NIFTY Multi-Factor Indices

"Multi-factor index strategies provide diversified factor-exposure with varied risk-return profile"

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Introduction

Factor-based investing has gathered popularity amongst the global investment community. By using well established stock-specific factors used in active investment and rules based frame work of passive investment, factor-based index strategies combine the benefits of both active and passive investment styles and tend to deliver risk premium in long run in a transparent, rule-based and cost effective manner. Factor based investing has come a long-way after the first factor-based ETF got introduced way back in 2003. As on January 2017, there are 1,200+ factor-based equity ETFs/ETPs listed globally with total assets under management of US$534 billion offered by around 150 asset managers listed on 37 exchanges in 32 countries. (Source: ETFGI report January 2017)

Single-factor based investment style has the backing of strong academic research spread over decades by Fama-French, Carhart and Ross and others and has historically delivered long term risk premium on exposure to systematic factor-risk. The most popular factors which are typically used to capture long term risk premium across the globe include Alpha, Quality, Value, Low-Volatility amongst others.

Single-factor based index strategies, however, typically exhibit cyclicality and may underperform during certain market phases. An alternative smart beta index strategy is to select stocks based on combination of multiple factors, targeting to counter the impact of cyclicality of single-factor indices. India Index Services & Products Ltd (IISL), an NSE group company, has launched a series of 4 such multi-factor equity indices.

About NIFTY Multi-Factor Index series

The 4 multi-factor indices launched by IISL are:

1. NIFTY Alpha Low-Volatility 30
2. NIFTY Quality Low-Volatility 30
3. NIFTY Alpha Quality Low-Volatility 30
4. NIFTY Alpha Quality Value Low-Volatility 30

Each of the above 4 indices track a portfolio of stocks selected based on combination of 2 or more factors. The factor details along with weights are presented in the table below.

Index		Factors Weights			
	Number of factors	Alpha	Low-Vol.	Quality	Value
NIFTY Alpha Low-Volatility 30	2	50%	50%	-	-
NIFTY Quality Low-Volatility 30	2	-	50%	50%	-
NIFTY Alpha Quality Low-Volatility 30	3	33.33%	33.33%	33.33%	-
NIFTY Alpha Quality Value Low-Volatility 30	4	25%	25%	25%	25%

Exhibit 1: Factor details along with weights

Highlights of NIFTY multi-factor index series:

- The index series has a base date of April 01, 2005 and a base value of 1000

- Stocks from NIFTY 100 and NIFTY Midcap 50 at the time of review are eligible for inclusion in the indices

- Indices consist of well diversified portfolio of 30 stocks selected based on combination of 2 or more factors from the 4 factors – Alpha, Quality, Value and Low-Volatility

- Stock selection and weights are derived from factor scores resulting in portfolio capturing the essence of underlying factor dynamics

- With threshold mechanism that lays down stringent criteria for inclusion and exclusion, the index seeks to minimize degree of churning and replication cost

