CONTRIBUTORS

Akash Jain
Associate Director
Global Research & Design
akash.jain@spglobal.com

Priscilla Luk
Managing Director
Global Research & Design
priscilla.luk@spglobal.com

Factor Performance Across Different Macroeconomic Regimes in India

EXECUTIVE SUMMARY

In response to increasing interest in smart beta strategies in the Indian equity market, this paper examines the performance of six factors—value, momentum, quality, low volatility, dividend, and size (small cap)—across different business cycles, market cycles, and investor sentiment regimes in India from October 2005 to June 2017.

- Over the period studied, all six factor portfolios outperformed the S&P BSE LargeMidCap. The low volatility and quality factors showed reduced return volatility and the rest of the factors had more volatile return.
- Quality and low volatility factors tended to be more defensive, while the dividend, value, and size factors displayed procyclical characteristics across different macroeconomic regimes.
- Single-factor portfolios could potentially act as tools for implementation of active views, or alternatively they could be blended in multifactor porfolios that aim to deliver smoother excess return across business and market cycles.

Exhibit 1: Factor Performance Across Different Business Cycles, Market Cycles, and Investor Sentiment Regimes in India

CATEGORY	PHASE	VALUE	MOMENTUM	QUALITY	LOW VOLATILITY	DIVIDEND	SIZE (SMALL CAP)
Business Cycles	Expansion	▲	▲	▲	▲	▲	▲
	Contraction	▼	▲	▲	▲		▼
Market Cycles	Bullish	▼	▲			▼	▼
	Bearish	▼	▲	▲	▲	▼	▼
	Recovery Period	▲	▲	▲	▼	▲	▲
Investor Sentiment	Bullish	▲	▲	▲	▼	▲	▲
	Neutral		▲	▲	▲	▲	▲
	Bearish		▼	▲			▼

Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Index performance based on total return in INR. Past performance is no guarantee of future results. Table is provided for illustrative purposes. Note: Yellow, upward triangles represent favorable performance (positive excess return with outperformance probability not lower than 50%), while blue, downward triangles represent unfavorable performance (negative excess return with outperformance probability not higher than 50%) versus the S&P BSE LargeMidCap. The two factors with the highest information ratio in each of the market cycle phases are circled.

OBJECTIVE AND METHODOLOGY

In the paper, we compared sector composition of factor portfolios and examined performance characteristics of factors in different macroeconomic regimes.

In the paper Factor Risk Premia in the Indian Market, we examined four factors—low volatility, momentum, quality, and value—in the Indian market based on quintile analysis and concluded that, historically, the low volatility and quality delivered factor risk premium. In this paper, we compared sector composition of factor portfolios and examined performance characteristics of factors in different macroeconomic regimes, including market cycles, business cycles, and investor sentiment regimes in India. Other than the low volatility, momentum, value, and quality factors that we examined before, we included two other commonly discussed factors, dividend and size (small cap), in this analysis.

The analyses of low volatility, momentum, value, and quality are based on the S&P BSE Single-Factor Indices, while the studies on dividend and size are based on hypothetical portfolios that follow a rule-based stock selection and weighting methodology, as shown in Exhibit 2. Apart from the size portfolio, in which all S&P BSE LargeMidCap[1] members are equally weighted, portfolios for all other factors consist of the 30 stocks with the highest factor scores drawn from the S&P BSE LargeMidCap universe after applying liquidity criteria and buffer rules. All portfolios are semiannually rebalanced, effective at the open of the Monday following the third Friday in March and September.

[1] The S&P BSE LargeMidCap is designed to represent 85% of the total market cap of the S&P BSE AllCap. The index is a combination of the S&P BSE LargeCap and the S&P BSE MidCap, and it is designed to represent the performance of the large- and mid-cap segments of India's stock market. For further details please refer the link - http://www.asiaindex.co.in/indices/equity/sp-bse-largemidcap

Exhibit 2: Overview of the S&P BSE Single-Factor Indices and Hypothetical Portfolios

