

How Smart Beta Strategies Work in the Chinese Market

Contributors

Liyu Zeng

Director
Global Research & Design
liyu.zeng@spglobal.com

Priscilla Luk

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

EXECUTIVE SUMMARY

In response to the increasing interest in smart beta strategies in the Chinese equity market, we examined the effectiveness of six well-known risk factors—size, value, low volatility, momentum, quality, and dividends—in that market from July 31, 2006, to Nov. 30, 2018.

- All the risk factors delivered absolute and risk-adjusted quintile return spreads, with the low volatility, value, and high dividend portfolios generating the highest risk-adjusted return spreads.
- All the Chinese factor indices offered by S&P DJI, except the momentum index, generated absolute and risk-adjusted excess returns in the long run. The low volatility and high dividend indices delivered the highest absolute and risk-adjusted returns, while only the low volatility index had reduced return volatility and drawdown compared with the [S&P China A BMI](#).
- S&P DJI's various Chinese factor indices behaved differently during up and down markets. The momentum index tended to perform better in up markets, but the low volatility, value, quality, and dividend indices had better returns in down markets.
- Our macro regime analysis showed that most factor portfolios in China were sensitive to local market cycles and investor sentiment regimes.
- Factor strategies can be useful tools for the implementation of active views on the Chinese equity market due to distinct cyclicity in factor performance.

Exhibit 1: Performance across Different Market Cycles and Investor Sentiment Regimes in China

CATEGORY	PHASE	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY
Market Cycles	Bullish	▲	▲	▲	▲	▲	▲
	Bearish	▲	▲	▲	▲	▲	▲
	Recovery Period	▲	▲	▲	▲	▲	▲
Investor Sentiment	Bullish	▲	▲	▲	▲	▲	▲
	Neutral	▲	▲	▲	▲	▲	▲
	Bearish	▲	▲	▲	▲	▲	▲

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe (see footnote 8) with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Index performance based on total returns in RMB. Past performance is no guarantee of future results. Table is provided for illustrative purposes. Note: Light blue, upward triangles represent favorable performance, while dark blue, downward triangles represent unfavorable performance based on excess return of each factor versus the S&P China A BMI. The three factors with the highest information ratios in each of the market cycle phases are circled in yellow.

FACTOR-BASED INVESTING IN THE CHINESE EQUITY MARKET

Smart beta strategies are gaining significant attention in the asset management industry, and the exchange-traded products (ETPs) tracking factor indices have shown significant asset growth since the end of 2008 [1]. Factor-based strategies are a category of smart beta strategies that target specific risk factors. They have characteristics of passive investing, such as rules-based construction, transparency, and cost efficiency; they also share features of active investing in that they aim to enhance return and reduce risk compared with traditional market-cap-weighted indices.

For each risk factor, we ranked all stocks in the eligible universe based on their designated factor measure...

Single-factor indices are constructed to capture a specific risk factor. They exhibit distinct cyclical behavior in response to a changing market environment, which also makes them ideal tools for the implementation of active views.

In China, we observe increasing interest in factor-based investing in the equity market, although it lags the U.S. and some other Asian markets (like Japan). Dividend products still dominate the Chinese factor-based ETP market [1].

In this paper, we examined the effectiveness of six well-known risk factors (size, value, low volatility, momentum, quality, and dividend) in the Chinese equity market and the behavior of these factors under different market regimes.

UNIVERSE AND METHODOLOGY

To form the eligible universe for our analysis with consideration of portfolio investability, we eliminated from the combined [S&P China A BMI](#) and [S&P China A Venture Enterprises Index](#) markets all stocks with a float-adjusted market capitalization of less than RMB 1 billion and a three-month average daily value traded below RMB 20 million. Our sample period for the analysis was from July 31, 2006, to Nov. 30, 2018.

...and formed the hypothetical top and bottom quintile portfolios.

For each risk factor, we ranked eligible stocks based on their designated factor measure¹ and formed the hypothetical top and bottom quintile portfolios (Q1 and Q5, respectively) with equal and float-adjusted market-cap weighting. All portfolios were rebalanced semiannually.² We examined

¹ Size was measured by float-adjusted market cap. Value was measured as the average z-score of earnings-to-price, sales-to-price, and book value-to-price ratios. Volatility was measured as the one-year realized price return volatility. Momentum was measured by the z-score of the six-month risk-adjusted momentum, calculated as the price return over the past six months (excluding the most recent month) divided by the standard deviation of daily price returns during the same period. Quality was measured as the average z-score of the balance sheet accrual (BSA) ratio, financial leverage, and ROE. Dividend was measured by the past 12-month gross dividend yield.

² Rebalance reference dates are the end of May and November. Rebalance effective dates are the third Friday of June and December after market close.

these portfolios on the basis of return, volatility, turnover, sector composition, and performance during up and down markets.

In addition, we reviewed various S&P DJI Chinese factor indices, which are designed to track the performance of stocks with specific factor characteristics in the Chinese A-share market.³ Apart from the risk/return profile, we also reviewed sector biases, fundamental tilts, and performance across different market cycle phases and investor sentiment regimes. Due to the differences in the stock selection and weighting methods, and the incorporation of rebalancing buffers and other portfolio diversification constraints, the performance of the S&P DJI Chinese factor indices might deviate from their hypothetical quintile portfolios.

Small cap delivered factor risk premium in the Chinese equity market.

Size

Size (small cap) was one of the first systematic risk factors identified [2-3]. Academic explanations for the small-cap premium mainly focus on the uncertainty, vulnerability, and illiquidity of small-cap companies, as well as market participants' behavioral bias [4-8]. The small-cap anomaly has been observed in developed and emerging markets [9].

In our analysis, the size quintile portfolios were based on companies' float-adjusted market cap. Stocks with the lowest float-adjusted market cap formed the small-cap portfolio (Q1) and stocks with the highest float-adjusted market cap formed the large-cap portfolio (Q5). During the examined period, the equal- and float-cap-weighted small-cap portfolios recorded higher absolute and risk-adjusted returns, along with higher return volatility, than their respective large-cap portfolios (see Exhibit 2).

The small-cap portfolios tended to outperform the benchmark during up markets and underperform during down markets (see Exhibit 19 in the Appendix).

The small-cap portfolios tended to outperform during up markets and underperform during down.

Compared with the S&P China A BMI, the small-cap portfolios were more concentrated in Information Technology, Industrials, and Consumer Discretionary, and carried less weight in the Financials sector (see Exhibit 22 in the Appendix).

³ All portfolio constituents are drawn from the combined universe of the S&P China A BMI and S&P China A Venture Enterprises Index except for the [S&P China A-Share Dividend Opportunities Index](#). To ensure investability, eligible stocks must have a float-adjusted market capitalization no less than RMB 1 billion and a three-month average daily value traded not below RMB 20 million. The [S&P China A-Share Enhanced Value Index](#), [S&P China A-Share Short-Term Momentum Index](#), and [S&P China A-Share Quality Index](#) include the 100 stocks with the highest factor scores, and the stocks are weighted by their score-tilted market cap, subject to security and sector constraints. The [S&P China A-Share Low Volatility Index](#) includes the 100 stocks with the lowest realized return volatility, and the stocks are weighted by the inverse of volatility. The S&P China A-Share Dividend Opportunities Index includes the 100 stocks from the [S&P China A Composite Index](#) with the highest dividend yield, while meeting earnings-per-share growth criteria, with all the stocks weighted by their dividend yield. The S&P China A-Share Small Cap Portfolio is a hypothetical portfolio, which includes 100 stocks with the lowest float-adjust market capitalization, and stocks are weighted by float-adjust market capitalization. All indices were rebalanced semiannually apart from the S&P China A-Share Low Volatility Index, which was rebalanced quarterly.

Exhibit 2: Risk/Return Profile of Small-Cap Portfolios

CATEGORY	S&P CHINA A BMI	SMALL-CAP PORTFOLIOS (Q1)		LARGE-CAP PORTFOLIOS (Q5)	
		FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED
Annualized Return (%)	10.3	17.0	17.7	9.1	7.8
Annualized Volatility (%)	28.7	33.6	33.7	28.3	29.6
Risk-Adjusted Return	0.36	0.51	0.53	0.32	0.27
Rolling 252-Day Maximum Drawdown (%)	-70.6	-69.5	-69.3	-70.6	-71.6
Annualized Excess Return (%)	-	6.7	7.4	-1.2	-2.4
Annualized Tracking Error (%)	-	12.7	12.8	5.8	3.9
Information Ratio	-	0.53	0.58	-0.20	-0.62
Average Annualized Turnover (%)	11.1	125.3	127.7	28.0	55.1

Our value portfolios were constructed based on earnings-to-price, sales-to-price, and book value-to-price ratios.