Exhibit 2: Key factors which contribute to risk premium in long term

Exhibit 3 : Multi-factor indices combine the benefits of passive and active investment styles
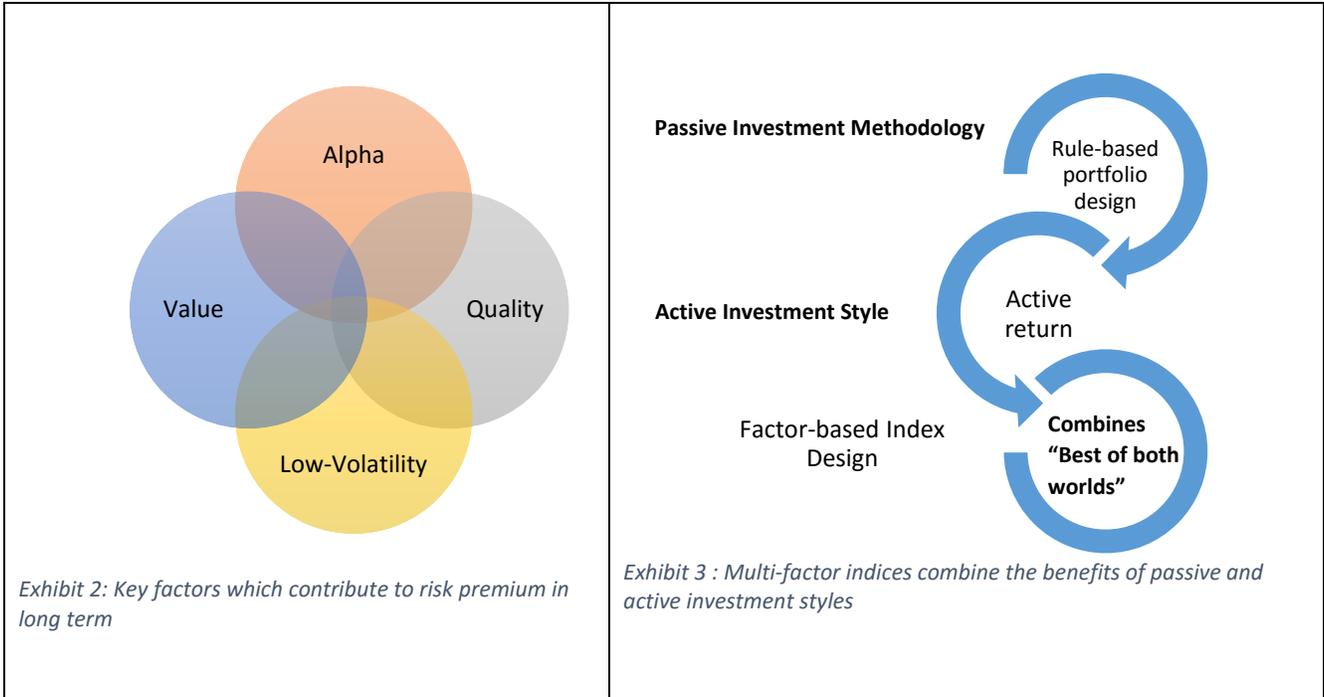
NIFTY multi-factor indices seek to combine the well established stock-specific factors used in active investment along with the rules-based frame work of passive investment. Multi-factor based index strategies offer the best of two worlds in a transparent, rule-based and cost effective manner. It also seeks to counter the cyclicality which is typically observed in single factor based index strategies.

The launch of NIFTY multi-factor indices can be viewed as an alternative to traditional market capitalization weighted and single factor based indices. Based on historical backtesting of over 12 years over multiple market cycles, it has been observed that NIFTY multi-factor indices counter cyclicality of single factor based portfolio by diversification across multiple factors. NIFTY multi-factor indices also address the high sector concentration typically observed in single factor based index strategies.

About NIFTY Singles Factor Indices

IISL currently maintains various single-factor based indices. These indices are individually based on Alpha, Quality, Value and Low-Volatility factors. The framework used by IISL for single factor indices is given in exhibit 4 below:

Factors	Alpha	Quality	Value	Low Volatility
Parameters	- High Jensens Alpha	- High ROE - Low Debt Equity ratio -Average Change in PAT	- High ROCE - High Dividend Yield - Low P/E - Low P/B	- Low standard deviation of price returns
Data source	Previous one year stock prices	Annual Report	Annual Report	Previous one year stock prices
Condition	Company should have pricing history of atleast 1 year	Company should have reported postive PAT in previous 3 financial years	Company should have reported postive PAT in previous 1 financial year	Company should have pricing history of atleast 1 year

