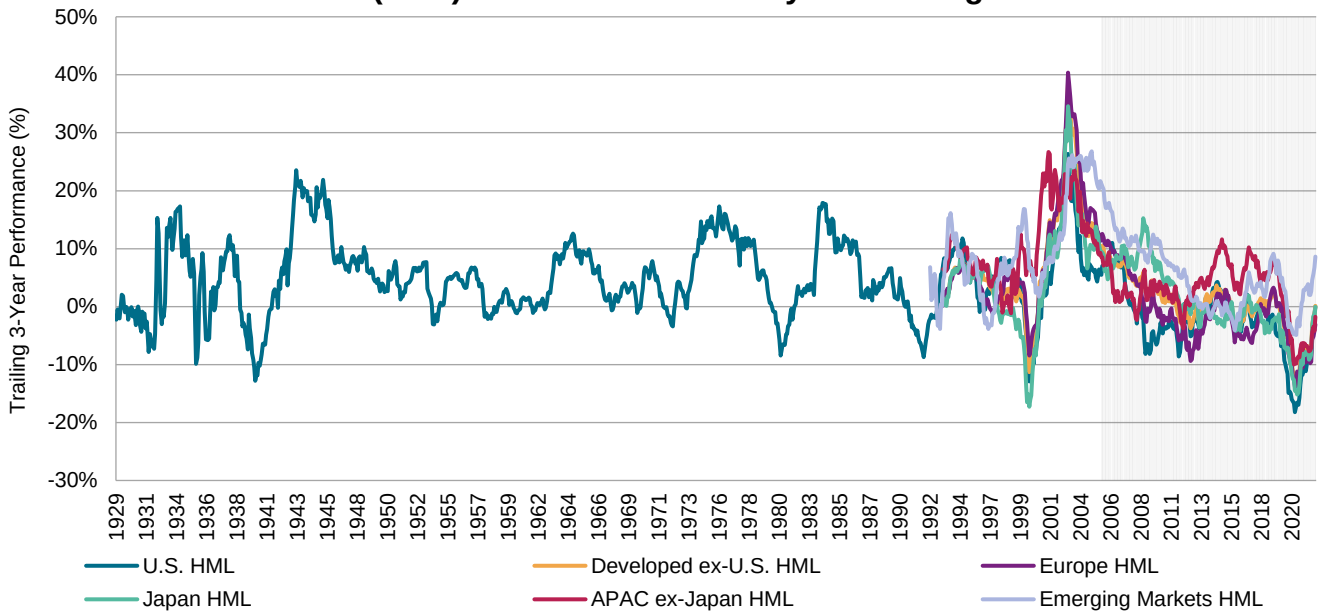
All quintiles are hypothetical.
Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept 30, 2005, to March 31, 2022. The S&P BSE LargeMidCap was launched April 15, 2015. All data prior to index launch date is back-tested hypothetical data. Past performance is no guarantee of future results. Charts 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.

We've tried to find some explanations behind this counterintuitive result. One of the reasons could be the sample period. The value factor went through one of the worst drawdown periods globally over the past two decades (see Exhibit 11). In the U.S., this is the largest value underperformance periods since 1926, so a sample period from 2005 could be a bad measurement of typical value factor performance. The existence of the value factor is supported not only by empirical data but also by a theoretical framework; academic researchers and industry practitioners have written extensively to defend value performance over the past decades.[7] A historical underperformance does not indicate that the value factor will continue to fail going forward. In addition, in the next section we will show that despite the underperformance, the value factor can still play an important role in constructing a multi-factor strategy.

[7] Fama, Eugene F and Kenneth R. French. "A five-factor asset pricing model." Journal of Financial Economics, Volume 116, Issue 1, 2015, Pages 1-22, ISSN 0304-405X.

Israel, Ronen, Kristoffer Laursen and Scott Richardson. "Is (Systematic) Value Investing Dead?" The Journal of Portfolio Management Dec 2020, 47 (2) 38-62; DOI: 10.3905/jpm.2020.1.194.

Exhibit 11: Value Factor (HML) Performance Globally in the Long Term



Source: Ken French Data Library. Data as of April 2022. HML (high minus low) is the value factor used in the Fama French three-factor model. For more details on HML calculation, please see https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_factors.html. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

The S&P BSE Enhanced Value Index is designed to measure the performance of the 30 companies in the S&P BSE LargeMidCap with the most attractive valuations based on their value scores, which follow a similar calculation as previously described. Constituents are weighted by the product of their value score and float-adjusted market capitalization. The index is subject to a security cap and a sector cap. The maximum weight of each security is the lower of 5% and 20 times its float-adjusted market capitalization weight in the eligible index universe, and each security's weight is floored at 0.05%. The maximum weight of any common India industry classification structure macro-economic indicator is 30%.

Exhibit 12 shows the index characteristics as of March 31, 2022, and the five-year quarterly average. We can see that compared with the S&P BSE LargeMidCap, the S&P BSE Enhanced Value Index has:

- A much lower weighted average market capitalization, indicating the index has a strong tilt toward smaller-cap companies in the S&P BSE LargeMidCap universe;
- A lower ROE and ROA, indicating the index tilts toward less profitable companies;
- A similar historical three-year EPS growth. Despite the fact that the five-year quarterly average looks slightly higher, the historical three-year EPS growth in the S&P BSE Enhanced Value Index is sufficiently volatile that we were unable to conclude any growth characteristics from the historical data; and
- Much lower valuation measures such as P/E, P/B, and P/S, and a higher dividend yield, showing that the index was targeting companies with lower valuations.