Small-cap portfolios (Q1) and large-cap portfolios (Q5) are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on total return in RMB of the factor quintile 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. Average annual turnover is calculated from 2007 to 2017.

VALUE

Value investing was first documented in 1934 by Graham and Dodd [10]. According to academic reviews, value companies may have a higher level of risk, as they tend to have less flexibility in times of financial distress compared with their growth counterparts and therefore demand a higher risk premium [11]. The value factor is traditionally measured by price valuation ratios, such as earnings yield, cash flow yield, sales yield, book value-to-price ratio, and dividend yield.

Historically, the high value portfolios outperformed the low value portfolio on an absolute and a risk-adjusted basis.

Our value quintile portfolios were constructed based on the average z-score⁴ of earnings-to-price, sales-to-price, and book value-to-price ratios. Stocks with the cheapest valuations formed the high value portfolios (Q1) and stocks with the most expensive valuations formed the low value portfolios (Q5). Over the examined period from July 31, 2006, to Nov. 30, 2018, the equal- and float-cap-weighted high value portfolios outperformed the low value portfolios on an absolute and risk-adjusted basis, with smaller return drawdowns and lower portfolio turnover (see Exhibit 3).

The equal-weighted high value portfolio performed better in up markets, demonstrating stronger procyclical characteristics. However, the float-cap-weighted high value portfolio exhibited defensive characteristics with better performance in down markets (see Exhibit 19 in the Appendix). The float-

⁴ The z-score for each of the three ratios for each security was calculated using the mean and standard deviation of the relevant variable within the eligible universe. The higher the fundamental ratio, the higher the resulting z-score. For each security, the average z-score was computed by taking a simple average of the three z-scores. A security must have at least one z-score for it to be included in the index. Outlier average z-scores were winsorized at +/-4.

cap-weighted high value portfolio exhibited a strong bias to large-cap stocks compared with the S&P China A BMI since 2009, which might have contributed to its defensive characteristics in down markets.

Compared with the S&P China A BMI and under the same weighting scheme, the high value portfolios were more concentrated in the Materials and Financials sectors, while underweight in Information Technology, Consumer Staples, and Health Care (see Exhibit 22 in the Appendix).

Exhibit 3: Risk/Return Profile of Value Portfolios

CATEGORY	S&P CHINA A BMI	HIGH VALUE PORTFOLIOS (Q1)		LOW VALUE PORTFOLIOS (Q5)	
		FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED
Annualized Return (%)	10.3	15.2	16.2	4.7	6.7
Annualized Volatility (%)	28.7	30.0	32.0	31.3	32.1
Risk-Adjusted Return	0.36	0.51	0.51	0.15	0.21
Rolling 252-Day Maximum Drawdown (%)	-70.6	-70.1	-69.1	-73.8	-74.6
Annualized Excess Return (%)	-	4.9	5.9	-5.6	-3.5
Annualized Tracking Error (%)	-	9.6	8.1	11.7	12.2
Information Ratio	-	0.51	0.73	-0.47	-0.29
Average Annualized Turnover (%)	11.1	57.6	78.6	84.2	99.1

All the Q1 sub-portfolios with highest valuation ratios outperformed their respective Q5 sub-portfolios.

High value portfolios (Q1) and low value portfolios (Q5) are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on total return in RMB of the factor quintile 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. Average annual turnover is calculated from 2007 to 2017.

To decompose the risk/return contribution from each of the three components of value measurement (earnings-to-price, sales-to-price, and book value-to-price ratios), we constructed the top and bottom value quintile sub-portfolios based on each of these three valuation ratios following the same methodology.

All the sub-portfolios with the highest valuation ratios (Q1) outperformed their respective Q5 sub-portfolios, with higher absolute and risk-adjusted returns. Among the three valuation ratios, the book value-to-price and earnings-to-price ratios had a higher contribution to the outperformance of the high value portfolios.

Exhibit 4: Value Factor Performance Decomposition

CATEGORY	S&P CHINA A BMI	Q1 PORTFOLIOS		Q5 PORTFOLIOS	
		FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED
EARNINGS-TO-PRICE RATIO: Q1 = HIGHER RATIO					
Annualized Return (%)	10.3	14.3	14.9	3.6	8.3
Annualized Excess Return (%) Over Q5	N/A	10.7	6.7	N/A	N/A
Annualized Volatility (%)	28.7	29.7	31.6	32.4	32.7
Risk-Adjusted Return	0.36	0.48	0.47	0.11	0.25
SALES-TO-PRICE RATIO: Q1 = HIGHER RATIO					
Annualized Return (%)	10.3	13.3	14.4	6.0	9.0
Annualized Excess Return (%) Over Q5	N/A	7.3	5.4	N/A	N/A
Annualized Volatility (%)	28.7	29.6	32.0	31.0	32.3
Risk-Adjusted Return	0.36	0.45	0.45	0.20	0.28
BOOK VALUE-TO-PRICE RATIO: Q1 = HIGHER RATIO					
Annualized Return (%)	10.3	16.2	16.1	5.7	7.1
Annualized Excess Return (%) Over Q5	N/A	10.4	8.9	N/A	N/A
Annualized Volatility (%)	28.7	29.7	32.0	30.6	31.6
Risk-Adjusted Return	0.36	0.54	0.50	0.19	0.23

High value portfolios (Q1) and low value portfolios (Q5) are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on total return in RMB of the factor quintile 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.

LOW VOLATILITY

The inverse relationship between equity volatility and long-term return has been well documented [12-18]. The academic explanations for the low volatility premium have mainly focused on the behavioral biases that drive excess demand for high-risk stocks and the limitations on arbitrage in practice [19]. The two most commonly used metrics to measure volatility are realized volatility and the combination of predicted volatility and covariance. The low and high volatility quintile portfolios constructed for our analysis were based on stocks' one-year realized daily price return volatility.

The risk/return characteristics of the low and high volatility quintile portfolios (Q1 and Q5, respectively) based on the realized return volatility of stocks are summarized in Exhibit 5. The low volatility portfolios delivered higher absolute and risk-adjusted returns than the high volatility portfolios. The return volatility of the low volatility portfolios was reduced by roughly 20% compared with that of the high volatility portfolios on an equal- and float-cap-weighted basis.

The low volatility portfolios delivered higher absolute and risk-adjusted returns than the high volatility portfolios.

Compared with the S&P China A BMI and under the same weighting scheme, the low volatility portfolios were more concentrated in the Financials and Utilities sectors, while underweight in Materials and Information Technology (see Exhibit 22 in the Appendix). In contrast, companies in the high volatility portfolios were more concentrated in the Information Technology and Materials sectors.

The low volatility portfolios exhibited strong defensive features...

The low volatility portfolios exhibited a marked defensive feature, outperforming the benchmark the majority of the time in down markets, with significant excess returns (see Exhibit 19 in the Appendix).

Exhibit 5: Risk/Return Profiles of Low Volatility Portfolios

CATEGORY	S&P CHINA A BMI	LOW VOLATILITY PORTFOLIOS (Q1)		HIGH VOLATILITY PORTFOLIOS (Q5)	
		FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED
Annualized Return (%)	10.3	14.2	16.3	3.0	6.8
Annualized Volatility (%)	28.7	26.0	28.0	35.5	35.5
Risk-Adjusted Return	0.36	0.54	0.58	0.08	0.19
Rolling 252-Day Maximum Drawdown (%)	-70.6	-66.6	-64.6	-77.1	-75.0
Annualized Excess Return (%)	-	3.9	6.0	-7.3	-3.5
Annualized Tracking Error (%)	-	8.4	6.8	12.7	13.5
Information Ratio	-	0.46	0.88	-0.57	-0.26
Beta	1.00	0.87	0.95	1.17	1.16
Average Annualized Turnover (%)	11.1	66.4	100.1	116.0	103.8

Low volatility portfolios (Q1) and high volatility portfolios (Q5) are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on total return in RMB of the factor quintile 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. Average annual turnover is calculated from 2007 to 2017.

...with better performance in down markets.

MOMENTUM

The momentum effect has been well documented in the U.S. market and other markets [20-21]. These studies have found that stock price trends tended to continue over certain periods, meaning winners continued to win and losers continued to lose. Theories behind the momentum effect have mainly been in an investor behavioral context [22-24].