FACTOR	INDEX	DESCRIPTION
Low Volatility	S&P BSE Low Volatility Index	The 30 least volatile companies from the S&P BSE LargeMidCap, weighted by inverse proportion to their volatility and subject to a stock capping of 5%. Volatility is defined as the standard deviation of a security's daily price return over the one-year period.
Momentum	S&P BSE Momentum Index	The 30 companies from the S&P BSE LargeMidCap with the highest momentum scores. Constituents are weighted by the product of momentum score and float-adjusted market capitalization (FMC) and subject to stock capping of a minimum of 5% or three times the FMC weight in the eligible index universe. Momentum score is computed as 12-month price change, excluding the most recent month, divided by standard deviation of price return for the same period.
Value	S&P BSE Enhanced Value Index	The 30 companies from the S&P BSE LargeMidCap with the highest value scores, weighted by the product of value score and FMC and subject to sector capping of 30% and stock capping of a minimum of 5% or 20 times the FMC weight in the eligible index universe. Value score is calculated based on book-to-price, earnings-to-price, and sales-to-price ratios.
Quality	S&P BSE Quality Index	The 30 companies from the S&P BSE LargeMidCap with the highest quality scores, weighted by the product of quality score and FMC and subject to sector capping of 30% and stock capping of a minimum of 5% or 20 times the FMC weight in the eligible index universe. Quality score is calculated based on return on equity, accruals ratio, and financial leverage ratio.
Dividend[2]	S&P BSE Dividend Portfolio	The 30 companies from S&P BSE LargeMidCap with the highest dividend yield, weighted in relative proportions to their dividend yields subject to sector capping of 30% and stock capping of 5%.
Size	S&P BSE Equal-Weighted Portfolio	All constituents from S&P BSE LargeMidCap weighted equally constitute the portfolio.

The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data as of October 2017. Table is provided for illustrative purposes.

RISK/RETURN OVER THE LONG TERM

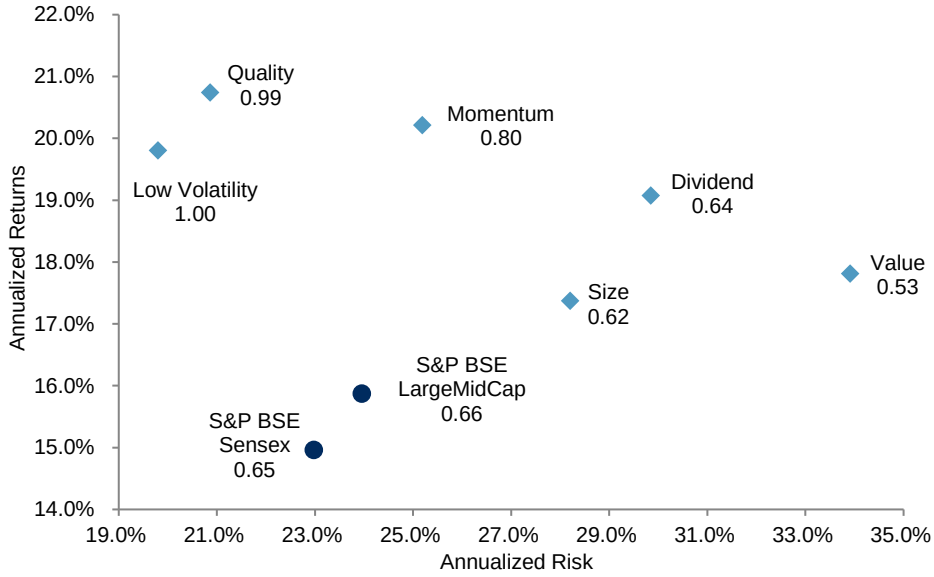
Among the six factors, low volatility and quality recorded lower return volatility than the benchmark and had the highest risk-adjusted return…

Over the period from October 2005 to June 2017, portfolios for all factors, (low volatility, momentum, value, quality, dividend, and size) outperformed the S&P BSE LargeMidCap (see Exhibit 3). However, only low volatility, quality, and momentum delivered better risk-adjusted return (return per unit of risk) than the S&P BSE LargeMidCap. Among the six factors, low volatility and quality recorded lower return volatility than the benchmark and had the highest risk-adjusted return, while value, dividend, and size showed much higher return volatility than the benchmark.

[2] The eligibility criteria for the dividend portfolio require that each eligible stock maintains a ratio of dividend-per-share to par value-per-share above 10% for two consecutive years.

…while value, dividend, and size showed much higher return volatility than the benchmark.