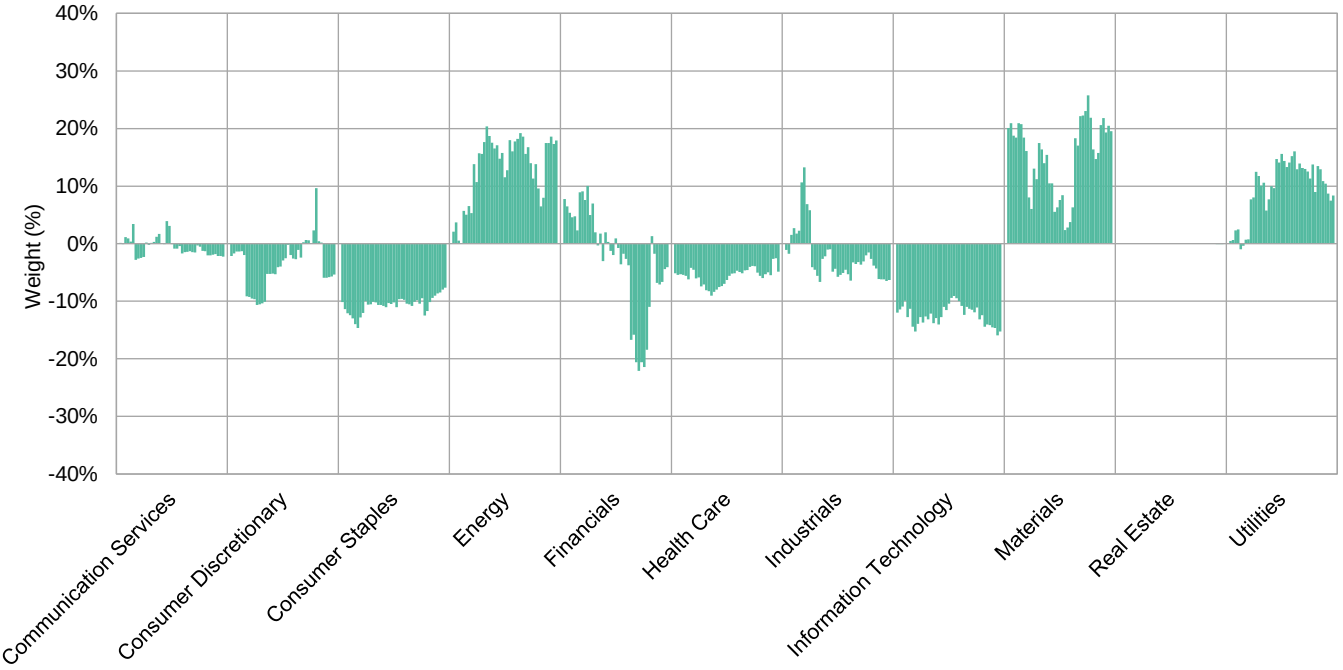
Exhibit 12: Characteristics of the S&P BSE Enhanced Value Index

Index	Market Capitalization (INR Millions)	ROE (%)	ROA (%)	Historical 3-Year EPS Growth (%)	Dividend Yield (%)	P/E	P/B	P/S
YTD as of March 31, 2022								
S&P BSE LargeMidCap	4,859,354	17.34	8.70	19.36	1.13	21.31	3.36	2.44
S&P BSE Enhanced Value Index	823,377	18.52	6.75	17.53	4.96	5.44	0.96	0.47
5-Year Quarterly Average								
S&P BSE LargeMidCap	3,000,821	17.78	9.05	13.02	1.16	21.95	2.84	1.92
S&P BSE Enhanced Value Index	729,233	10.62	4.70	15.80	2.84	8.82	0.90	0.42

Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2017, to March 31, 2022. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Exhibit 13 shows the historical relative overweight and underweight of GICS sectors in the S&P BSE Enhanced Value Index in relation to the S&P BSE LargeMidCap. We can see that most of the time, the S&P BSE Enhanced Value Index underweighted Consumer Staples, Consumer Discretionary, Health Care and Information Technology, while overweighting Energy, Materials and Utilities. The relative weights in Communication Services, Financials and Industrials are unclear.

Exhibit 13: Relative GICS Sector Weights of the S&P BSE Enhanced Value Index



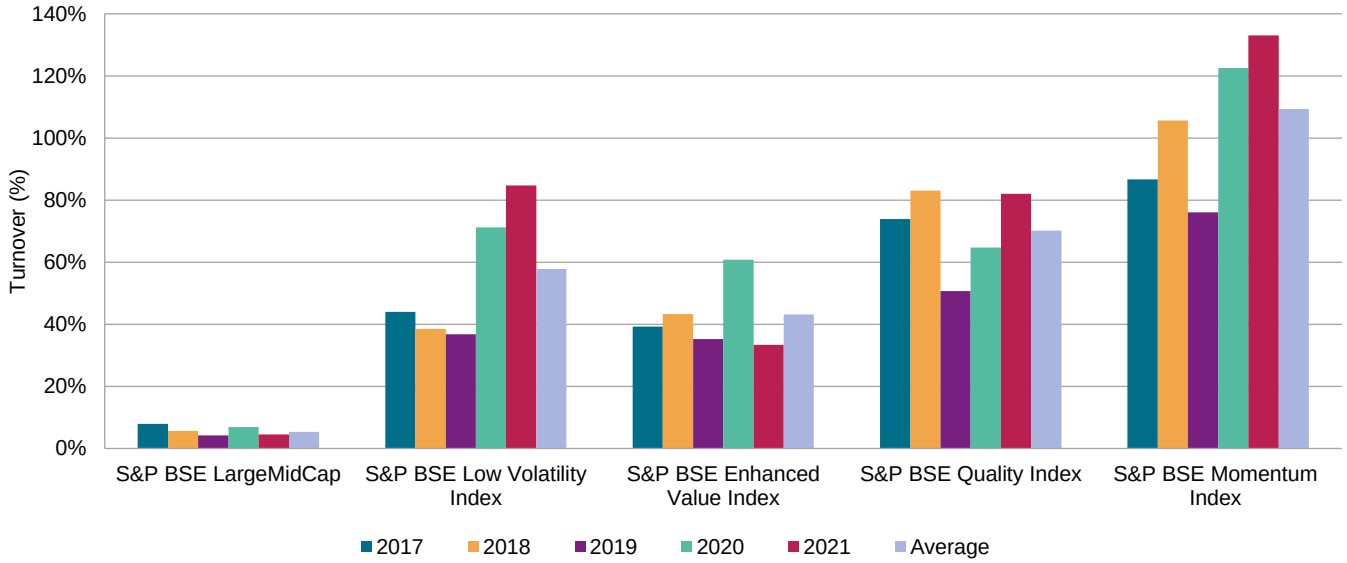
Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2012, to March 31, 2022. Chart is provided for illustrative purposes.

