

CONTRIBUTOR

Liyu Zeng, CFA
Director
Global Research and Design
liyu.zeng@spglobal.com

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Examining Factor Strategies in China's A-Share Market

ALTERNATE BETA AND FACTOR INVESTING STRATEGIES

Traditionally, indices are constructed using the market-cap-weighted method. The theoretical foundation for market-cap-weighted indices as a basis for investment lies in the Capital Asset Pricing Model (CAPM) and the Efficient Market Hypothesis. In practice, market-cap-weighted indices have become the mainstream basis for passive investment because of the perceived benefits, such as self-rebalancing, low turnover, and low transaction costs. However, due to the embedded link between stock weights and stock prices, market-cap-weighted strategies could be more vulnerable to price bubbles, such as the late 1990s technology bubble and the 2007 financial bubble in the U.S.

The bitterness experienced during the market crash of the early 2000s led to an indexing innovation that goes beyond CAPM. As a result, we have witnessed a growing interest and proliferation of alternate beta or smart beta strategies that provide investors with alternative sources of risk and return, other than traditional market beta, yet in a passive and cost-efficient way.

Collectively, index strategies that use non-market-cap-weighted methods are referred to as alternate beta strategies. Since many of them can provide positive excess returns over the long term, they are also called smart beta strategies. Although different in stock selection and weighting methods, alternate beta strategies generally attempt to provide explicit or implicit exposure to one or a set of systematic risk factors apart from the market beta.

Since the introduction of alternate beta ETFs in 2005 in the U.S., we have seen the expansion of alternate beta strategies, especially in the U.S. and European ETP markets. Within these markets, the most popular and well-known categories are dividend, low-volatility or minimum variance, equally weighted, and fundamentally weighted strategies.

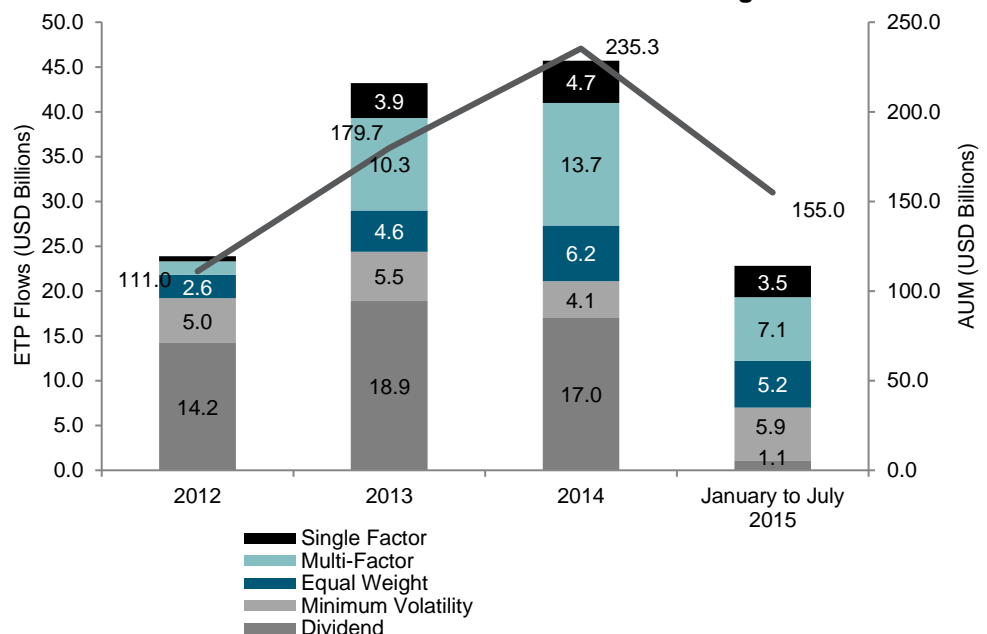
Factor-based strategies make up a subcategory of alternate beta strategies that are explicitly constructed to capture specific factors. In recent years, single-factor strategies have gained traction in the investment community, as they provide a new way of diversification along risk-factor dimensions instead of traditional asset classes (see Exhibit 1). The distinct risk/return

characteristics of each single factor, and often the low correlation among factors, make them a powerful toolkit for strategy implementation, and they helped give rise to innovative investment notions, such as factor rotation and factor timing.

While the validity of those basic risk factors (size, value, low volatility, and momentum) has been well established in many developed and emerging markets, it would be interesting to examine the effectiveness of those factors in the China A-share market in recent years and their investability in practice. In this paper, we first focus on six single factors: small cap, value, low volatility, momentum, quality, and dividend. Then, we go beyond single-factor strategies to explore the potential for the combination of factors.

Although different in stock selection and weighting methods, alternate beta strategies generally attempt to provide explicit or implicit exposure to one or a set of systematic risk factors apart from the market beta.