Exhibit 3: Risk/Return Characteristics and Risk-Adjusted Returns of Single-Factor Indices and Portfolios



The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Index performance based on total return in INR. 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. Note: Data points below each factor represent risk-adjusted return.

SECTOR COMPOSITION

Sector bias typically exists in factor portfolios, and the sector concentration in the factor portfolios could differ substantially from market-cap-weighted benchmarks. Historically, based on the Hirschman-Herfindhl Index (HHI),[3] size portfolio tended to be the most diverse in terms of sectors, while the value and dividend portfolios had the most concentrated sector exposures.

Value and dividend were overweight in basic materials…

Exhibit 4 highlights the two top and bottom most overweight and underweight sectors, on average, for each factor over the period from March 2006 to March 2017. Value and dividend were overweight in basic materials, whereas momentum, quality, and size were overweight in consumer discretionary goods & services. The finance sector was most underrepresented in the momentum, quality, low volatility, and size portfolios, and the information technology sector was underweight in value, dividend, and size portfolios. The differentials on sector exposure across factors were strongly associated with the unique cyclical nature of the various factor performances.

[3] The HHI value for the sector analysis is computed as the sum of the square of the weight of each sector in the portfolio, averaged over each semiannually rebalanced portfolio from March 2006 to March 2017. A higher HHI value indicates a more concentrated portfolio while a lower HHI indicates a more diversified portfolio. Sector weight is based on BSE sector definition.

…whereas momentum, quality, and size were overweight in consumer discretionary goods & services.

Exhibit 4: Sector Bias Versus the S&P BSE LargeMidCap and the HHI for Each Factor

FACTOR	Most Overweight Sectors and Weight Differential Versus Benchmark	Most Underweight Sectors and Weight Differential Versus Benchmark	HHI
Value	Basic Materials, 13.7%	Information Technology, -10.9%	1,961
	Energy, 7.7%	Fast Moving Consumer Goods, -8.1%	
Momentum	Healthcare, 6.2%	Finance, -6.0%	1,192
	Consumer Discretionary Goods & Services, 5.4%	Energy, -5.8%	
Quality	Fast Moving Consumer Goods, 9.6%	Finance, -22.9%	1,384
	Consumer Discretionary Goods & Services, 9.0%	Utilities, -4.0%	
Low Volatility	Healthcare, 11.1%	Finance, -16.9%	1,184
	Fast Moving Consumer Goods, 6.8%	Industrials, -5.2%	
Dividend	Basic Materials, 10.8%	Information Technology, -7.0%	1,575
	Energy, 4.2%	Healthcare, -4.7%	
Size	Utilities, 4.4%	Information Technology, -6.1%	1,178
	Consumer Discretionary Goods & Services, 4.2%	Finance, -5.2%	
Benchmark	-	-	1,313

The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from March 2006 to March 2017. Figures in the table are average figures for the semiannually rebalanced portfolios. 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.

FACTOR PERFORMANCE IN DIFFERENT MACROECONOMIC REGIMES

Macroeconomic and market events affected each factor in different ways. Factor returns tended to exhibit cyclicality, with periods of outperformance and underperformance in different phases of the cycles. Understanding the cyclical characteristic of factors across different macroeconomic regimes is vital for implementation of factor strategies. In this section, we analyzed three macroeconomic regimes—market cycles, business cycles, and investor sentiment regimes—between October 2005 and June 2017. The three different regimes were defined based on various proxy indicators, as shown in Exhibit 5.

Factor returns tended to exhibit cyclicality, with periods of outperformance and underperformance in different phases of the cycles.

Exhibit 5: Macroeconomic Regimes and Inflection Points

REGIME	PROXY INDICATOR
Market Cycles	S&P BSE SENSEX Price Return[4]
Business Cycles	Organisation for Economic Co-operation and Development (OECD) Composite Leading Indicator (CLI) for India
Investor Sentiment Regime	22-day realized volatility of the S&P BSE SENSEX Price Return

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

[4] A bearish phase is defined as a period during which the S&P BSE SENSEX goes from peak to trough. A recovery phase is defined as the 12-month period after the S&P BSE SENSEX trough. A bullish phase is defined as a period from the end of the recovery phase to the next S&P BSE SENSEX peak.