Exhibit 4: Parameters used for weighing factor indices

Single factor-based index strategies typically exhibit high cyclicality

Period	Market Capitalization based Indices			Single Factor index strategies			
Year	NIFTY 50	NIFTY 100	NIFTY 200	Alpha Portfolio	Quality Portfolio	Value Portfolio	Low Volatility Portfolio
2005	37.19%	35.75%	35.58%	34.11%	31.71%	23.08%	47.35%
2006	39.83%	38.03%	34.64%	50.41%	18.56%	10.07%	34.61%
2007	54.77%	57.53%	63.66%	84.94%	39.28%	53.96%	38.43%
2008	-51.79%	-53.69%	-56.61%	-66.96%	-50.75%	-52.64%	-44.60%
2009	75.76%	82.72%	86.58%	65.12%	108.12%	166.41%	82.17%
2010	17.95%	17.91%	14.20%	14.84%	16.35%	25.50%	24.40%
2011	-24.62%	-25.81%	-26.97%	-18.56%	-24.74%	-17.54%	-15.45%
2012	27.70%	30.60%	31.64%	38.88%	30.40%	25.59%	30.75%
2013	6.76%	6.46%	4.44%	9.29%	8.78%	-2.00%	6.55%
2014	31.39%	33.17%	35.53%	50.38%	37.17%	35.99%	40.86%
2015	-4.06%	-2.41%	-1.90%	16.90%	6.80%	-7.68%	11.66%
2016	3.01%	3.60%	3.70%	19.72%	-6.75%	6.11%	1.83%

Exhibit 5: Calendar year wise returns delivered by market capitalization based and single-factor indices.

Exhibit 5 above shows calendar year-wise returns delivered by market capitalization based and single-factor based index strategies. While single factor indices have delivered a risk premium over market capitalization based indices for various years, they tend to display cyclicality.

Mentioned below is a summary of how each of the 4 single factors has behaved across time

Alpha: Historically, alpha factor based portfolio exhibited pro-cyclicality with business cycles by outperforming NIFTY 50 during periods of bull-run in 2007 and during economic recovery in 2009 and 2012, however, showed low returns in economic downturn of 2008 and 2011.

Quality: Quality factor based portfolio significantly outperformed NIFTY 50 during period of economic recovery in 2009 and 2012, however, delivered similar returns as NIFTY 50 during economic downturn of 2008 and 2011. Historically, quality factor based portfolio included sectors like IT, FMCG and pharmaceutical which include companies that are typically cash-rich, low on gearing and boast of higher operating & net margins. Lower returns of quality factor during 2016 phase can be attributed to the draw-down in IT and Pharma sector which contributed to around 40% index exposure.

Value: Value factor based portfolio delivered significantly better performance during economic recovery in 2009, however delivered similar returns as NIFTY 50 during downturn of 2008. Value factor based portfolio witnessed upturn during commodity rallies of 2007, 2010 and 2016. Historically, value based portfolio has had greater exposure towards sectors such as Financial Services, IT, Consumer goods and Metals.

Low-Volatility: Historically, low-volatility portfolio has generated high return with low risk in most of the calendar years. The index included companies from FMCG, pharmaceutical and IT sector having relatively inelastic demand-supply dynamics and exhibiting robust behavior during periods of economic downturn of 2008 and 2011. Low-Volatility index strategy has remained one of best performing strategies over long term period.

Multi-Factor index strategies tend to counter the cyclical behavior of single-factor index strategies by diversifying across factors