The high and low momentum quintile portfolios (Q1 and Q5, respectively) constructed for the analysis were based on 6- or 12-month risk-adjusted price momentum.⁵ The high momentum portfolios based on a 6-month period tended to generate better performance and higher risk-adjusted returns than those measured over 12 months (see Exhibit 6). However, the

⁵ The 12-month risk-adjusted price momentum was calculated as the price return over the past 12 months (excluding the most recent month), divided by the standard deviation of daily price returns during the same period.

The high momentum portfolios based on a six-month look-back period tended to generate better performance than those in the 12-month period.

The high momentum portfolios based on a six-month period outperformed the low momentum portfolios on absolute and risk-adjusted basis.

Historically, the high momentum portfolios tended to have better performance in up markets than in down markets.

shorter the period of the momentum, the higher the resulting portfolio turnover. The momentum portfolios based on the six-month period and float-cap-weighting method had the highest top and bottom quintile return spread. In the following analysis, we focus on the six-month momentum portfolios.

Exhibit 6: Risk/Return Profiles of Momentum Portfolios

6-MONTH, RISK-ADJUSTED MOMENTUM	S&P CHINA A BMI	HIGH MOMENTUM PORTFOLIOS (Q1)		LOW MOMENTUM PORTFOLIOS (Q5)	
		FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED
Annualized Return (%)	10.3	11.2	12.8	7.0	9.7
Annualized Volatility (%)	28.7	30.4	32.3	30.1	32.1
Risk-Adjusted Return	0.36	0.37	0.40	0.23	0.30
Rolling 252-Day Maximum Drawdown (%)	-70.6	-72.9	-72.7	-68.0	-69.3
Annualized Excess Return (%)	-	0.9	2.5	-3.3	-0.6
Annualized Tracking Error (%)	-	8.8	10.6	8.4	9.9
Information Ratio	-	0.10	0.24	-0.39	-0.06
Average Annualized Turnover (%)	11.1	164.6	169.7	166.2	170.1
12-MONTH, RISK-ADJUSTED MOMENTUM					
Annualized Return (%)	10.3	8.0	9.6	9.4	13.0
Annualized Volatility (%)	28.7	30.5	32.1	29.8	31.9
Risk-Adjusted Return	0.36	0.26	0.30	0.32	0.41
Rolling 252-Day Maximum Drawdown (%)	-70.6	-74.0	-75.1	-65.6	-67.7
Annualized Excess Return (%)	-	-2.3	-0.7	-0.8	2.7
Annualized Tracking Error (%)	-	8.9	10.7	8.0	9.3
Information Ratio	-	-0.25	-0.06	-0.10	0.29
Average Annualized Turnover (%)	11.1	130.2	138.5	132.8	138.5

High momentum portfolios (Q1) and low momentum portfolios (Q5) are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on total return in RMB of the factor quintile 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. Average annual turnover is calculated from 2007 to 2017.

Procyclicality has been observed for the high momentum portfolios in China, much as in other markets. The high momentum portfolios, regardless of the weighting method, had better performance in up markets, with a higher win ratio and a higher average monthly excess return relative to the benchmark (see Exhibit 19 in the Appendix).

The sector composition of the high momentum portfolio changed more rapidly than in other factor portfolios. Over the period studied, companies selected for the high momentum portfolios were more concentrated in the Health Care and Information Technology sectors.

Compared to the S&P China A BMI, the high momentum portfolios had a small-cap bias. This might have contributed to their higher return volatility and larger return drawdowns.

In China, as in other markets, high momentum portfolios had much higher portfolio turnover than other factor portfolios.

The high momentum portfolios had much higher turnover than other factor portfolios.

QUALITY

Performance of high quality stocks cannot be comprehensively explained by classical risk factors alone—size, momentum, volatility, or value. We identified a three-pronged approach to evaluate high quality companies: profitability generation, earnings sustainability, and financial robustness [25]. In this paper, we constructed the high and low quality quintile portfolios (Q1 and Q5, respectively) following the S&P Quality Indices framework, which measures quality based on the average z-score⁶ of the return on equity (ROE), balance sheet accruals ratio (BSA), and financial leverage (LEV).

Over the examined period, the high quality portfolios outperformed the corresponding low quality portfolios on an absolute and risk-adjusted basis (see Exhibit 7). Under both weighting schemes, the high quality portfolios delivered smaller return drawdowns compared with the low quality portfolios.

The equal-weighted high quality portfolio was overweight in Health Care, Consumer Discretionary, and Information Technology compared with the float-cap-weighted S&P China A BMI. However, when the portfolio was weighted by float cap, the high quality portfolio had a significantly increased bias toward Consumer Staples (see Exhibit 22 in the Appendix).

Consistently, the high quality portfolio exhibited defensive features when it was float-cap weighted, but its return became more procyclical when it was equal weighted (see Exhibit 19 in the Appendix). This suggests the sector bias resulting from different weighting methods might have a significant impact on the returns of the quality portfolios in the Chinese market.

The high quality portfolios delivered higher absolute and risk-adjusted returns than the corresponding low quality portfolios.

⁶ The z-score for each of the three ratios for each security was calculated using the mean and standard deviation of the relevant variable within the eligible universe. The higher the ROE ratio, the higher the resulting z-score. However, the higher the BSA and LEV ratios, the lower the resulting z-score. For each security, the average z-score was computed by taking a simple average of the three z-scores. A security must have at least one z-score for it to be included in the index. Outlier average z-scores were winsorized at +/-4.

Exhibit 7: Risk/Return Profile of Quality Portfolios

CATEGORY	S&P CHINA A BMI	HIGH QUALITY PORTFOLIOS (Q1)		LOW QUALITY PORTFOLIOS (Q5)	
		FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED
Annualized Return (%)	10.3	12.1	13.4	10.9	10.7
Annualized Volatility (%)	28.7	28.6	30.8	29.8	32.0
Risk-Adjusted Return	0.36	0.42	0.44	0.37	0.33
Rolling 252-Day Maximum Drawdown (%)	-70.6	-68.1	-69.5	-71.2	-72.5
Annualized Excess Return (%)	-	1.8	3.2	0.6	0.4
Annualized Tracking Error (%)	-	6.7	8.5	7.4	8.4
Information Ratio	-	0.27	0.37	0.08	0.05
Average Annualized Turnover (%)	11.1	75.2	98.0	68.8	94.8

The high quality portfolio behaved more defensively when weighted by float cap.

ROE and LEV generated a positive quintile return spread, while BSA failed to do so.

High quality portfolios (Q1) and low quality portfolios (Q5) are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on total return in RMB of the factor quintile 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. Average annual turnover is calculated from 2007 to 2017.

To understand the contribution of BSA, LEV, and ROE to the overall performance of quality portfolios, we constructed top and bottom quintile sub-portfolios based on each of these three quality measures, following the same methodology.⁷

As shown in Exhibit 8, both ROE and LEV generated a positive quintile return spread under equal- and market-cap-weighting methods, while BSA failed to generate significant positive quintile return spread. LEV had more of an influence on the performance of the high quality portfolios when they were float-cap weighted, as demonstrated by the high quality portfolios and the Q1 LEV sub-portfolios having the highest return correlation (see Exhibit 21 in the Appendix).

Among these three quality measures, BSA was the most procyclical, while Q1 ROE and LEV sub-portfolios behaved defensively when they were float-cap weighted (see Exhibit 20 in the Appendix).

BSA was the most procyclical component, while the Q1 ROE and LEV sub-portfolios behaved defensively when they were float-cap weighted.

⁷ The quintile stocks with the highest ROE z-scores (highest ROE ratios) formed the Q1 ROE portfolio and vice versa for the Q5 ROE portfolio. The quintile stocks with the highest LEV z-scores (lowest LEV ratios) formed the Q1 LEV portfolio and vice versa for the Q5 LEV portfolio. The quintile stocks with the highest BSA z-scores (lowest BSA ratios) formed the Q1 BSA portfolio and vice versa for the Q5 BSA portfolio.