FACTOR PERFORMANCE ACROSS BUSINESS CYCLES

The value, dividend, and size factors exhibited strong procyclical characteristics.

In our analysis, a business cycle is defined by the monthly movement of the OECD CLI for India. A rising CLI signals business cycle signals expansion and a falling CLI signals business cycle contraction. From October 2005 to June 2017, the Indian economy experienced three economic expansions and two contraction phases.

We measured the performance of each factor during business expansion and contraction periods and the result showed that, historically, the value, dividend, and size factors exhibited strong procyclical characteristics. They had a tendency to outperform the benchmark during business expansion phases and the opposite held true when the business cycle contracted. In contrast, low volatility, quality, and momentum outperformed the benchmark in both cycle phases but had a higher tendency to outperform during business cycle contraction. Exhibit 6 summarizes the excess return and tendency of outperformance for each factor for the overall period studied, while Exhibit 7 shows the factors with the highest outperformance versus the benchmark during each of the expansion and contraction phases.

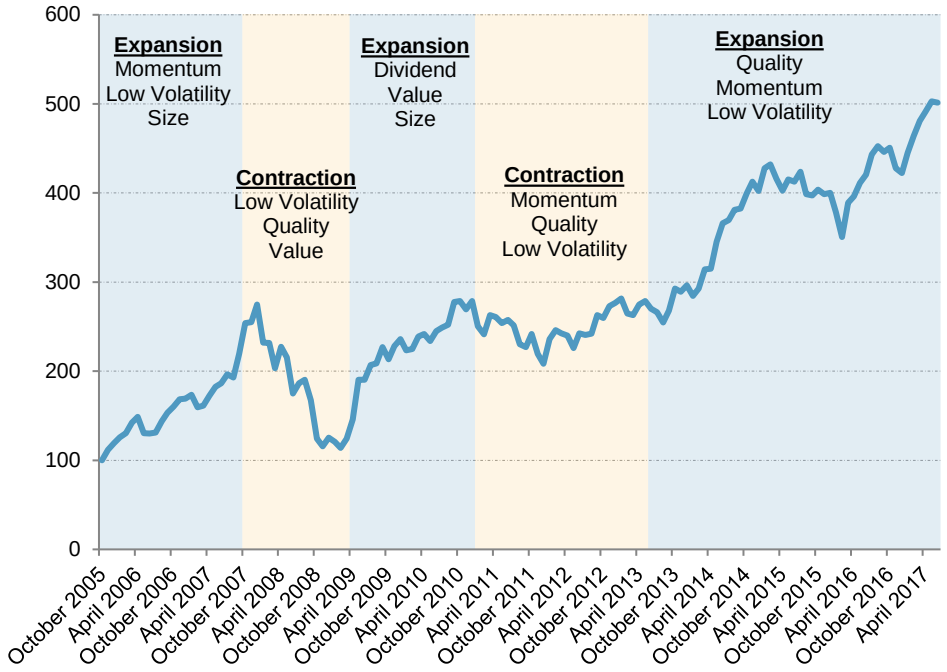
Low volatility, quality, and momentum outperformed the benchmark in both cycle phases but had a higher tendency to outperform during business cycle contraction.

Exhibit 6: Factor Performance in Each Business Cycle Phase

BUSINESS CYCLE PHASE	VALUE	MOMENTUM	QUALITY	LOW-VOLATILITY	DIVIDEND	SIZE
AVERAGE EXCESS RETURN (VERSUS THE S&P BSE LARGEMIDCAP, ANNUALIZED, %)						
Expansion	4.2	3.0	2.8	1.1	5.7	3.4
Contraction	-2.6	7.1	9.0	9.6	-1.8	-2.4
TRACKING ERROR (ANNUALIZED, %)						
Expansion	15.9	10.0	7.5	8.2	13.2	7.9
Contraction	16.8	10.6	9.5	10.6	11.9	8.0
INFORMATION RATIO						
Expansion	0.26	0.29	0.37	0.13	0.43	0.43
Contraction	-0.15	0.67	0.95	0.91	-0.15	-0.30
OUTPERFORMING PROBABILITY (VERSUS THE S&P BSE LARGEMIDCAP, %)						
Expansion	51.1	58.5	56.4	51.1	56.4	59.6
Contraction	38.3	63.8	61.7	63.8	51.1	38.3

The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Index performance based on annualized monthly return in INR. 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. See Appendix A for the OECD Composite Indicator business cycle.