Exhibit 1: Global ETP Flows—Smart Beta and Factor Strategies



Source: BlackRock ETP Landscape. Data as of July 2015. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

SMALL CAP

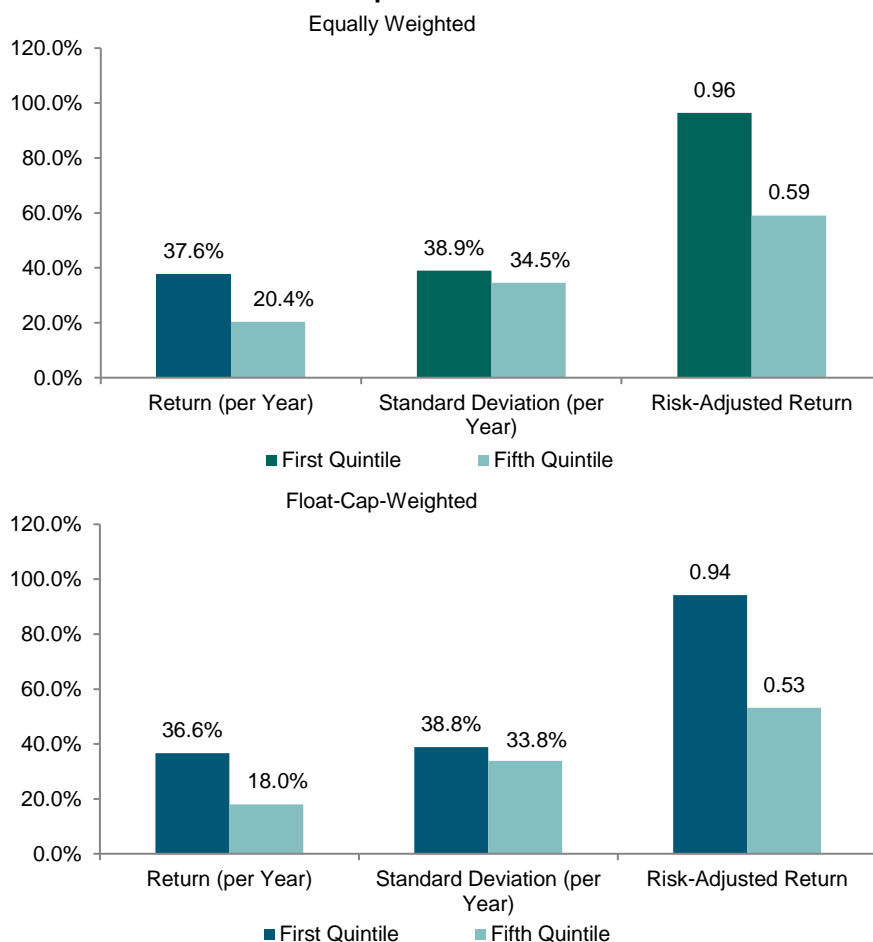
Small cap was one of the earliest identified systematic risk factors [1, 2]. Academic literature suggests that the small-cap premium is the compensation for the exposure to companies that are less certain, less liquid, and more vulnerable to financial distress [3, 4, 5, 6]. Behavioral finance explains that small-cap companies are likely to be mispriced, as naïve investors can sometimes extrapolate past performance into the future [7]. The small-cap anomaly has been observed in both developed and emerging markets [8].

In Exhibit 2, we selected the one-fifth of stocks in the eligible universe¹ with the lowest and highest float-adjusted market cap in order to form the first and fifth quintile of hypothetical portfolios (Q1 and Q5, respectively) for the small-cap factor. From June 30, 2006, to May 29, 2015, the small-cap portfolio generated higher absolute and risk-adjusted returns, but with higher volatility.

The weighting methods used to construct the portfolios did not have a significant impact on the results, which we expected, as market cap is more evenly distributed in the small-cap space.

Factor-based strategies make up a subcategory of alternate beta strategies that are explicitly constructed to capture specific factors.

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



Source: S&P Dow Jones Indices LLC. Performance based on monthly total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

¹ The eligible universe was constructed based on the S&P China A BMI (Broad Market Index) by applying the liquidity criteria of a three-month average daily value traded (3M ADVT) of no less than RMB 10 million as of the reference dates (last trading day of May and November). This same eligible universe was used as the basis for the construction of other factor portfolios in the following sections. Information for the S&P China A BMI index prior to its November 27, 2013 launch date is back-tested (hypothetical). Quintile-factor portfolios are formed by ranking stocks in the eligible universe based on the designated factor measure. The eligible universe and quintile-factor portfolios are rebalanced semiannually, effective on the third Friday of June and December.