Exhibit 8: Quality Factor Performance Decomposition

CATEGORY	S&P CHINA A BMI	Q1 PORTFOLIOS		Q5 PORTFOLIOS		
		FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	
BALANCE SHEET ACCRUALS RATIO (BSA): Q1 = LOWER RATIO						
Annualized Return (%)	10.3	9.8	12.6	11.0	12.5	
Annualized Excess Return (%) Over Q5	N/A	-1.2	0.2	N/A	N/A	
Annualized Volatility (%)	28.7	29.7	31.9	29.8	32.0	
Risk-Adjusted Return	0.36	0.33	0.40	0.37	0.39	
FINANCIAL LEVERAGE (LEV): Q1 = LOWER RATIO						
Annualized Return (%)	10.3	11.2	13.6	10.6	10.2	
Annualized Excess Return (%) Over Q5	N/A	0.6	3.4	N/A	N/A	
Annualized Volatility (%)	28.7	30.2	32.1	29.4	31.6	
Risk-Adjusted Return	0.36	0.37	0.42	0.36	0.32	
RETURN ON EQUITY (ROE): Q1 = HIGHER RATIO						
Annualized Return (%)	10.3	12.2	11.8	6.7	10.7	
Annualized Excess Return (%) Over Q5	N/A	5.5	1.1	N/A	N/A	
Annualized Volatility (%)	28.7	28.2	30.7	32.7	33.0	
Risk-Adjusted Return	0.36	0.43	0.39	0.21	0.32	

Q1 and Q5 portfolios are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on total return in RMB of the factor quintile 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.

DIVIDEND

Dividend strategies have historically been popular among income-seeking market participants. Although dividend yield has been traditionally considered as a value metric, it deserves separate attention due to its distinct risk/return profile.

In our analysis, the high and low dividend quintile portfolios (Q1 and Q5, respectively) were based on companies' 12-month trailing gross dividend yield. The high dividend portfolios delivered higher absolute and risk-adjusted return than the low dividend portfolios during the examined period (see Exhibit 9). Both the equal- and float-cap weighted high dividend portfolios had smaller return drawdowns than the low dividend portfolios and the benchmark.

The high dividend portfolio displayed procyclical features when it was equal weighted. However, when float-cap weighted, it displayed marked

The high and low dividend portfolios were constructed based on companies' 12-month trailing gross dividend yield.

The high dividend portfolios delivered higher absolute and risk-adjusted returns than the low dividend portfolios.

defensive features, with higher win ratios and average monthly excess return in down markets than in up markets (see Exhibit 19 in the Appendix). Since 2009, the float-cap-weighted high dividend portfolios exhibited a strong bias toward large cap compared with the S&P China A BMI, which might have contributed to its defensive characteristics in down markets.

The high dividend portfolio exhibited defensive features when it was float-cap weighted.

The high dividend portfolios were more concentrated in the Financials and Utilities sectors, with the highest underweight in the Information Technology sector (see Exhibit 22 in the Appendix).

Exhibit 9: Risk/Return Profile of Dividend Portfolios

CATEGORY	S&P CHINA A BMI	HIGH DIVIDEND PORTFOLIOS (Q1)		LOW DIVIDEND PORTFOLIOS (Q5)	
		FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED
Annualized Return (%)	10.3	14.7	17.1	6.0	10.0
Annualized Volatility (%)	28.7	28.4	30.8	30.7	32.4
Risk-Adjusted Return	0.36	0.52	0.56	0.20	0.31
Rolling 252-Day Maximum Drawdown (%)	-70.6	-69.0	-67.9	-73.0	-72.2
Annualized Excess Return (%)	-	4.4	6.8	-4.3	-0.3
Annualized Tracking Error (%)	-	8.0	6.5	6.5	10.1
Information Ratio	-	0.55	1.05	-0.65	-0.03
Average Annual Turnover (%)	11.1	65.2	92.7	107.2	94.1

High dividend portfolios (Q1) and low dividend portfolios (Q5) are hypothetical portfolios. Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on total return in RMB of the factor quintile 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. Average annual turnover is calculated from 2007 to 2017.

The S&P DJI Chinese factor indices demonstrate indexing implementation of the examined factor strategies in the Chinese market.

INDEXING OF SMART BETA STRATEGIES

The S&P DJI Chinese factor indices are designed to track the performance of stocks with specific factor characteristics. Performance characteristics of the S&P DJI Chinese factor indices might deviate from those observed in their respective hypothetical quintile portfolios, due to the difference in methods of stock selection and weighting, along with the incorporation of rebalancing buffers and other portfolio diversification constraints.

The S&P China A-Share Enhanced Value Index, S&P China A-Share Short-Term Momentum Index, and S&P China A-Share Quality Index include the 100 stocks from the eligible universe⁸ with the highest factor scores. The stocks are weighted by their score-tilted market cap, subject to security and sector constraints. The S&P China A-Share Low Volatility Index includes

⁸ All portfolio constituents are drawn from the combined universe of the S&P China A BMI and S&P China A Venture Enterprises Index, except for the S&P China A-Share Dividend Opportunities Index. To ensure investability, eligible stocks must have a float-adjusted market capitalization of no less than RMB 1 billion and a three-month average daily value traded not below RMB 20 million.

the 100 stocks from the same eligible universe with the lowest realized return volatility, and the stocks are weighted by the inverse of volatility. The S&P China A-Share Dividend Opportunities Index includes the 100 stocks from the S&P China A Composite Index with the highest dividend yield, while meeting earnings-per-share growth criteria, with all the stocks weighted by their dividend yield. All indices are rebalanced semiannually, apart from the S&P China A-Share Low Volatility Index, which is rebalanced quarterly.

Nearly all the indices delivered excess returns on an absolute and risk-adjusted basis versus the S&P China A BMI.

Over the examined period between July 31, 2006, and Nov. 30, 2018, all the factor indices except for the S&P China A-Share Short-Term Momentum Index delivered excess returns on an absolute and risk-adjusted basis versus the S&P China A BMI (see Exhibit 10). Among all the S&P DJI Chinese factor indices, the S&P China A-Share Dividend Opportunities Index and S&P China A-Share Low Volatility Index were the best-performing indices over the period. The S&P China A-Share Short-Term Momentum Index failed to generate excess returns in the long run.

From a return volatility perspective, only the S&P China A-Share Low Volatility Index recorded both lower volatility and smaller return drawdowns than the S&P China A BMI, while the S&P China A-Share Short-Term Momentum Index had the most volatile returns among the S&P DJI Chinese factor indices.

Exhibit 10: Risk/Return Profile of the S&P DJI Chinese Factor Indices

TRAIT	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY	S&P CHINA A BMI
Annualized Return (%)	19.6	9.3	16.9	19.5	12.2	18.9	10.3
Annualized Volatility (%)	34.1	32.2	29.9	29.5	28.9	26.7	28.7
Risk-Adjusted Return	0.58	0.29	0.56	0.66	0.42	0.71	0.36
252-Day Maximum Drawdown (%)	-68.2	-73.7	-70.8	-66.4	-67.5	-62.0	-70.6
Annualized Excess Return (%)	9.3	-1.0	6.6	9.2	2.0	8.6	N/A
Annualized Tracking Error (%)	13.9	12.1	13.5	7.6	8.7	8.7	N/A
Information Ratio	0.67	-0.08	0.49	1.21	0.22	0.98	N/A
Average Annualized Turnover (%)	150.2	181.5	51.1	95.3	74.5	119.6	11.1

Only the S&P China A-Share Low Volatility Index recorded both lower volatility and smaller return drawdowns than the benchmark.

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with the lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Index performance based on total returns in RMB of the S&P DJI Chinese factor indices. 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. Average annual turnover is calculated from 2007 to 2017.

Almost all the factor indices tended to underweight the Financials sector.

All the factor indices except for the S&P China A-Share Enhanced Value Index tended to underweight the Financials sector compared with the S&P China A BMI. Sector tilts were observed in various factor indices. While the S&P China A-Share Enhanced Value Index was historically overweight in the Financials and Materials sectors, the S&P China A-Share Short-Term Momentum Index was more biased toward the Information Technology and Health Care sectors. The S&P China A-Share Low Volatility Index, weighted by the inverse of volatility, allocated more to the Utilities and Industrials sectors, while the S&P China A-Share Quality Index showed bias toward the Consumer Staples, Health Care, and Consumer Discretionary sectors. The S&P China A-Share Dividend Opportunities Index had an average sector bias toward Consumer Discretionary and Industrials (see Exhibit 11).

The S&P Chinese factor indices exhibited designated characteristic tilts relative to the S&P China A BMI...

Exhibit 11: Sector Breakdown of the S&P DJI Chinese Factor Indices

AVERAGE SECTOR BIAS (%)	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY
Energy	-2.6	-1.0	-0.6	2.4	0.9	-0.3
Materials	6.1	2.1	6.0	0.3	-5.8	-3.0
Industrials	6.8	1.0	-1.0	4.6	-2.3	4.5
Consumer Discretionary	6.6	1.4	-2.3	5.0	4.3	0.8
Consumer Staples	0.7	2.8	-5.8	-1.6	14.6	0.7
Health Care	0.2	4.5	-5.3	-1.5	6.7	3.2
Financials	-19.0	-14.3	17.1	-7.3	-13.5	-6.7
Information Technology	4.7	6.0	-5.9	-4.3	1.9	-3.9
Telecommunication Services	-0.5	-0.4	1.7	-0.8	-0.5	-0.1
Utilities	-1.7	-1.3	-0.7	3.5	-3.0	8.3
Real Estate	-1.2	-0.8	-3.0	-0.5	-3.3	-3.4

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from June 2006 to June 2018 for the S&P DJI Chinese factor indices. Table is provided for illustrative purposes. Dark blue numbers indicate sectors in which the factor index was most overweight, and light blue numbers indicate sectors in which the factor index was most underweight.