Combining Factor Indices

In the previous four sections, we studied the quintile performances and observed that, except for the value factor, they all had a positive spread between Quintile 1 and Quintile 5. We also introduced the corresponding S&P BSE Factor Indices. In this section, we will dive deep into the factor indices' historical performance.

One aspect of these factor indices that we have not discussed yet is the turnover. All four S&P BSE Factor Indices are rebalanced on a semiannual basis in March and September. From Exhibit 14, we can see that the S&P BSE Momentum Index had the highest turnover—with an average of 110% turnover per year. The S&P BSE Quality Index had the second-highest turnover, averaging 70%. The S&P BSE Enhanced Value Index and the S&P BSE Low Volatility Index both had about 50% average turnover per year.

Exhibit 14: Five-Year Annual Turnover of the S&P BSE Factor Indices



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 2016, to Dec. 31, 2021. Chart is provided for illustrative purposes.

For these factor indices, there are three potential applications. First, an investor who has a strong conviction for a factor and would like to actively pursue that factor premium can buy an investment product that tracks the factor index. This approach assumes that the investor already has a core allocation, which most of the time replicates the broad market index and is adding a factor product as a satellite to pursue the factor premium. Second, the factor indices' performance tends to have cycles, and it's possible that a savvy market participant can use investment products that track factor indices to time the market and rotate across factor exposures to outperform the market. However, market timing has proven challenging. Third, an investor could combine all four factors to form a fund-of-funds approach, which could serve as a substitute for a core equity solution. To study the last use case, we can equally weight

the four factor indices to form an index of indices (referred to as the Multi-Factor Index) and rebalance it on a monthly basis.

Exhibit 15 shows the performance of the indices over the full time period. From the back-tested data, we can observe the following.

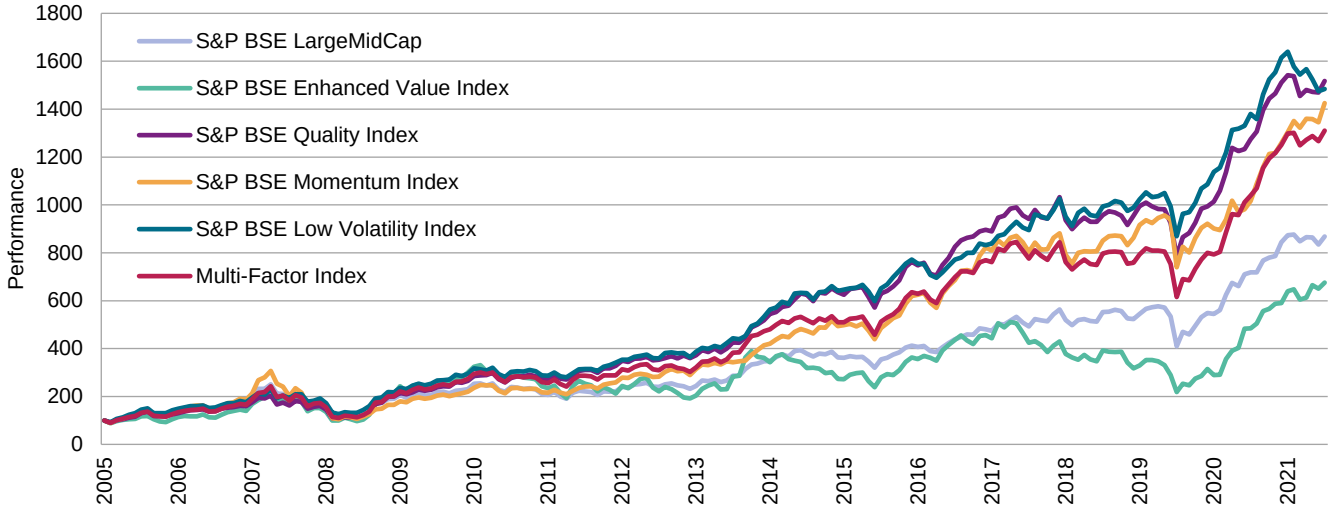
- The quality, low volatility and momentum Indices all outperformed the S&P BSE LargeMidCap since Sept. 30, 2005. The S&P BSE Enhanced Value Index underperformed the S&P BSE LargeMidCap by 1.72% per year based on annualized compound return, despite having a higher annualized average return.
- Among single-factor indices, the quality, low volatility and momentum indices all performed well. The S&P BSE Low Volatility Index generated the highest risk-adjusted return, while the S&P BSE Momentum Index had the highest information ratio against the S&P BSE LargeMidCap, closely followed by the S&P BSE Quality Index.
- The Multi-Factor Index generated the highest information ratio among all strategies. This is because even though the performance of the index of indices is not the highest, thanks to the diversification effect, combing the four factor indices resulted in a much lower tracking error against the S&P BSE LargeMidCap, which contributed to the higher information ratio.

Exhibit 15a: Back-Tested Historical Performance of S&P BSE Factor Indices

Characteristic	S&P BSE LargeMidCap	S&P BSE Enhanced Value Index	S&P BSE Quality Index	S&P BSE Momentum Index	S&P BSE Low Volatility Index	Multi-Factor Index
Annualized Average Return (%)	15.75	16.76	18.48	19.02	18.14	18.10
Annualized Compound Return (%)	13.99	12.27	17.92	17.47	17.76	16.87
Annualized Standard Deviation (%)	22.62	32.47	19.26	23.24	18.25	21.77
Risk-Adjusted Return	0.62	0.38	0.93	0.75	0.97	0.77
Relative to the S&P BSE LargeMidCap						
Premium (%)	-	1.02	2.74	3.27	2.39	2.35
Tracking Error (%)	-	15.97	8.47	9.87	9.21	5.18
Information Ratio	-	0.06	0.32	0.33	0.26	0.45

Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. Index performance based on total return. The S&P BSE LargeMidCap was launched April 15, 2015. The S&P BSE Enhanced Value Index, S&P BSE Quality Index, S&P BSE Momentum Index and S&P BSE Low Volatility Index were launched Dec. 3, 2015. All data prior to index launch date is back-tested hypothetical data. 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 15b: Back-Tested Historical Performance of S&P BSE Factor Indices



Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. Index performance based on total return. The S&P BSE LargeMidCap was launched April 15, 2015. The S&P BSE Enhanced Value Index, S&P BSE Quality Index, S&P BSE Momentum Index and S&P BSE Low Volatility Index were launched Dec. 3, 2015. All data prior to index launch date is back-tested hypothetical data. 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.