Exhibit 7: Best-Performing Factors in Each Business Cycle Phase



The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Index performance based on total return in INR. Data from October 2005 to June 2017. Top three factors by performance in each period are shown in the chart. 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. See Appendix A for the OECD Composite Indicator business cycles.

FACTOR PERFORMANCE ACROSS MARKET CYCLES

Market cycles are related to the upward and downward movements of stock markets. The stock market reflects the cumulative assessment of all market participants about the current state of the economy and, hence, is considered as forward-looking or a leading indicator of the state of the business cycle and can be used to anticipate turning points in real time.[5]

Due to the strong defensive characteristics of quality and low volatility, they are potential factor strategies to minimize downside risk.

We examined the performance of all factors for each market cycle phase from October 2005 to June 2017. We divided the market cycles into three phases—bearish (peak to trough), recovery (first 12 months after the trough), and bullish (from recovery to the peak)—based on the S&P BSE SENSEX price return performance. During the examined period, the Indian equity market was divided into three bearish, three recovery, and four bullish market phases.[6]

During bear markets, quality and low volatility were the best-performing factors, outperforming the benchmark more than 70% of the months, while value was the worst-performing factor in this phase. Due to the strong

[5] Chauvet, M. (1998), "Stock market fluctuations and the business cycle."

[6] Start and end dates for each cycle phase can be found in Appendix B.

defensive characteristics of quality and low volatility, they are potential factor strategies to minimize downside risk. During recovery periods, value, dividend, and size generated the highest excess returns, while low volatility had the worst performance. In bullish markets, only the momentum factor delivered significant excess returns. Exhibit 9 highlights the factors that delivered the most favorable return in each bullish, bearish, and recovery period between 2005 and 2017.

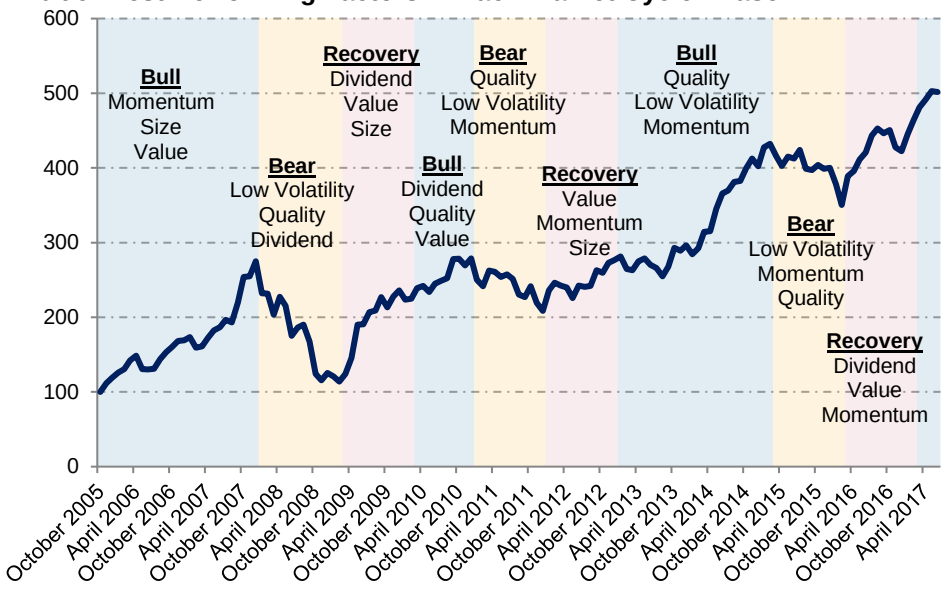
During recovery periods, value, dividend, and size generated the highest excess returns, while low volatility had the worst performance.