...and all of them, except for the S&P China A-Share Enhanced Value, had different degrees of small-cap tilts.

All S&P DJI Chinese factor indices, except for the S&P China A-Share Quality Index, exhibited designated characteristic tilts relative to the eligible universe, as shown in Exhibit 12. The S&P China A-Share Quality Index had a strong tilt toward high ROE and low financial leverage, but had no designated tilt toward a low accrual ratio, which is consistent with the low return correlation between the Q1 BSA portfolio and high quality quintile portfolio under the float-cap weighting method (see Exhibit 21 in Appendix).

All S&P DJI Chinese factor indices, except for the S&P China A-Share Enhanced Value Index, had different degrees of small-cap tilts. Unintended fundamental characteristic tilts were also observed for various indices. The small-cap portfolio exhibited tilts toward high volatility, low momentum, low

dividend yield, low financial leverage, and low ROE. The S&P China A-Share Short-Term Momentum Index displayed a high volatility tilt and low dividend yield. The S&P China A-Share Enhanced Value had additional tilts toward low volatility, low momentum, and high dividend yield. The S&P China A-Share Dividend Opportunities Index demonstrated tilts toward cheaper valuation. The S&P China A-Share Quality Index exhibited a historical tilt toward a high price-to-book ratio and high EPS growth, while the S&P China A-Share Low Volatility Index had unintended bias toward low momentum and cheaper valuation.

Exhibit 12: Characteristics of the S&P DJI Chinese Factor Indices

CHARACTERISTIC	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY
Market Capitalization	-17.0	-8.0	1.8	-1.5	-4.3	-0.4
12-Month Volatility	7.6	6.4	-8.9	-4.4	-0.1	-24.1
36-Month Beta	-0.7	0.7	-4.1	-2.3	-2.4	-6.7
One-Year Price Change	-5.2	9.9	-6.1	-4.9	1.4	-7.5
Dividend Yield	-6.6	-6.3	7.3	17.1	1.5	4.0
Price-to-Earnings	2.5	2.3	-11.7	-10.9	-3.2	-4.6
Price-to-Sales	0.4	3.2	-21.9	-6.9	2.9	-3.8
Price-to-Book	0.2	5.7	-21.7	-8.4	4.3	-6.9
Historical Three-Year Sales Growth	-3.6	-0.3	-0.3	-1.6	0.3	-3.0
Historical Three-Year EPS Growth	-2.5	0.0	-0.4	1.2	4.3	-2.3
Long-Term Debt to Capital	-5.9	-1.4	2.8	-0.4	-10.4	0.4
ROE	-5.9	-0.8	2.3	3.2	10.4	-1.6
BSA Ratio (L90D)	0.7	0.8	-1.4	-0.7	1.0	-1.5

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC, FactSet Characteristics Tilt Report. Averaged characteristic tilts of the S&P DJI Chinese factor indices are calculated as the weighted Welch's T-test relative to the eligible universe as of semiannual rebalances between June 2006 to June 2018. 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. Dark blue numbers indicate intended factor biases, and light blue numbers indicate unintended biases.

The momentum index and small-cap portfolio tended to have better performance in up markets...

...but the low volatility, value, quality and dividend indices performed better in down markets.

Most factor indices in China exhibited distinct return characteristics during up and down markets, due to the difference in sector and fundamental characteristic tilts. The momentum index and the small-cap portfolio tended to have better performance in up markets, but the low volatility, value, quality, and dividend indices performed better in down markets (see Exhibit 13).

Exhibit 13: Performance of the S&P DJI Chinese Factor Indices in Up and Down Markets

INDICES	MONTHS OUTPERFORMED (%)			AVERAGE MONTHLY EXCESS RETURN (%)		
	UP MONTHS	DOWN MONTHS	ALL MONTHS	UP MONTHS	DOWN MONTHS	ALL MONTHS
Small Cap	69.0	45.9	59.5	1.4	0.0	0.9
Momentum	56.3	41.0	50.0	0.4	-0.4	0.1
Value	43.7	63.9	52.0	0.0	1.4	0.6
Dividend	55.2	68.9	60.8	0.6	0.8	0.7
Quality	48.3	62.3	54.1	-0.1	0.4	0.1
Low Volatility	41.4	78.7	56.8	-0.3	1.8	0.6

The correlation across different factors was fairly low in the Chinese market.

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Figures based on monthly total return in RMB for the S&P DJI Chinese factor indices. 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.

Correlation across different factors was fairly low over the examined period, indicating the potential advantage of blending various factors for risk diversification benefits (see Exhibit 14).

Exhibit 14: Correlation of Factor Excess Returns

CORRELATION	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY
SMALL CAP	1.00	0.31	-0.43	0.10	0.10	0.04
MOMENTUM	-	1.00	-0.42	-0.13	0.37	-0.15
VALUE	-	-	1.00	0.39	-0.25	0.23
DIVIDEND	-	-	-	1.00	0.08	0.47
QUALITY	-	-	-	-	1.00	0.06
LOW VOLATILITY	-	-	-	-	-	1.00

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Correlation based on daily excess total returns in RMB for the S&P DJI Chinese factor indices relative to the S&P China A BMI. 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 portfolios exhibited cyclical in their returns, with short-term periods of out- and underperformance.

MACROECONOMIC REGIME ANALYSIS

Factor portfolios exhibited cyclical in their returns with short-term periods of outperformance and underperformance. Factor strategies can be useful tools for implementation of active views on the Chinese equity market due to distinct cyclical in the factor performance. To better understand the cyclical behavior of factor strategies, we examined factor performance in two market regimes—the equity market cycle and investor sentiment—from July 31, 2006, to Nov. 30, 2018.

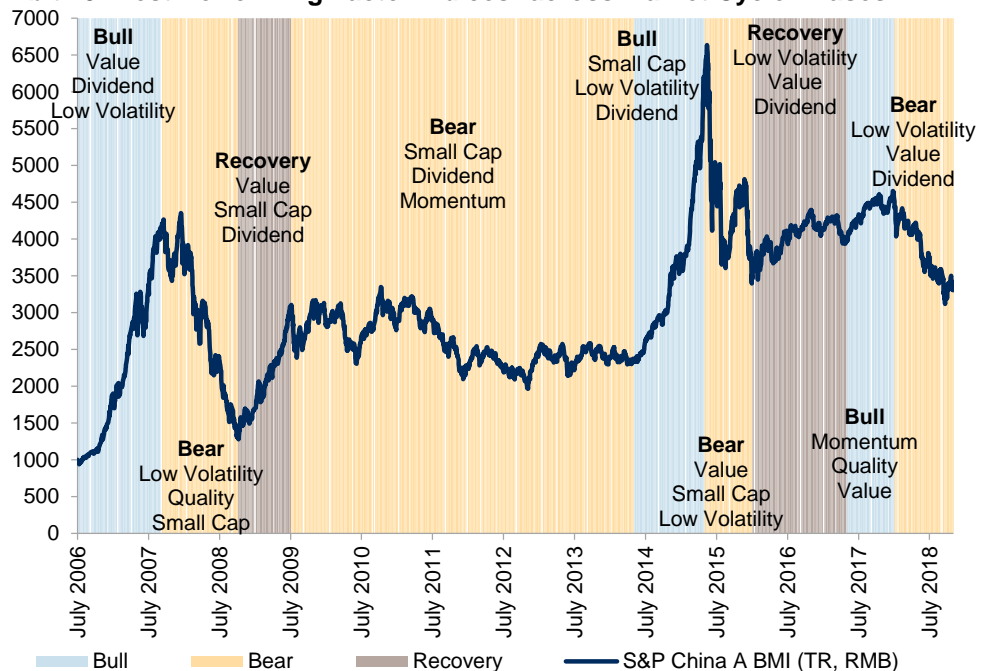
Factor Performance across Market Cycles

Market cycles refer to the upward and downward movement of stock markets. We identified nine market cycle phases (three bullish, two recovery, and four bearish) in the Chinese equity market from July 31, 2006, to Nov. 30, 2018, based on the performance trends of the S&P China A BMI (see Exhibit 15).