We can see the diversification effect in Exhibit 16, which shows the correlation among the factor indices. As mentioned previously, the S&P BSE Enhanced Value Index can still contribute to the overall strategy, because it's the only factor index that had a negative correlation with all the three other factor indices. Adding the S&P BSE Enhanced Value Index to the overall index of indices can complement the exposure from the three other factor indices. The Multi-Factor Index had the highest correlation with the underlying S&P BSE LargeMidCap.

Exhibit 16: Correlation among S&P BSE Factor Indices

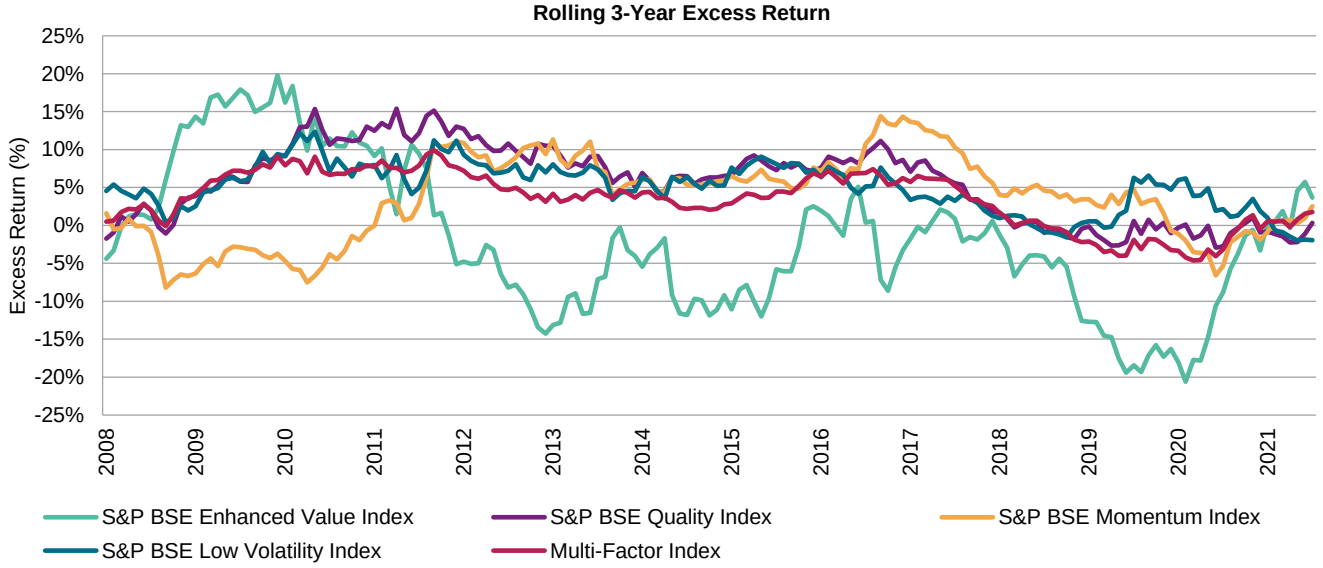
Correlation	S&P BSE Enhanced Value Index	S&P BSE Quality Index	S&P BSE Momentum Index	S&P BSE Low Volatility Index	Multi-Factor Index	S&P BSE LargeMidCap
S&P BSE Enhanced Value Index	1.00	-0.29	-0.30	-0.46	0.30	0.89
S&P BSE Quality Index	-	1.00	0.35	0.76	0.69	0.93
S&P BSE Momentum Index	-	-	1.00	0.28	0.51	0.91
S&P BSE Low Volatility Index	-	-	-	1.00	0.53	0.92
Multi-Factor Index	-	-	-	-	1.00	0.97
S&P BSE LargeMidCap	-	-	-	-	-	1.00

Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. Index performance based on total return. The S&P BSE LargeMidCap was launched April 15, 2015. The S&P BSE Enhanced Value Index, S&P BSE Quality Index, S&P BSE Momentum Index and S&P BSE Low Volatility Index were launched Dec. 3, 2015. All data prior to index launch date is back-tested hypothetical data. 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 17 shows the rolling three-year excess return and tracking error of the five factor indices against the S&P BSE LargeMidCap. The rolling three-year performance can smooth out the timing effect in the sample period. It offers us 163 observations of a three-year back-test window on how the strategy performed. Those 163 observations are equivalent to an investor allocating to an investment product tracking the underlying index at each month-end in the past 163 months since Sept. 30, 2005 and holding each investment for three years. What do the results of those 163 investments look like?