Period	Single Factor Portfolio					Multi Factor Indices			
Year	NIFTY 50	Quality Factor Portfolio	Alpha Factor Portfolio	Low-Volatility Factor Portfolio	Value Factor Portfolio	NIFTY Alpha Low-Volatility 30	NIFTY Quality Low-Volatility 30	NIFTY Alpha Quality Low-Volatility 30	NIFTY Alpha Quality Value Low-Volatility 30
2005	37.19%	31.71%	34.11%	47.35%	23.08%	50.15%	44.86%	43.06%	33.98%
2006	39.83%	18.56%	50.41%	34.61%	10.07%	36.67%	27.07%	31.58%	22.79%
2007	54.77%	39.28%	84.94%	38.43%	53.96%	59.79%	26.51%	35.87%	37.62%
2008	-51.79%	-50.75%	-66.96%	-44.60%	-52.64%	-50.27%	-41.47%	-43.93%	-49.01%
2009	75.76%	108.12%	65.12%	82.17%	166.41%	59.88%	76.65%	73.20%	91.98%
2010	17.95%	16.35%	14.84%	24.40%	25.50%	28.62%	30.01%	27.22%	30.42%
2011	-24.62%	-24.74%	-18.56%	-15.45%	-17.54%	-13.50%	-9.99%	-11.88%	-14.50%
2012	27.70%	30.40%	38.88%	30.75%	25.59%	32.82%	32.15%	33.48%	28.27%
2013	6.76%	8.78%	9.29%	6.55%	-2.00%	14.74%	13.45%	13.53%	11.77%
2014	31.39%	37.17%	50.38%	40.86%	35.99%	46.56%	43.66%	41.11%	34.67%
2015	-4.06%	6.80%	16.90%	11.66%	-7.68%	13.42%	7.54%	10.25%	9.21%
2016	3.01%	-6.75%	19.72%	1.83%	6.11%	8.02%	-2.26%	4.96%	4.15%

Exhibit 6: Calendar year wise returns delivered by Single and Multi-factor indices

- Though few single factor index strategies outperformed traditional market capitalization weighted index strategies for most of the years, risk of cyclicality in single-factors indices is noteworthy. By having stocks based on combination of 2 or more factors, multi-factor index strategies exhibit lower performance swings. For instance, during the downturn of 2008, Alpha portfolio fell by 66.96% whereas NIFTY Alpha Quality Low-Volatility 30 fell only by 43.93%, reducing the dip by over 23%. Similarly during 2016, Low-Volatility portfolio gave returns of 1.83% whereas NIFTY Alpha Low-Volatility gave returns of 8.02%.

- Multi-factor index strategies can enable investors to diversify their factor-risk exposures and counter the cyclicality of various single-factors. A strategy of combination of quality, value, alpha and low volatility factors (read NIFTY Alpha Quality Value Low-Volatility 30) has given less variability in returns throughout the analysis period. A slightly aggressive strategy of mixing Alpha with other factors (read NIFTY Alpha Quality Low-Volatility & NIFTY Alpha Low-Volatility) remained the best performing index strategies.

Multi-Factor indices have firm academic grounding

The genesis of multi-factor based investing has been in existence since Fama-French (1992-93) developed their influential three and four factor model incorporating size, value, quality and momentum to explain risk-return characteristics. Futher, subsequent work by Ross [Arbitrage Pricing Theory, 1976] proposed that stock returns can be modeled as function of various other factors (fundamental, macroeconomic or statistical) with market risk (Beta) being most important one but not the only factor determining returns of the stock. Reasons for long term risk premium earned by the factors have also been explained by factors that have 'systematic risk' attached to them (for instance factors like value, size and momentum have high dependence on macro-economic factors like growth, inflation, capital inflows, etc) and behavioral biases like overreaction, overconfidence, loss aversion, etc.