Factor indices in China were sensitive to the local market cycles, with momentum and value being more cyclical, and quality and low volatility being more defensive.

Factor indices in China were sensitive to the local market cycles, with momentum being more cyclical, and quality and low volatility being more defensive. The three factors that delivered the most favorable returns in each bullish, bearish, and recovery period are highlighted in Exhibit 15.

Exhibit 15: Best-Performing Factor Indices* across Market Cycle Phases



Momentum outperformed in bullish and bearish markets, with more pronounced excess returns during bullish markets.

Value, high dividend, and small-cap stocks had strong outperformance when the market recovered from its troughs.

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Bullish phases include the three periods from August 2006 to September 2007, June 2014 to May 2015, and June 2017 to January 2018. Bearish phases cover the four periods from October 2007 to October 2008, August 2009 to May 2014, June 2015 to January 2016, and February 2018 to November 2018. Recovery phases include the two periods from November 2008 to July 2009 and February 2016 to May 2017. Index performance based on total returns in RMB of the S&P DJI Chinese factor Indices. 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. *Top three best-performing factor indices ordered by excess return relative to the S&P China A BMI in descending order in each period.

Momentum appeared to have higher average monthly excess returns in bullish markets than in bearish markets and suffered the most from price trend reversals during recovery periods (see Exhibit 16).

Value, high dividend, and small-cap stocks generated positive average monthly excess returns in all three market cycle phases, and all three

Low volatility stocks were defensive, with most outperformance during bearish markets.

factors had strong performance when the market recovered from its troughs. However, value stocks had the highest excess return in the recovery periods, while high dividend and small-cap stocks performed best in bullish and bearish markets, respectively.

Low volatility stocks were defensive, with most of their outperformance from bearish markets, while underperforming in recovery periods. Quality stocks outperformed the benchmark in bearish and recovery periods, with more pronounced excess returns during bearish markets, but their defensive features were not as strong as those seen in low volatility stocks.

Quality stocks outperformed in bearish and recovery market phases...

Exhibit 16: Factor Index Performance versus the S&P China A BMI across Market Cycle Phases

MARKET CYCLE PHASE	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY
AVERAGE EXCESS RETURN (ANNUALIZED, %)						
Bull	0.4	9.2	11.5	16.7	-4.0	6.0
Bear	16.3	1.4	3.5	6.7	4.1	10.5
Recovery	6.4	-11.6	13.1	5.5	0.8	-3.8
INFORMATION RATIO						
Bull	0.02	0.41	0.54	1.54	-0.29	0.47
Bear	1.15	0.09	0.28	0.89	0.46	1.09
Recovery	0.39	-1.02	1.09	0.93	0.12	-0.34
PERCENTAGE OF OUTPERFORMANCE						
Bull	47.1	52.9	47.1	61.8	41.2	44.1
Bear	61.8	53.9	49.4	59.6	59.6	64.0
Recovery	68.0	32.0	68.0	64.0	52.0	48.0

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Index performance based on monthly total returns in RMB of the S&P DJI Chinese factor indices. 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. Excess return, information ratio, and percentage of outperformance were calculated relative to the S&P China A BMI.

Factor Performance across Different Investor Sentiment Regimes

Investor sentiment regimes reflect the overall attitude of market participants toward the financial market, as measured by the activity and price movement of the stock market. In our analysis, the 30-day realized return volatility of the S&P China A BMI is used as the indicator of investor sentiment (bullish, neutral, and bearish) toward the Chinese equity market. We sorted the month-end volatility values over the examined period; values in the top quintile (high market volatility) represent a bearish market sentiment, values in the bottom quintile (low market volatility) represent a bullish market regime, and values between the top and bottom quintiles represent a neutral market regime. We then compared the performance of each factor index across the different regimes (see Exhibit 17).

...with more pronounced excess returns during bearish markets.

Most of the factor indices tended to be sensitive to both bullish and bearish sentiments.

Most of the factor indices we examined in the Chinese market tended to be sensitive to both bullish and bearish sentiments, as the pronounced outperformance and underperformance appeared under these two conditions. Among the three investor sentiments, value stocks performed best during bullish sentiments. In contrast, low volatility, high dividend, and high quality stocks performed best during bearish sentiments. Uniquely to the Chinese market over this period, small-cap and high momentum stocks were rewarded by market participants during bearish and neutral sentiments, but they underperformed the benchmark during bullish sentiments.

Among the three investor sentiments, value stocks performed best in bullish sentiments.

Exhibit 17: Factor Index Performance versus the S&P China A BMI in Different Investor Sentiment Regimes

MARKET SENTIMENT	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY
AVERAGE EXCESS RETURN (ANNUALIZED, %)						
Bullish	-2.6	-0.8	9.4	8.1	1.6	8.5
Neutral	7.6	0.1	7.1	5.1	0.4	2.0
Bearish	36.6	4.4	3.8	20.9	5.5	21.0
INFORMATION RATIO						
Bullish	-0.16	-0.06	0.80	1.31	0.14	1.29
Neutral	0.45	0.01	0.48	0.65	0.04	0.19
Bearish	1.76	0.21	0.21	2.02	0.64	1.61
PERCENTAGE OF OUTPERFORMANCE (%)						
Bullish	50.0	43.3	50.0	66.7	40.0	56.7
Neutral	60.2	51.1	52.3	55.7	55.7	53.4
Bearish	66.7	53.3	53.3	70.0	63.3	66.7

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Index performance based on monthly total returns in RMB of the S&P DJI Chinese factor indices. 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. Excess returns, information ratio, and percentage of outperformance were calculated relative to the S&P China A BMI.

In contrast, low volatility, high dividend, and high quality stocks performed best in bearish sentiments.

Investor sentiment changes more frequently than market cycle phases, and its analysis could serve as a useful complement to explain short-term factor performance in different market conditions. Exhibit 18 summarizes the factor performance characteristics across various market cycles and investor sentiment regimes.

Exhibit 18: Performance across Different Market Cycles and Investor Sentiment Regimes in China

CATEGORY	PHASE	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY
Market Cycles	Bullish	▲	▲	▲	▲	▲	▲
	Bearish	▲	▲	▲	▲	▲	▲
	Recovery Period	▲	▲	▲	▲	▲	▲
Investor Sentiment	Bullish	▲	▲	▲	▲	▲	▲
	Neutral	▲	▲	▲	▲	▲	▲
	Bearish	▲	▲	▲	▲	▲	▲

The Small Cap portfolio is a hypothetical portfolio that includes the 100 stocks from the eligible universe with lowest float-adjusted market capitalization, and stocks are float-adjusted market capitalization weighted.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Index performance based on monthly total returns in RMB of the S&P DJI Chinese factor indices. Past performance is no guarantee of future results. Table is provided for illustrative purposes. Note: Light blue, upward triangles represent favorable performance, while dark blue, downward triangles represent unfavorable performance based on excess returns versus the S&P China A BMI of each factor. The three factors with the highest information ratio in each of the market cycle phases are circled in yellow.

We observed that all factors delivered positive absolute and risk-adjusted return spreads under both equal- and market-cap-weighted methods.

CONCLUSION

In this paper, we examined the effectiveness of six well-known factors, including size, value, low volatility, momentum, quality, and dividends, in the Chinese equity market, as well as the behavior of these factors under different market regimes from July 31, 2006, to Nov. 30, 2018.

From the quintile analysis, we observed that all factors delivered positive absolute and risk-adjusted return spreads under both equal- and market-cap-weighting methods. The low volatility, value, and high dividend portfolios generated the highest risk-adjusted return spreads, while the high quality generated the lowest risk-adjusted return spreads.

From a risk perspective, the low volatility portfolios, float-cap-weighted high quality portfolio, and float-cap-weighted high dividend portfolio showed both lower volatility and smaller return drawdowns compared with the market benchmark.

Small-cap and high momentum top quintile portfolios behaved procyclically, while low volatility portfolios displayed marked defensive features. This shows the potential benefit to return enhancement and risk reduction of various factor-based strategies in the Chinese equity market.

All of the S&P DJI Chinese factor indices, except the momentum index, outperformed the S&P China A BMI on an absolute and risk-adjusted basis in the long run. The low volatility and high dividend indices delivered the highest absolute and risk-adjusted returns, while only the low volatility index had both reduced return volatility and drawdown compared with the S&P China A BMI. Compared with the S&P China A BMI, all factor indices had unique sector tilts. Except for the value index, all factor indices tended to underweight Financials.