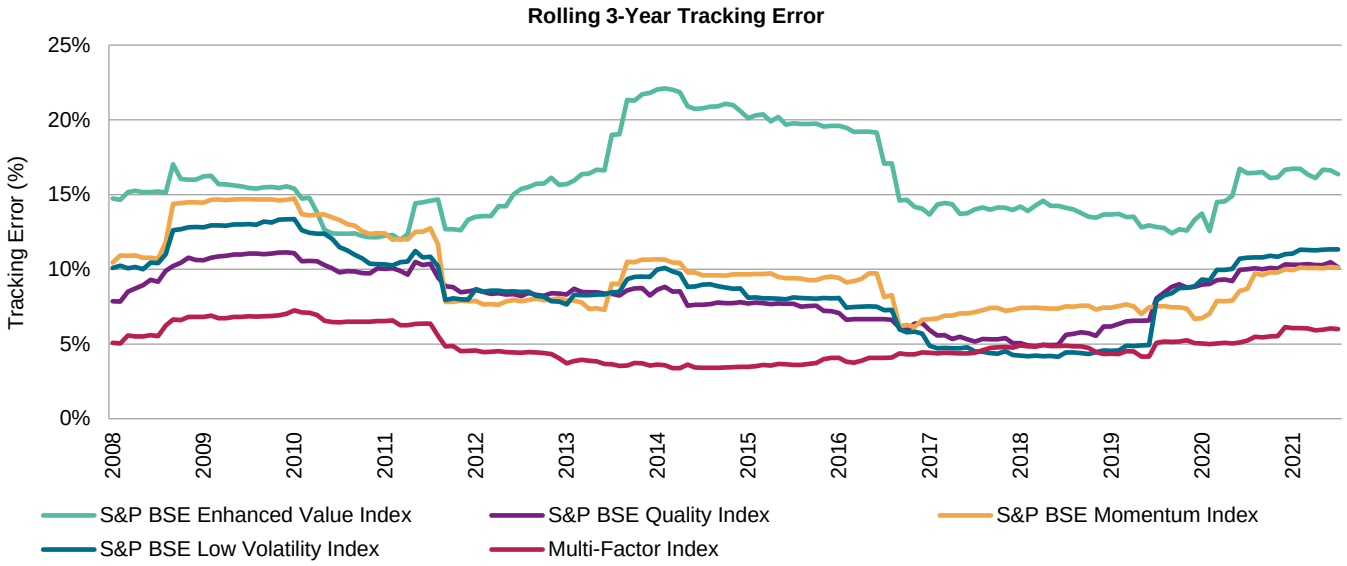
- More than 70% of the time, the momentum, quality and low volatility indices outperformed the S&P BSE LargeMidCap. The S&P BSE Low Volatility Index had the highest likelihood of beating the S&P BSE LargeMidCap over the history in a three-year back-test window. In over 90% of the three-year back-tested periods, the S&P BSE Low Volatility Index outperformed. The S&P BSE Quality Index generated the highest average rolling three-year excess returns.
- The S&P BSE Enhanced Value Index underperformed the S&P BSE LargeMidCap more than one-half of the time, and it had the highest rolling three-year tracking error.
- The Multi-Factor Index outperformed the S&P BSE LargeMidCap 82% of the time in the three-year back-tested windows, with an average rolling three-year excess return of 3.48%. More importantly, the rolling three-year tracking error of the Multi-Factor Index was relatively stable, at about 5% against the S&P BSE LargeMidCap.

Exhibit 17a: Rolling Three-Year Performance of the S&P BSE Factor Indices



Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. Index performance based on total return. The S&P BSE LargeMidCap was launched April 15, 2015. The S&P BSE Enhanced Value Index, S&P BSE Quality Index, S&P BSE Momentum Index and S&P BSE Low Volatility Index were launched Dec. 3, 2015. All data prior to index launch date is back-tested hypothetical data. Past performance is no guarantee of future results. Charts and table 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 17b: Rolling Three-Year Performance of the S&P BSE Factor Indices



Characteristic	S&P BSE Enhanced Value Index	S&P BSE Quality Index	S&P BSE Momentum Index	S&P BSE Low Volatility Index	Multi-Factor Index
Number of Observations	163	163	163	163	163
Number of Positive Excess Returns	62	128	114	149	133
% of Positive Excess Returns	38	79	70	91	82
Average Rolling 3-Year Excess Returns (%)	-1.81	5.61	3.54	5.06	3.48

Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. Index performance based on total return. The S&P BSE LargeMidCap was launched April 15, 2015. The S&P BSE Enhanced Value Index, S&P BSE Quality Index, S&P BSE Momentum Index and S&P BSE Low Volatility Index were launched Dec. 3, 2015. All data prior to index launch date is back-tested hypothetical data. Past performance is no guarantee of future results. Charts and table 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.

Let's take a look at the factor indices' performance under different market environments. In Exhibit 18, we compare the factor indices during the three largest market drawdowns in India. We also compare how the indices performed when the underlying S&P BSE LargeMidCap went up or down.

- The S&P BSE Quality Index, S&P BSE Low Volatility Index and Multi-Factor Index all had better drawdown performances than the S&P BSE LargeMidCap, while the S&P BSE Enhanced Value Index had the worst drawdown performance.
- The S&P BSE Quality Index and S&P BSE Low Volatility Index are defensive strategies, and they outperformed the market when the market was down. For example, 82% of the time when the S&P BSE LargeMidCap generated a negative return, the S&P BSE Low Volatility Index outperformed. On the other hand, the quality and low volatility indices tended to underperform when the market was up.

– The Multi-Factor Index generated the most balanced performance. It had better drawdown performances than the S&P BSE LargeMidCap and outperformed the market during both up and down environments.