Multi-Factor indices outperform traditional indices consistently over long periods
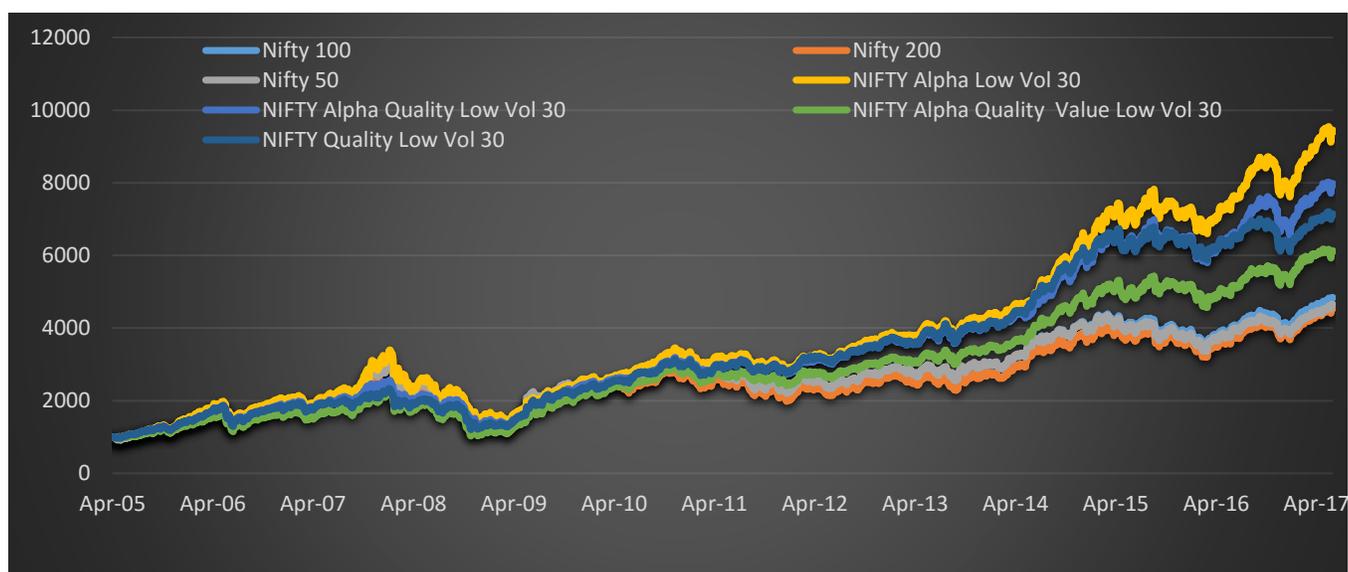
Note: Performance of all indices is compared w.r.t inception date April 1, 2005
Exhibit 7: All NIFTY multi-factor indices outperformed market cap based indices over long term

Period	Market capitalization based indices			2 Factor Indices		3 Factor Indices	4 Factor Indices
CAGR	NIFTY 100	NIFTY 200	NIFTY 50	NIFTY Alpha Low-Volatility 30	NIFTY Quality Low-Volatility 30	NIFTY Alpha Quality Low-Volatility 30	NIFTY Alpha Quality Value Low-Volatility 30
Since Apr 2005	13.83%	13.25%	13.47%	20.33%	17.61%	18.69%	16.12%
10 years	9.01%	8.59%	8.40%	15.81%	13.75%	14.81%	13.45%
7 years	10.09%	9.90%	9.53%	19.28%	15.55%	17.36%	14.30%
5 years	15.49%	15.77%	14.33%	24.48%	17.98%	20.95%	18.08%
3 years	11.33%	11.98%	9.9%	25.72%	15.54%	21.68%	17.04%
1 year	20.05%	21.23%	17.91%	25.55%	10.34%	21.57%	19.62%
6 Month	17.05%	17.34%	16.98%	17.67%	11.53%	14.35%	11.93%

Exhibit 8: Performance comparison of market capitalization and multi-factor based indices