Exhibit 8: Factor Performance in Each Market Cycle Phase

MARKET CYCLE PHASE	VALUE	MOMENTUM	QUALITY	LOW VOLATILITY	DIVIDEND	SIZE
AVERAGE EXCESS RETURN (VERSUS THE S&P BSE LARGEMIDCAP, ANNUALIZED, %)						
Bull	-3.3	5.5	-0.4	0.2	-4.1	-1.5
Bear	-9.3	3.9	17.2	18.5	-1.5	-4.0
Recovery	23.5	2.7	1.6	-4.5	21.8	12.8
TRACKING ERROR (ANNUALIZED, %)						
Bull	17.4	9.7	7.4	8.0	14.3	8.1
Bear	12.1	8.9	8.3	8.5	8.8	6.2
Recovery	16.3	12.5	8.9	10.3	12.1	8.5
INFORMATION RATIO						
Bull	-0.19	0.57	-0.05	0.03	-0.29	-0.18
Bear	-0.76	0.44	2.08	2.18	-0.17	-0.64
Recovery	1.44	0.21	0.18	-0.44	1.80	1.51
OUTPERFORMING PROBABILITY (VERSUS THE S&P BSE LARGEMIDCAP, %)						
Bull	43.3	59.7	53.7	49.3	47.8	49.3
Bear	36.8	60.5	73.7	76.3	50.0	44.7
Recovery	63.9	61.1	50.0	44.4	72.2	66.7

The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Index performance based on annualized monthly total return in INR. 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. See Appendix B to note the classification of the time horizon into three market cycles, namely—bull, bear, and recovery phases

Exhibit 9: Best-Performing Factors in Each Market Cycle Phase



The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Top 3 factors by performance in each period are shown in the chart. Index performance based on total return in INR. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. See Appendix B to note the classification of the time horizon into three market cycles, namely—bull, bear, and recovery phases

FACTOR PERFORMANCE ACROSS INVESTOR SENTIMENT REGIMES

The value portfolio delivered the most pronounced return, while the low volatility portfolio had the worst performance when investor sentiment was bullish.

Investment sentiment measures how optimistic or pessimistic market participants are in regard to current market and business conditions. We used rolling 22-day realized return volatility of the S&P BSE SENSEX Price Return as a proxy to measure investor sentiment in the Indian equity market.[7] We divided the examined period into three sentiment regimes—bullish, neutral, and bearish. Bearish investor sentiment is signaled by high levels of realized volatility (values in the bottom decile), whereas bullish investor sentiment is represented by low realized volatility values (values in the top decile) and neutral investor sentiment makes up the periods when the realized volatility values lie between the top and bottom deciles.

Historically, the value portfolio delivered the most pronounced return, while the low volatility portfolio had the worst performance when investor sentiment was bullish. Momentum and size were most penalized while high quality stocks were favored by market participants when they were bearish. Unlike what we have seen in many other markets, low volatility

[7] Bearish realized volatility signals are those that are in the bottom decile. Bullish realized volatility signals are those that are in the top decile. Neutral realized volatility signals are those that are between the top and the bottom deciles.

stocks were not the most rewarded during bearish sentiment regime in India; instead they were favored by market participants when the sentiment was neutral. Momentum and quality stocks also tended to perform better, with a high tendency of outperforming, during neutral sentiment (see Exhibit 10).

Momentum and size were most penalized while high quality stocks were favored by market participants when they were bearish.

As investor sentiment regime changes more frequently than market and business cycle phases, investor sentiment regime analysis supplements market and business cycle analyses.[8]

Exhibit 10: Factor Performance in Different Investor Sentiment Regimes

PHASE INVESTOR SENTIMENT	VALUE	MOMENTUM	QUALITY	LOW VOLATILITY	DIVIDEND	SIZE
AVERAGE EXCESS RETURN (VERSUS THE S&P BSE LARGEMIDCAP, ANNUALIZED %)						
Bullish	7.6	3.9	1.3	-2.7	3.0	2.3
Neutral	0.9	6.9	5.6	6.1	3.9	2.8
Bearish	1.0	-14.3	5.1	-1.9	-1.8	-9.4
TRACKING ERROR (ANNUALIZED %)						
Bullish	19.0	9.9	6.0	6.0	14.1	6.0
Neutral	14.7	8.3	8.0	8.3	11.6	6.9
Bearish	22.0	19.3	12.5	16.4	19.2	15.1
INFORMATION RATIO						
Bullish	0.40	0.39	0.22	-0.45	0.21	0.39
Neutral	0.06	0.83	0.70	0.74	0.34	0.40
Bearish	0.05	-0.74	0.41	-0.12	-0.09	-0.62
OUTPERFORMING PROBABILITY (VERSUS THE S&P BSE LARGEMIDCAP, %)						
Bullish	50.0	63.6	54.5	36.4	54.5	59.1
Neutral	46.7	63.8	59.0	59.0	54.3	56.2
Bearish	42.9	28.6	57.1	57.1	57.1	14.3

The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Index performance based on annualized monthly total return in INR. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

As investor sentiment regime changes more frequently than market and business cycle phases, investor sentiment regime analysis supplements market and business cycle analyses.