All S&P DJI Chinese factor indices except the momentum index outperformed the benchmark on an absolute and risk-adjusted basis in the long run.

As most factors in China displayed distinct cyclical performance...

Additionally, most S&P DJI Chinese factor indices exhibited targeted fundamental tilts relative to the S&P China A BMI, and all of them, except for the value index, had small-cap tilts. Due to the difference in sector and fundamental characteristic tilts, most factor indices exhibited distinct cyclical features, with different factors leading and lagging in the up and down markets. Correlation across different factors was fairly low over the examined period, indicating the potential advantage of blending various factors for risk diversification benefits.

Based on our regime analysis, factor portfolios in China tended to be sensitive to local market cycles, with momentum being more cyclical, and quality and low volatility being more defensive.

...they can be useful tools for implementation of active views on the Chinese equity market.

Investor sentiment switched more frequently than market cycle phases, and its analysis serves as a useful complement to explain short-term factor performance in different market conditions. The value factor performed better during bullish sentiments than bearish or neutral sentiments. In contrast, low volatility, high dividend, and high quality stocks performed better during bearish sentiments than bullish or neutral sentiment conditions. Surprisingly, small-cap and high momentum stocks in China were rewarded by market participants during bearish and neutral sentiments, but they underperformed the benchmark during bullish sentiments.

As most factors in China displayed distinct cyclical performance, they can be useful tools for the implementation of active views on the Chinese equity market. In addition, a multi-factor approach may be a way to harvest the factor premium while diversifying factor risk exposure.

APPENDIX

Exhibit 19: Performance of Top Quintile Factor Portfolios in Up and Down Markets

FACTOR	% OF MONTH OUTPERFORMED			AVERAGE MONTHLY EXCESS RETURN (%)		
	UP MONTHS	DOWN MONTHS	ALL MONTHS	UP MONTHS	DOWN MONTHS	ALL MONTHS
EQUAL-WEIGHTED TOP QUINTILE PORTFOLIOS						
Small Cap	63.2	42.6	54.7	1.3	-0.1	0.7
Value	58.6	45.9	53.4	1.0	-0.1	0.5
Low Volatility	52.9	73.8	61.5	0.0	1.1	0.4
Momentum	57.5	47.5	53.4	0.8	-0.3	0.3
Quality	57.5	45.9	52.7	0.4	0.1	0.3
Dividend	63.2	55.7	60.1	0.7	0.3	0.6
FLOAT-CAP-WEIGHTED TOP QUINTILE PORTFOLIOS						
Small Cap	63.2	42.6	54.7	1.2	-0.2	0.7
Value	48.3	60.7	53.4	0.2	0.7	0.4
Low Volatility	34.5	83.6	54.7	-0.8	1.6	0.2
Momentum	54.0	44.3	50.0	0.1	0.1	0.1
Quality	48.3	57.4	52.0	-0.1	0.5	0.1
Dividend	42.5	70.5	54.1	0.0	0.9	0.3

All factor portfolios are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Portfolio performance based on monthly total return in RMB. 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 20: Performance of Top Quintile Quality Factor Sub-Portfolios in Up And Down Markets

FACTOR	% OF MONTH OUTPERFORMED			AVERAGE MONTHLY EXCESS RETURN (%)		
	UP MONTHS	DOWN MONTHS	ALL MONTHS	UP MONTHS	DOWN MONTHS	ALL MONTHS
EQUAL-WEIGHTED TOP QUINTILE QUALITY FACTOR SUB-PORTFOLIOS						
BSA Ratio	64.4	41.0	54.7	0.8	-0.4	0.3
Financial Leverage	57.5	47.5	53.4	0.5	0.0	0.3
ROE	57.5	45.9	52.7	0.4	-0.1	0.2
FLOAT-CAP-WEIGHTED TOP QUINTILE QUALITY FACTOR SUB-PORTFOLIOS						
BSA Ratio	56.3	45.9	52.0	0.2	-0.4	0.0
Financial Leverage	49.4	55.7	52.0	0.0	0.2	0.1
ROE	37.9	60.7	47.3	-0.2	0.6	0.1

All factor portfolios are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Portfolio performance based on monthly total return in RMB. 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 21: Correlation of Top Quintile Quality Factor Excess Return

EQUAL-WEIGHTED TOP QUINTILE PORTFOLIOS				
CORRELATION	BSA RATIO	FINANCIAL LEVERAGE	ROE	QUALITY
BSA RATIO	1.00	0.81	0.59	0.79
FINANCIAL LEVERAGE	-	1.00	0.76	0.89
ROE	-	-	1.00	0.88
QUALITY	-	-	-	1.00

FLOAT-CAP-WEIGHTED TOP QUINTILE PORTFOLIOS				
CORRELATION	BSA RATIO	FINANCIAL LEVERAGE	ROE	QUALITY
BSA RATIO	1.00	0.25	-0.22	0.17
FINANCIAL LEVERAGE	-	1.00	-0.23	0.58
ROE	-	-	1.00	0.22
QUALITY	-	-	-	1.00

All factor portfolios are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Correlation based on daily excess total returns in RMB.

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 22: Sector Bias of Top Quintile Factor Portfolios

EQUAL-WEIGHTED TOP QUINTILE PORTFOLIOS RELATIVE TO S&P CHINA A BMI EQUAL WEIGHTED PORTFOLIO	AVERAGE SECTOR BIAS (%)					
	SMALL CAP	MOMENTUM	VALUE	DIVIDEND	QUALITY	LOW VOLATILITY
Energy	-0.9	-0.3	0.9	2.1	2.1	0.2
Materials	0.7	-1.2	5.7	-1.5	-6.9	-4.7
Industrials	1.9	-1.0	2.5	0.7	-2.3	0.4
Consumer Discretionary	1.3	-1.8	0.3	-1.0	1.0	-0.6
Consumer Staples	-0.2	0.3	-4.3	-1.4	2.3	-0.1
Health Care	-0.8	3.2	-4.1	-1.2	5.3	3.4
Financials	-2.0	0.0	2.8	3.7	0.2	4.4
Information Technology	2.6	2.3	-6.2	-3.9	1.5	-4.7
Telecommunication Services	-0.1	0.0	0.2	-0.1	0.0	0.3
Utilities	-1.2	-0.6	1.8	3.2	-1.8	4.3
Real Estate	-1.4	-1.0	0.4	-0.7	-1.4	-3.0

FLOAT-CAP-WEIGHTED TOP QUINTILE PORTFOLIOS RELATIVE TO S&P CHINA A BMI						
Energy	-2.3	-1.3	-0.1	1.3	3.8	0.4
Materials	5.5	-0.8	3.8	-0.7	-3.5	-6.0
Industrials	6.9	-0.3	-0.9	-3.1	-1.2	-3.6
Consumer Discretionary	5.9	0.3	-1.0	-2.8	3.0	-3.1
Consumer Staples	0.2	2.8	-5.1	-2.0	7.6	0.0
Health Care	0.2	3.1	-4.5	-3.1	5.5	0.6
Financials	-19.0	-4.1	11.6	13.2	-12.5	15.9
Information Technology	5.1	2.3	-5.0	-4.4	1.6	-4.0
Telecommunication Services	-0.6	-0.3	1.2	-0.4	0.1	1.0
Utilities	-1.1	-0.6	0.6	3.1	-1.2	2.6
Real Estate	-0.9	-1.0	-0.7	-1.2	-3.2	-3.7

All factor portfolios and S&P China A BMI Equal Weighted Portfolio are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC. Data from July 31, 2006, to Nov. 30, 2018. Table is provided for illustrative purposes. Light blue numbers indicate sectors in which the factor portfolio was most underweight, and dark blue numbers indicate sectors in which the factor portfolio was most overweight.