Empirical evidence of back-tested Multi-Factor indices over long time horizons further strengthens the hypothesis that multi-factors index strategies deliver long term risk premium over traditional market capitalization based index strategies. As on May 31, 2017, all multi-factor indices have outperformed NIFTY 50 index by a significant margin. Two-factor index - NIFTY Alpha Low-Volatility 30 was the best performing index outperforming NIFTY 50 by 6.86 % per annum (since Apr 2005). 3 factor index - NIFTY Alpha Quality Low-Volatility 30 outperformed NIFTY 50 by 5.22% per annum (since April 2005). While for more recent shorter time horizons (1 year or 6 months), NIFTY 50 has outperformed few multi-factor indices. Historical evidence of multi-factor indices outperforming the traditional counterpart over longer time period further emphasizes the importance of long term holding period reminiscent of funds with longer investment horizon.
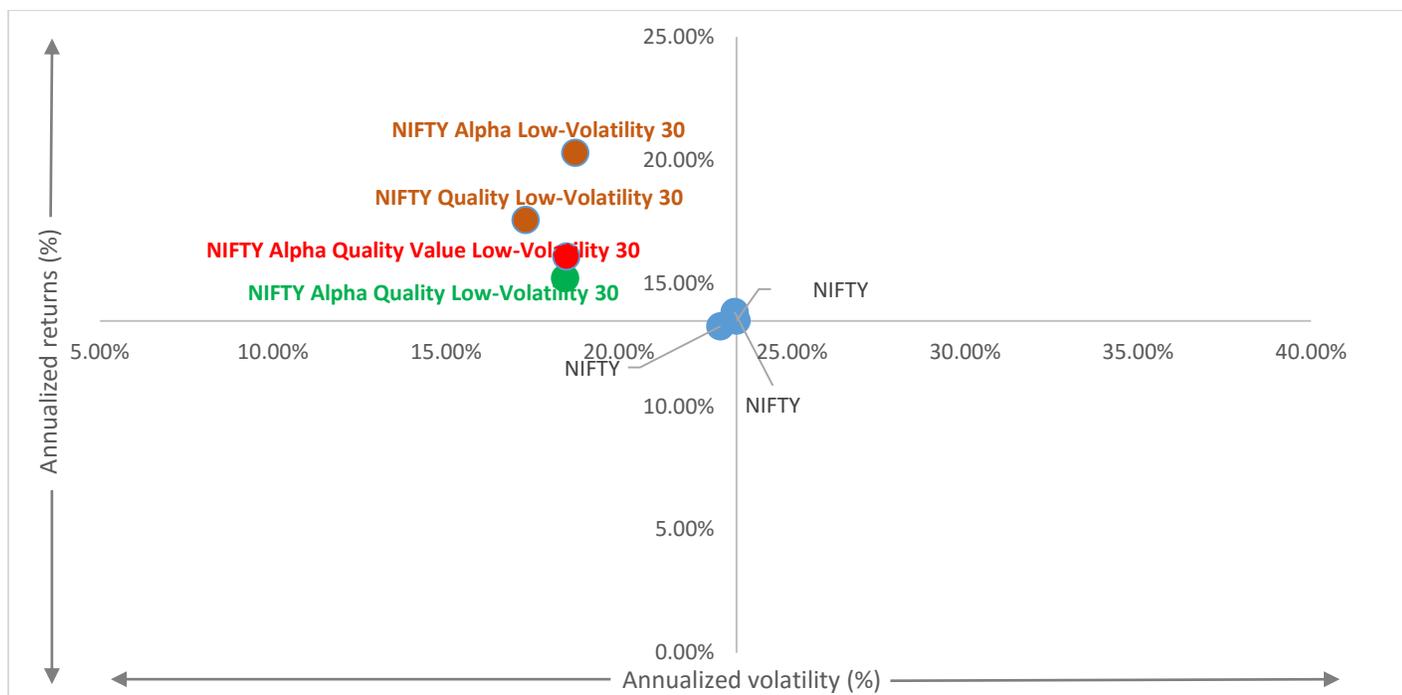
Exhibit 9: Factor indices performed better on risk-return basis vis-a-vis market cap weighted indices during April 2005 - May 2017 period

Exhibit 9 above plots the since inception return and risk for each of the market capitalization based and multifactor indices. As can be seen, all the multi-factor indices plot on the upper-left quadrant which depicts lower risk - higher return profile as compared to NIFTY 50