THE NEXT STEP: MULTI-FACTOR PORTFOLIOS

While single-factor smart beta strategies tended to outperform the market over the long term, they experienced periods of underperformance at different macroeconomic conditions, depending on their cyclical characteristics.[9] Due to the cyclicality of factors, they can be potential tools for the implementation of active views. On the other hand, blending factors in a portfolio to diversify factor exposure may help deliver smoother excess return across business and market cycles, with the effectiveness

[8] Ung, D., Luk, P. (2016), "What Is in Your Smart Beta Portfolio? A Fundamental and Macroeconomic Analysis."

[9] Innes, A., (2017), "The Merits and Methods of Multi-Factor Investing."

depending on the correlation of returns among factors. Over the long run, excess returns for dividend, value, and size were highly correlated, while low volatility had the most negative excess return correlation with the value and size factors (see Exhibit 11). Quality versus dividend and size are the most uncorrelated pairs among all the factors. There are different approaches to combining factors in a portfolio that aim for various objectives, which will be a key topic in our continuous research on factor investing.

Blending factors in a portfolio to diversify factor exposure may help deliver smoother excess return across business and market cycles…

Correlations between factors did not remain constant across various market conditions. When constructing multi-factor portfolios, it is important to be aware of the changes in factor correlations in different market regimes. For example, correlation between size and momentum was negative (-43%) during bull and recovery markets and switched to positive (32%) in bearish markets. Large shifts in correlation were also observed in the low volatility-momentum and quality-value pairs across different market cycle phases (See Exhibits 12 and 13).

…with the effectiveness depending on the correlation of returns among factors.

Exhibit 11: Correlation Among Single Factors Across All Market Cycles

FACTOR	VALUE	MOMENTUM	QUALITY	LOW VOLATILITY	DIVIDEND	SIZE
VALUE	-	-32%	-29%	-45%	85%	80%
MOMENTUM	-32%	-	28%	25%	-31%	-29%
QUALITY	-29%	28%	-	75%	-9%	-19%
LOW VOLATILITY	-45%	25%	75%	-	-24%	-34%
DIVIDEND	85%	-31%	-9%	-24%	-	78%
SIZE	80%	-29%	-19%	-34%	78%	-

The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Correlation calculated using excess price returns over S&P BSE LargeMidCap. Index performance based on price return in INR. 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: Correlation Among Single Factors—Recovery and Bull Market Cycles

FACTOR	VALUE	MOMENTUM	QUALITY	LOW VOLATILITY	DIVIDEND	SIZE
VALUE	-	-42%	-38%	-50%	86%	83%
MOMENTUM	-42%	-	42%	49%	-39%	-43%
QUALITY	-38%	42%	-	73%	-18%	-22%
LOW VOLATILITY	-50%	49%	73%	-	-31%	-39%
DIVIDEND	86%	-39%	-18%	-31%	-	82%
SIZE	83%	-43%	-22%	-39%	82%	-

The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Correlation calculated using excess price returns over S&P BSE LargeMidCap. Index performance based on price return in INR. 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.

Correlations between factors did not remain constant across various market conditions.

Exhibit 13: Correlation Among Single Factors—Bear Market Cycle

FACTOR	VALUE	MOMENTUM	QUALITY	LOW VOLATILITY	DIVIDEND	SIZE
VALUE	-	11%	13%	-20%	78%	59%
MOMENTUM	11%	-	-13%	-50%	9%	32%
QUALITY	13%	-13%	-	73%	37%	2%
LOW VOLATILITY	-20%	-50%	73%	-	9%	-4%
DIVIDEND	78%	9%	37%	9%	-	53%
SIZE	59%	32%	2%	-4%	53%	-

The S&P BSE Dividend Portfolio and S&P BSE Equal-Weighted Portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from October 2005 to June 2017. Correlation calculated using excess price returns over S&P BSE LargeMidCap. Index performance based on price return in INR. 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.