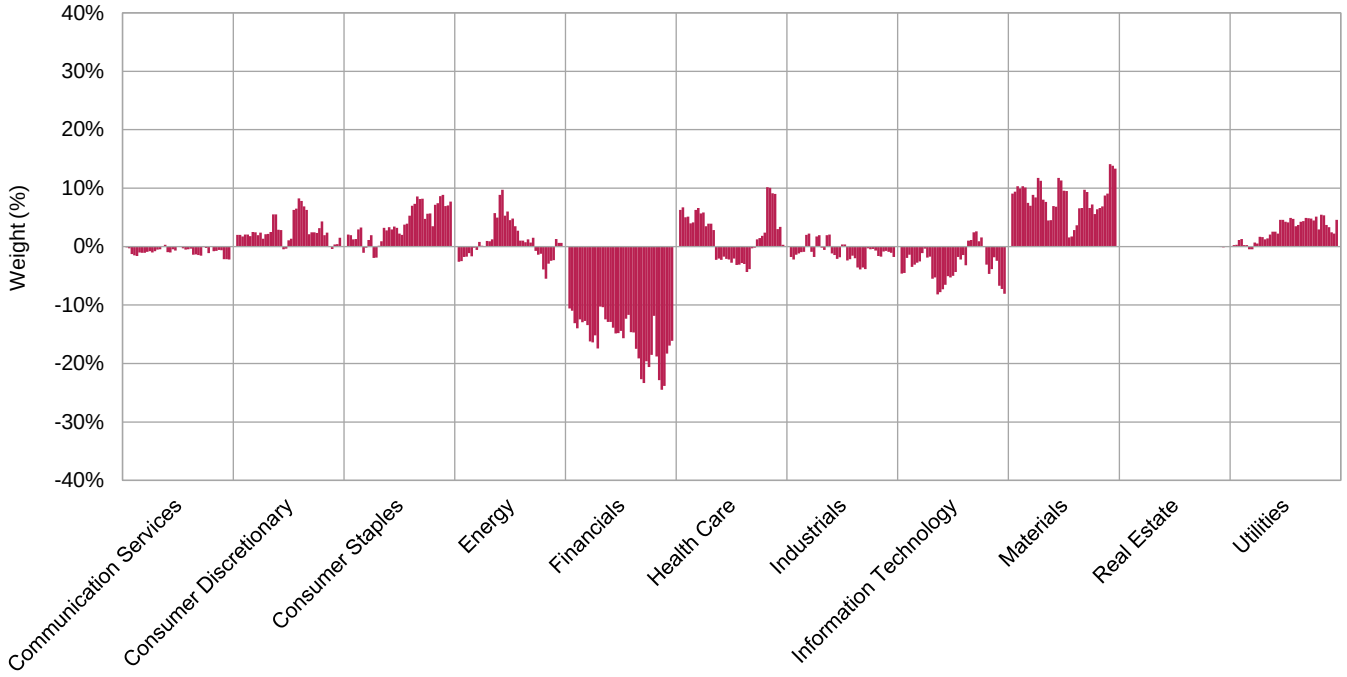
Exhibit 18: S&P BSE Factor Indices Performance under Different Market Environments

Period	S&P BSE LargeMidCap	S&P BSE Enhanced Value Index	S&P BSE Quality Index	S&P BSE Momentum Index	S&P BSE Low Volatility Index	Multi-Factor Index
Performance during Largest Three Drawdowns in Indian Market (%)						
Dec. 31, 2007-Feb. 28, 2009	-58.58	-58.71	-47.30	-65.74	-45.22	-54.37
Dec. 31, 2019-March 31, 2020	-28.88	-57.27	-23.93	-22.70	-17.32	-27.16
Dec. 31, 2010-Dec. 31, 2011	-25.27	-42.14	-14.85	-15.19	-13.86	-19.92
Hit Rate (%)						
All Months	-	47	56	58	54	57
Up Months	-	61	42	56	36	55
Down Months	-	26	78	61	82	59
Monthly Excess Return (%)						
All Months	-	0.08	0.23	0.27	0.20	0.20
Up Months	-	1.32	-0.57	0.18	-0.74	0.05
Down Months	-	-1.90	1.51	0.42	1.71	0.43
Capture Ratio (%)						
Upside	-	127	89	104	85	101
Downside	-	142	67	91	62	90

Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. Index performance based on total return. The S&P BSE LargeMidCap was launched April 15, 2015. The S&P BSE Enhanced Value Index, S&P BSE Quality Index, S&P BSE Momentum Index and S&P BSE Low Volatility Index were launched Dec. 3, 2015. All data prior to index launch date is back-tested hypothetical data. 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.

Lastly, looking at the GICS sector breakdown for the Multi-Factor Index (see Exhibit 19), we can see that compared with the single-factor indices, the sector allocation of the Multi-Factor Index was more balanced, with a much lower deviation from the S&P BSE LargeMidCap. Some notable deviations include underweight in Financials and overweight in Materials, Consumer Staples and Consumer Discretionary.

Exhibit 19: Relative GICS Sector Weights of the Multi-Factor Index



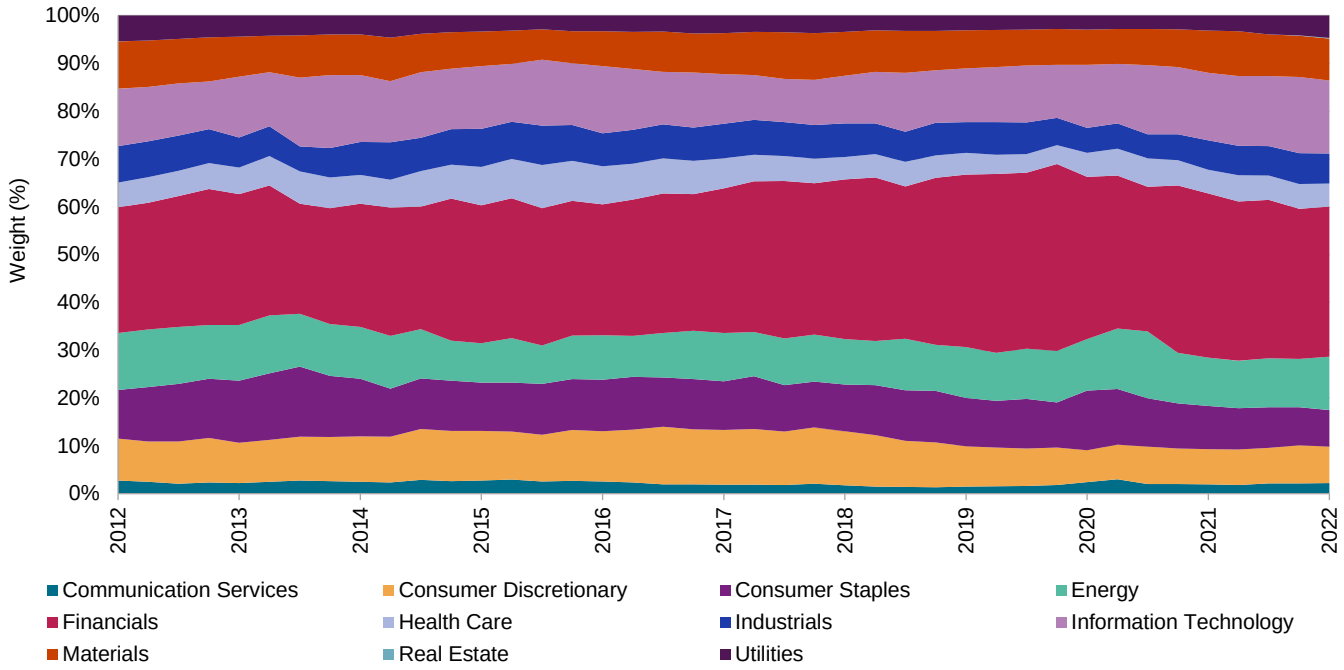
Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2012, to March 31, 2022. Chart is provided for illustrative purposes.