Period	Market capitalization based indices			2 Factor		3 Factor Indices	4 Factor
Return to Risk ratio	Nifty 100	Nifty 200	Nifty 50	NIFTY Alpha Low-Volatility 30	NIFTY Quality Low-Volatility 30	NIFTY Alpha Quality Low-Volatility 30	NIFTY Alpha Quality Value Low-Volatility 30
Since Inception	0.59	0.58	0.58	1.08	1.02	1.03	0.87
10 years	0.38	0.37	0.36	0.86	0.83	0.85	0.75
7 years	0.63	0.62	0.59	1.56	1.30	1.40	1.13
5 years	1.04	1.05	0.96	2.00	1.52	1.70	1.44
3 years	0.78	0.81	0.70	1.95	1.28	1.64	1.27
1 year	1.70	1.75	1.56	2.09	1.01	1.79	1.68

Exhibit 10: 'Return to Risk' ratio of various indices

Exhibit 10 above shows the ratio of return to standard deviation (risk) for each index. Return to Risk ratio of multi-factor indices has been in the range of 0.87 to 1.08 since inception, as compared to approximately 0.58 of market cap weighted indices, highlighting the fact that multi-factor indices have historically given higher returns per unit of risk undertaken by the investor.

Multiple-factor index strategies result in more sector-diversified portfolios
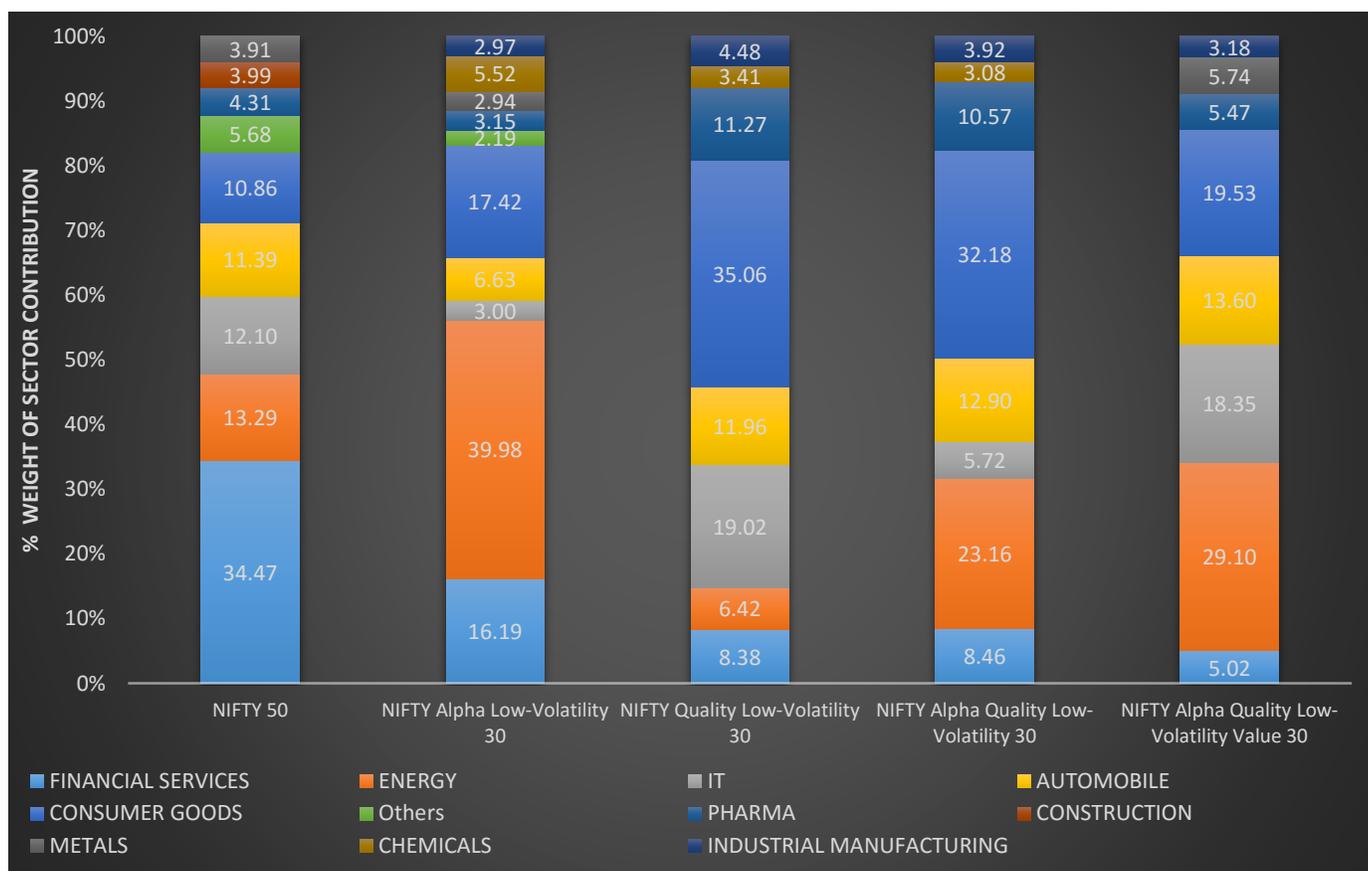
Exhibit 11: Multi-Factor indices sector composition relative to NIFTY 50