REFERENCES

1. Boyadzhiev, Dimitar, Bryan, Alex, Choy, Jackie, Johnson, Ben, and Venkataraman, Anshula, (2017). "A Global Guide to Strategic-Beta Exchange-Traded Products". Morningstar Manager Research.
2. Fama, Eugene F. and French, Kenneth R., (1992). "The Cross-Section of Expected Stock Returns". *Journal of Finance*. 47, 427-465.
3. Fama, Eugene F. and French, Kenneth R., (1993). "Common Risk Factors in the Returns on Stocks and Bonds". *Journal of Financial Economics*. 33, 3-56.
4. Amihud, Yakov, (2002). "Illiquidity and Stock Returns: Cross-Section and Time-Series Effects". *Journal of Financial Markets*. 5, 32-56.
5. Zhang, Frank X., (2006). "Information Uncertainty and Stock Returns". *Journal of Finance*. Vol. LXI, No.1, 105-136.
6. Chan, K. C. and Chen, Nai-fu, (1991). "Structural and Return Characteristics of Small and Large Firms". *Journal of Finance*. 46, 1467-1484.
7. Vassalou, M. and Xing, Y., (2004). "Default Risk in Equity Returns". *Journal of Finance*. LIX, 2, 831-868.
8. Lakonishok, J., Shleifer, A., and Vishny, R.W., (1994). "Contrarian Investment, Extrapolation, and Risk". *Journal of Finance*. Vol 69 (5), 1541-1578.
9. Rizova, S., (2006). "International Evidence on the Size Effect". Dimensional Fund Advisors, White paper.
10. Graham, Benjamin and Dodd, David, (1934). *Security Analysis: Principles and Techniques*. New York: McGraw-Hill.
11. Fama, Eugene F. and French, Kenneth R., (1996). "Multifactor Explanations of Asset Pricing Anomalies". *Journal of Finance*. 51, 55-84.
12. Friend, I. and Blume, M., (1970). "Measurement of Portfolio Performance Under Uncertainty". *American Economic Review*. Vol.65, 561-575.
13. Haugen, R. and Baker, N., (1991). "The Efficient Market Inefficiency of Capitalization-Weighted Stock Portfolios". *Journal of Portfolio Management*. 17, 35-40.
14. Jagannathan, R. and Ma, T., (2003). "Risk Reduction in Large Portfolios: Why Imposing the Wrong Constraints Helps". *Journal of Finance*. 58, 1651-1684.
15. Clarke, R., de Silva, H., and Thorley, S., (2006). "Minimum-Variance Portfolios in the U.S. Equity Market". *Journal of Portfolio Management*. 33, 10-24.
16. Ang, A., Hodrick, J., Xing, Y., and Zhang, X., (2006). "The Cross-Section of Volatility and Expected Returns". *Journal of Finance*. 61, 259-299.
17. Ang, A., Hodrick, J., Xing, Y., and Zhang, X., (2009). "High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence". *Journal of Financial Economics*. Vol 91, 1-23.

18. Dutt, T. and Humphery-Jenner, M., (2013). "Stock Return Volatility, Operating Performance and Stock Returns: International Evidence on Drivers of the 'Low Volatility' Anomaly". *Journal of Banking and Finance*. Vol 37(3), 99-1017.
19. Baker, M., Bradley B., and Wurgler J., (2011). "Benchmarks as Limits to Arbitrage: Understanding the Low-Volatility Anomaly". *Financial Analysts Journal*. 67, 40-54.
20. Jegadeesh, Narasimhan and Sheridan, Titman, (1993). "Returns to Buying Winners and Selling Losers: Implications for Stock Market Inefficiency". *Journal of Finance*. 48, 65-91.
21. Rowenhorst, K. G., (1998). "International Momentum Strategies". *Journal of Finance*. 53, 267-284.
22. Daniel, K.D., Hirshleifer, D., and Subrahmanyam, A., (2001). "Overconfidence, Arbitrage, and Equilibrium Asset Pricing". *Journal of Finance*. Vol 56(3), 921-965.
23. Hong, H., Lim, T., and Stein, J. C., (2000). "Bad News Travels Slowly: Size, Analyst Coverage and the Profitability of Momentum Strategies". *Journal of Finance*. Vol 55(1), 265-295.
24. Vayanos, Dimitri and Wooley, Paul, (2011). "An Institutional Theory of Momentum and Reversal". London School of Economics (LSE), Working paper.
25. Ung, Daniel and Luk, Priscilla (2014). "Quality: A Distinct Equity Factor?". S&P Dow Jones Indices.

S&P DJI RESEARCH CONTRIBUTORS		
Sunjiv Mainie, CFA, CQF	Global Head	sunjiv.mainie@spglobal.com
Jake Vukelic	Business Manager	jake.vukelic@spglobal.com
GLOBAL RESEARCH & DESIGN		
AMERICAS		
Aye M. Soe, CFA	Americas Head	aye.soe@spglobal.com
Cristopher Anguiano, FRM	Analyst	cristopher.anguiano@spglobal.com
Phillip Brzenk, CFA	Senior 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
Hamish Preston	Associate Director	hamish.preston@spglobal.com
Maria Sanchez	Associate Director	maria.sanchez@spglobal.com
Kunal Sharma	Senior Analyst	kunal.sharma@spglobal.com
Kelly Tang, CFA	Director	kelly.tang@spglobal.com
Hong Xie, CFA	Senior Director	hong.xie@spglobal.com
APAC		
Priscilla Luk	APAC Head	priscilla.luk@spglobal.com
Arpit Gupta	Senior Analyst	arpit.gupta1@spglobal.com
Akash Jain	Associate Director	akash.jain@spglobal.com
Anurag Kumar	Senior Analyst	anurag.kumar@spglobal.com
Xiaoya Qu	Senior Analyst	xiaoya.qu@spglobal.com
Yan Sun	Senior Analyst	yan.sun@spglobal.com
Liyu Zeng, CFA	Director	liyu.zeng@spglobal.com
EMEA		
Sunjiv Mainie, CFA, CQF	EMEA Head	sunjiv.mainie@spglobal.com
Leonardo Cabrer, PhD	Senior Analyst	leonardo.cabrer@spglobal.com
Andrew Cairns	Senior Analyst	andrew.cairns@spglobal.com
Andrew Innes	Associate Director	andrew.innes@spglobal.com
Jingwen Shi	Analyst	jingwen.shi@spglobal.com
INDEX INVESTMENT STRATEGY		
Craig J. Lazzara, CFA	Global Head	craig.lazzara@spglobal.com
Chris Bennett, CFA	Director	chris.bennett@spglobal.com
Fei Mei Chan	Director	feimei.chan@spglobal.com
Tim Edwards, PhD	Managing Director	tim.edwards@spglobal.com
Anu R. Ganti, CFA	Director	anu.ganti@spglobal.com
Sherifa Issifu	Analyst	sherifa.issifu@spglobal.com
Howard Silverblatt	Senior Index Analyst	howard.silverblatt@spglobal.com

PERFORMANCE DISCLOSURE

The S&P China A BMI was launched on November 27, 2013. The S&P China A-Share Dividend Opportunities Index was launched on September 11, 2008. The S&P China A-Share Enhanced Value, S&P China A-Share Short-Term Momentum Index, S&P China A-Share Quality, S&P China A-Share Low Volatility Index were launched on July 11, 2018. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. Complete index methodology details are available at www.spdji.com.

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

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

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

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

GENERAL DISCLAIMER

Copyright © 2019 S&P Dow Jones Indices LLC. All rights reserved. STANDARD & POOR'S, S&P, S&P 500, S&P 500 LOW VOLATILITY INDEX, S&P 100, S&P COMPOSITE 1500, S&P MIDCAP 400, S&P SMALLCAP 600, S&P GIVI, GLOBAL TITANS, DIVIDEND ARISTOCRATS, S&P TARGET DATE INDICES, GICS, SPIVA, SPDR and INDEXOLOGY are registered trademarks of Standard & Poor's Financial Services LLC, a division of S&P Global ("S&P"). DOW JONES, DJ, DJIA and DOW JONES INDUSTRIAL AVERAGE are registered trademarks of Dow Jones Trademark Holdings LLC ("Dow Jones"). These trademarks together with others have been licensed to S&P Dow Jones Indices LLC. Redistribution or reproduction in whole or in part are prohibited without written permission of S&P Dow Jones Indices LLC. This document does not constitute an offer of services in jurisdictions where S&P Dow Jones Indices LLC, S&P, Dow Jones or their respective affiliates (collectively "S&P Dow Jones Indices") do not have the necessary licenses. Except for certain custom index calculation services, all information provided by S&P Dow Jones Indices is impersonal and not tailored to the needs of any person, entity or group of persons. S&P Dow Jones Indices receives compensation in connection with licensing its indices to third parties and providing custom calculation services. Past performance of an index is not an indication or guarantee of future results.

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

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

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

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

The Global Industry Classification Standard (GICS®) was developed by and is the exclusive property and a trademark of S&P and MSCI. Neither MSCI, S&P nor any other party involved in making or compiling any GICS classifications makes any express or implied warranties or representations with respect to such standard or classification (or the results to be obtained by the use thereof), and all such parties hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability or fitness for a particular purpose with respect to any of such standard or classification. Without limiting any of the foregoing, in no event shall MSCI, S&P, any of their affiliates or any third party involved in making or compiling any GICS classifications have any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) even if notified of the possibility of such damages.]