Conclusion

In this paper, we documented the performances of four common factors in the Indian market: low volatility, momentum, quality and value. We found that the low volatility, momentum and quality factors have worked well in the Indian market over the 17 years since 2005, while the value factor underperformed the market. The value factor had negative correlations against the other three factors. Combining the four factors to form a multi-factor strategy could serve as a substitute for a traditional equity allocation. Over the back-tested period, the multi-factor strategy delivered over 2% per year excess return, with about 5% tracking error, and demonstrated a resilient performance across different market environments.

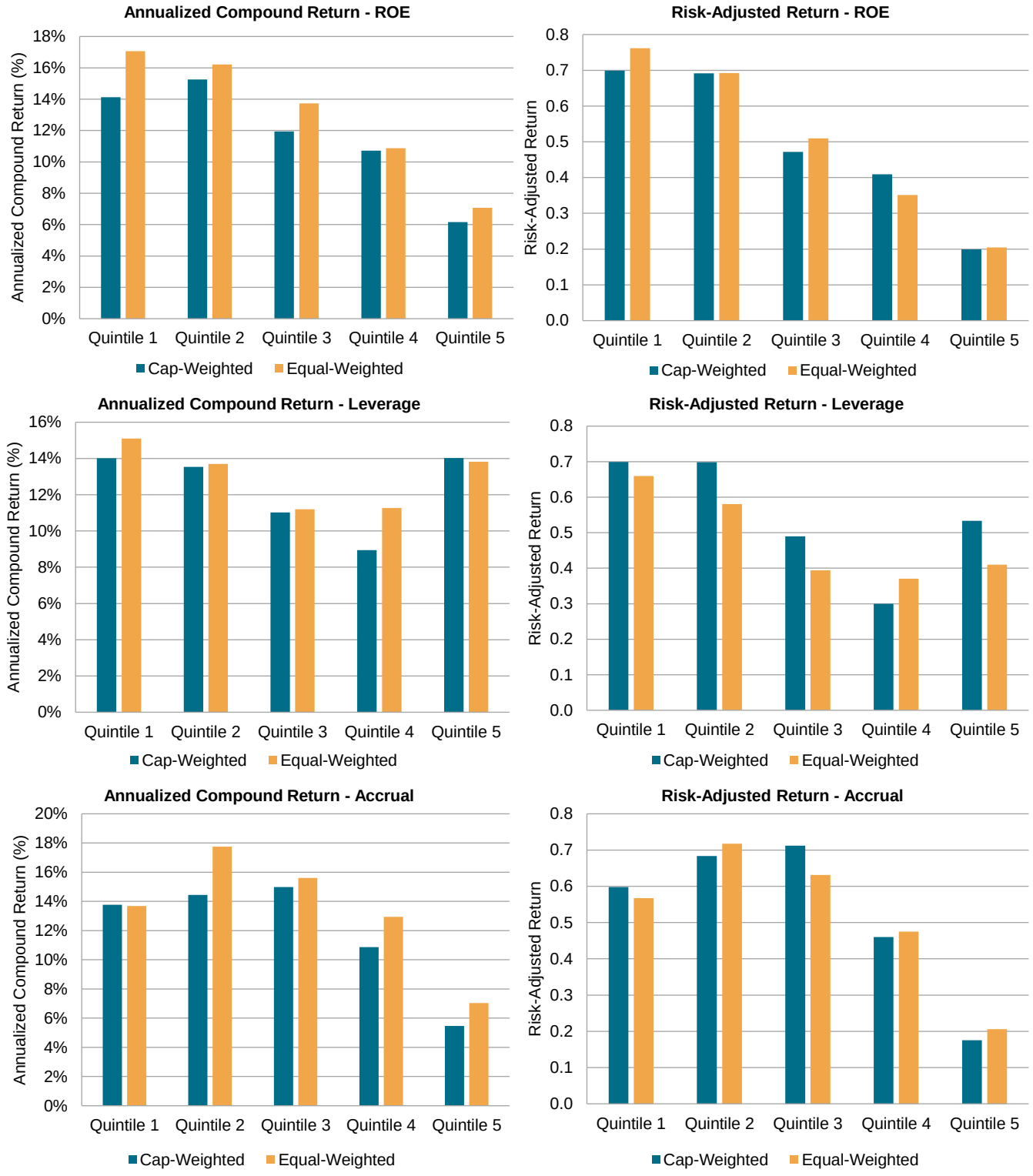
Appendix

Exhibit 20: GICS Sector Breakdown of S&P BSE LargeMidCap



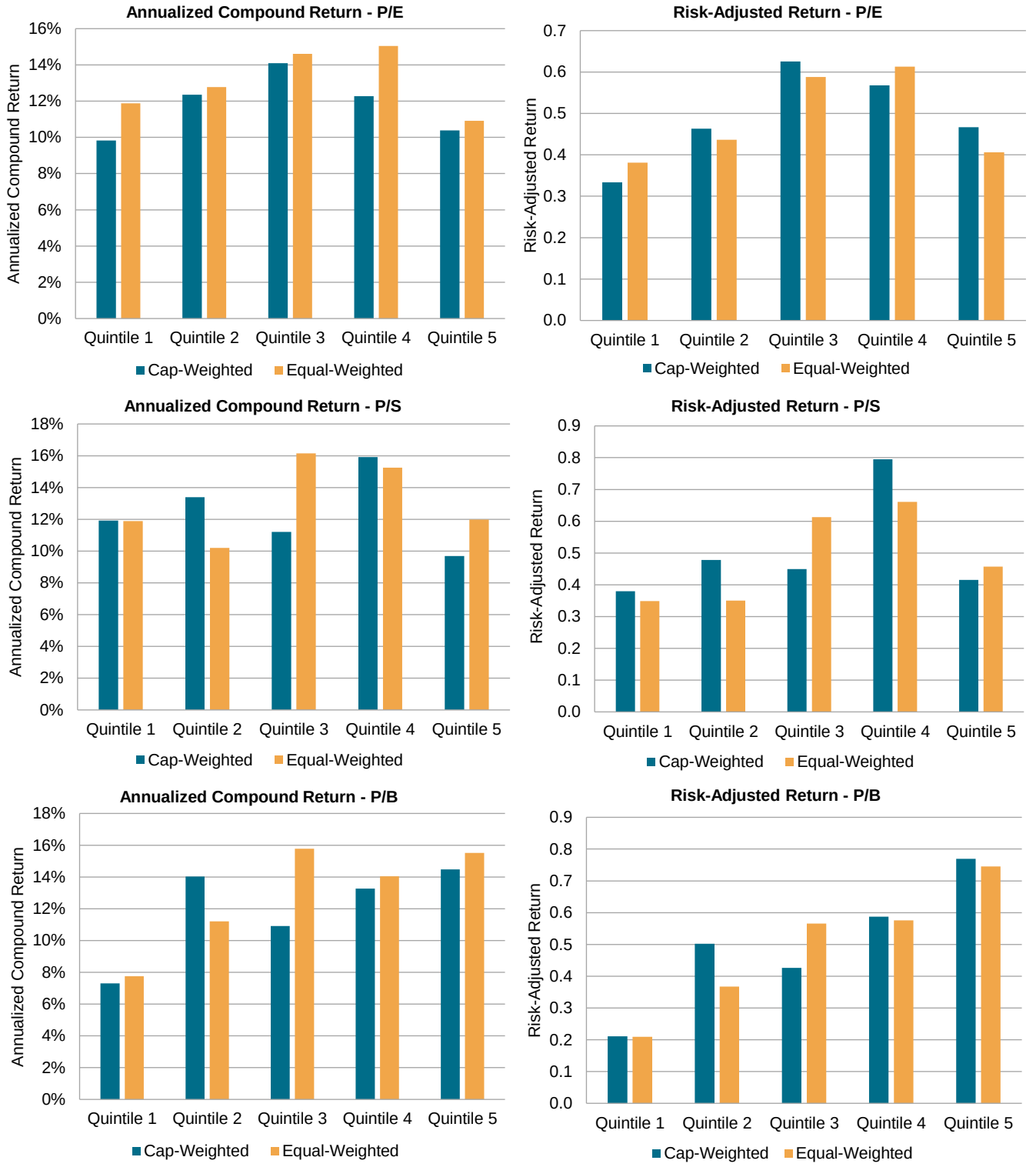
Source: S&P Dow Jones Indices LLC, FactSet. Data as of March 31, 2022. Chart is provided for illustrative purposes.

Exhibit 21: Quintile Performance of Individual Quality Metrics



Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. The S&P BSE LargeMidCap was launched April 15, 2015. All data prior to index launch date is back-tested hypothetical data. 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.

Exhibit 22: Quintile Performance of Individual Valuation Metrics



Source: S&P Dow Jones Indices LLC, FactSet. Data from Sept. 30, 2005, to March 31, 2022. The S&P BSE LargeMidCap was launched April 15, 2015. All data prior to index launch date is back-tested hypothetical data. 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.

Exhibit 23: Performance Metrics

Period	S&P BSE LargeMidCap	S&P BSE Enhanced Value Index	S&P BSE Quality Index	S&P BSE Momentum Index	S&P BSE Low Volatility Index	Multi-Factor Index