Exhibit 11 above shows the sector exposure of NIFTY 50 and each of the multi-factor indices. NIFTY 50 has highest sector exposure towards financial services, IT and energy. In comparision, NIFTY multi-factor indices witness exposure to different set of sectors (relatively higher towards consumer goods & pharma and relatively lower towards financial services).

Combining factors also helps create a portfolio with exposure to more sectors. For instance, the portfolio of Quality factor portfolio has been traditional heavy on IT, consumer goods, pharma and automobile sectors whereas Low-Volatility factor portfolio has been more concentrated on consumer goods, energy and financial services. Multi-factor index combining Quality and Low-Volatility (read NIFTY Quality Low-Volatility Index) thus has exposure to the combined set of sectors. Lower concentration of weights in these specific sectors makes it less prone to concentration risks during periods of market stress/sectoral underperformance.

Signing Off…

Historically, long term investors and fund managers have relied upon passive investment styles like market capitalization and single factor based portfolio design techniques to capture the premium for systematic risk. Multi-factor based indexing strategies present an effective route through which investors can gain exposure to combination of factors which were earlier accessible only through stock picking in active investment. Based on back-testing of multi-factor strategies for over 12 years, it has been observed that Investment in multi-factors has consistently earned long term risk premium and exhibited better performance over traditional market cap weighted indices.

Additional risk charateristics such as cyclicality and sector concerntation exhibited by single-factor strategies were also partially mitigated by diversification across multiple factors as underperformance of individual factors need not necessarily coincide in long run. Multi-factor indices, thus, combine "the best of two worlds: active and passive styles" and have better risk-return characteristics compared to traditional market capitalization based indices over longer time frames and lower cyclicality and concentration risk as compared to single factor indices. Multi-factor indices, thus, provides an alternative index strategy that could be appealing to investors who want to take exposure to the desired combination of factors and build a more diversified portfolio.

About India Index Services & Products Ltd. (IISL):

India Index Services & Products Ltd. (IISL), a subsidiary of NSE, provides a variety of indices and index related services for the capital markets. IISL focuses upon the index as a core product. IISL owns and manages a portfolio of indices under the NIFTY brand of NSE, including the flagship index, the NIFTY 50. IISL equity Indices comprises of broad-based benchmark indices, sectoral indices, strategy indices, thematic indices and customised indices. IISL also maintains fixed income indices based on Government of India securities, corporate bonds and money market instruments. Many investment products based on IISL indices have been developed within India and abroad. These include index based derivatives traded on NSE, Singapore Exchange Ltd. (SGX), Chicago Mercantile Exchange Inc. (CME), Osaka Exchange Inc. (OSE), Taiwan Futures Exchange (TAIFEX) and a number of index funds and exchange traded funds. The flagship 'NIFTY 50' index is widely tracked and traded as the benchmark for Indian Capital Markets.

For more information, please visit: www.nseindia.com

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