CONCLUSION

The paper examined how six common risk factors—value, momentum, quality, low volatility, dividend, and size (small cap)—performed in the Indian market across different macroeconomic regimes between October 2005 and June 2017. Over the period studied, portfolios for all six factors outperformed the S&P BSE LargeMidCap, while low volatility and quality saw reduced return volatility and the rest of the factors had more volatile performance.

Factor returns tended to exhibit cyclicality with periods of outperformance and underperformance in different phases of the cycles.

Sector bias typically existed in factor portfolios, and the differentials on sector exposure across factor portfolios were strongly associated with the unique cyclical nature of the various factor performances. Macroeconomic and market events affected each factor portfolio in different ways. Factor returns tended to exhibit cyclicality with periods of outperformance and underperformance in different phases of the cycles.

Based on our factor performance analysis across business cycles defined by the monthly movement of the OECD CLI for India, we observed that value, dividend, and size exhibited strong procyclical characteristics and tended to outperform the benchmark when business activities expanded. In contrast, low volatility, quality, and momentum outperformed the benchmark in both cycle phases but with a higher tendency to outperform the benchmark during business cycle contraction.

Apart from business cycle, factors also displayed different cyclical behavior across market cycles that we divided into bearish, recovery, and bullish phases based on historical price trends of the S&P BSE SENSEX . Quality and low volatility performed the best and offered downside risk protection. Conversely, value, dividend, and size gained the highest excess returns when the market recovered from troughs. In bullish markets, momentum had the strongest performance among all factors.

In addition, we also studied factor performance over investor sentiment regimes, which changed more frequently than market and business cycle phases. We used realized return volatility of the S&P BSE SENSEX Price Return to measure investor sentiment and divided the examined period into bullish, neutral, and bearish sentiment regimes. Results showed that value delivered the most excess return, while low volatility had the worst performance when market participants were bullish. In contrast, momentum and size underperformed, while high quality stocks were favored by market participants when they were bearish.

Blending factors to design multi-factor portfolios can potentially help deliver smoother excess return across business and market cycles.

Despite some single-factor portfolios outperforming the market over the long term, they experienced periods of underperformance in different macroeconomic conditions, depending on their cyclical characteristics. Blending factors to design multi-factor portfolios can potentially help deliver smoother excess return across business and market cycles. Correlation among factors is one of the common considerations in the construction of multi-factor portfolios. However, we observed that factor correlations did not remain constant across various market regimes, and it is important to be mindful of the changes when blending different factors.

APPENDIX A

Exhibit 14: Illustrative Business Cycles

BUSINESS CYCLE PHASE	PERIOD
Expansion	September 2005-September 2007
	April 2009-December 2010
	June 2013-June 2017
Contraction	October 2007-March 2009
	January 2011-May 2013

Source: S&P Dow Jones Indices LLC, Organisation for Economic Co-operation and Development. Data from September 2005 to June 2017. Table is provided for illustrative purposes.

APPENDIX B

Exhibit 15: Illustrative Market Cycles

MARKET CYCLE PHASE	PERIOD
Bull	September 2005-December 2007
	March 2010-December 2010
	January 2013-February 2015
	March 2017–June 2017
Recovery	March 2009–February 2010
	January 2012-December 2012
	March 2016–February 2017
Bear	January 2008-February 2009
	January 2011-December 2011
	March 2015–February 2016

Source: S&P Dow Jones Indices LLC. Data from September 2005 to June 2017. Table is provided for illustrative purposes.

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

PERFORMANCE DISCLOSURE

The S&P BSE Low Volatility Index, S&P BSE Momentum Index, S&P BSE Enhanced Value Index, and S&P BSE Quality Index were launched on December 3, 2015. The S&P BSE AllCap was launched on April 15, 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. Complete index methodology details are available at www.spdji.com.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its datafeed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown. The back-test period does not necessarily correspond to the entire available history of the Index. Please refer to the methodology paper for the Index, available at www.spdji.com for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices LLC maintains the Index and calculates the Index levels and performance shown or discussed, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US $10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US $1,650), the net return would be 8.35% (or US $8,350) for the year. Over a three year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US $5,375, and a cumulative net return of 27.2% (or US $27,200).

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