Return (%)						
YTD	0.33	10.27	2.57	4.76	-5.34	3.03
1-Year	20.87	39.37	19.13	40.25	7.51	26.14
3-Year	16.24	19.93	16.59	18.77	14.30	18.01
5-Year	14.63	9.12	12.96	15.73	13.96	13.41
10-Year	14.65	10.30	17.18	19.41	16.77	16.42
15-Year	12.57	12.73	17.30	16.28	16.27	16.20
Standard Deviation (%)						
1-Year	11.72	16.57	10.23	10.44	12.10	10.29
3-Year	21.47	31.20	15.70	18.66	14.50	18.17
5-Year	18.64	28.32	14.25	17.38	13.43	16.74
10-Year	16.67	28.39	13.80	16.04	12.73	15.90
15-Year	22.66	33.11	18.93	22.97	17.56	21.59
Risk-Adjusted Return						
1-Year	1.78	2.38	1.87	3.86	0.62	2.54
3-Year	0.76	0.64	1.06	1.01	0.99	0.99
5-Year	0.78	0.32	0.91	0.91	1.04	0.80
10-Year	0.88	0.36	1.25	1.21	1.32	1.03
15-Year	0.55	0.38	0.91	0.71	0.93	0.75

Source: S&P Dow Jones Indices LLC, FactSet. Data from March 31, 2007, to March 31, 2022. Index performance based on total return. The S&P BSE LargeMidCap was launched April 15, 2015. The S&P BSE Enhanced Value Index, S&P BSE Quality Index, S&P BSE Momentum Index and S&P BSE Low Volatility Index were launched Dec. 3, 2015. All data prior to index launch date is back-tested hypothetical data. 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.

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S&P Dow Jones Indices LLC. S&P BSE Factor Indices Methodology.

Performance Disclosure/Back-Tested Data

The S&P BSE LargeMidCap was launched April 15, 2015. The S&P BSE Enhanced Value Index, S&P BSE Quality Index, S&P BSE Momentum Index and S&P BSE Low Volatility Index were launched December 3, 2015. 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 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.

Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices 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).

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