We then examined the risk/return profile of the Q1 small-cap portfolio over the same period (see Exhibit 3). Compared with the market benchmark (S&P China A BMI), the Q1 small-cap portfolio generated an annualized excess return of more than 15%, but with higher volatility. Although the high excess return and high information ratio compensated for the high tracking error, the implementation of small-cap strategies posed a challenge due to the high portfolio turnover and low basket liquidity, which translated into high replication costs and low portfolio capacity. Applying a rebalance buffer could lower portfolio turnover, but it would have little impact on basket liquidity.

In this analysis, the eligible universe was included to control the effect of applying a liquidity screen. It seemed that the liquidity screen contributed little to the excess returns of the final portfolios over the period tested.

Applying a rebalance buffer could lower portfolio turnover, but it would have little impact on basket liquidity.

Exhibit 3: Risk/Return Profiles of Small-Cap Portfolios

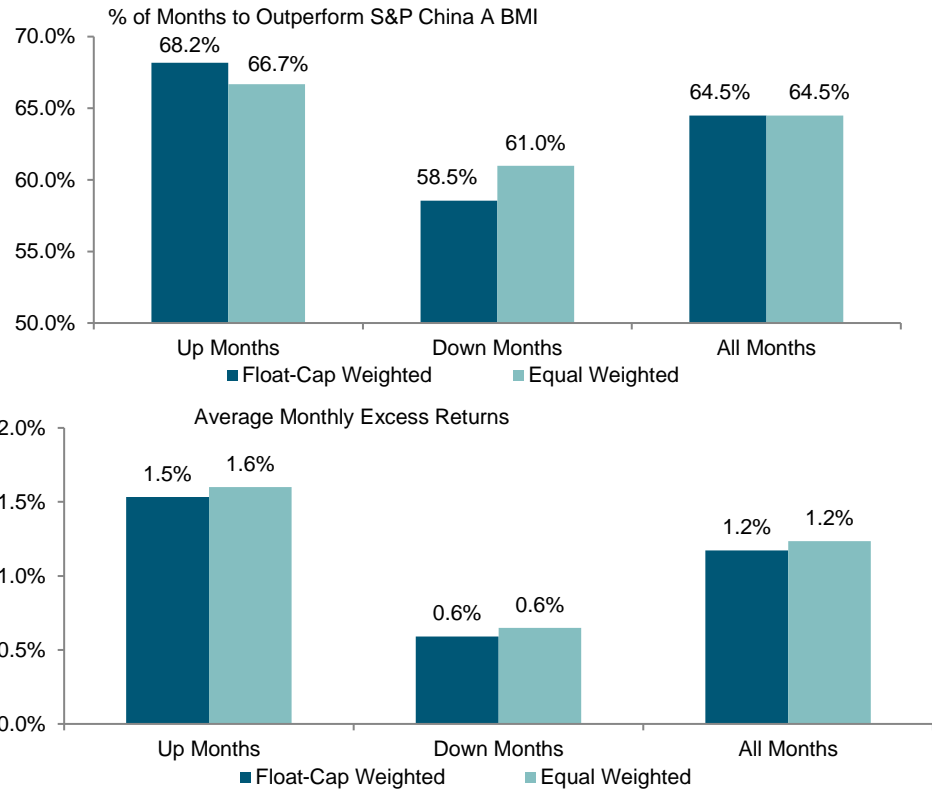
WEIGHTING METHOD	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 SMALL-CAP PORTFOLIOS		
			NO REBALANCE BUFFER		WITH REBALANCE BUFFER
	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED
Return (per Year) (%)	21.0	21.1	36.6	37.6	36.8
Standard Deviation (per Year) (%)	33.6	33.7	38.8	38.9	39.1
Risk-Adjusted Return	0.63	0.63	0.94	0.96	0.94
Rolling 12-Month Maximum Drawdown (%)	-67.5	-67.5	-66.0	-65.9	-66.0
Excess Return (per Year) (%)	-	0.1	15.6	16.5	15.8
Tracking Error (per Year) (%)	-	1.5	18.4	18.6	18.4
Information Ratio	-	0.05	0.85	0.89	0.86
Beta	1.00	1.01	1.03	1.03	1.03
Average Annual Turnover (%)	14.9	10.3	81.8	81.6	68.5
Latest Basket Liquidity (RMBmm)	-	34,350	4,124	4,958	4,085
Average Basket Liquidity (%)	-	100.0	17.1	19.8	17.9

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The eligible universe covers all constituents of the S&P China A BMI with a 3M ADVT of no less than RMB 10 million as of the reference dates (last trading day of May and November). Average annual turnover is calculated from 2007 to 2014. The latest basket liquidity² is calculated based on data as of the December 2014 rebalance. Basket liquidity (%) is the basket liquidity of the factor portfolio presented as the percentage of the basket liquidity of the eligible universe. Average basket liquidity (%) is calculated from the June 2006 rebalancing to the December 2014 rebalancing. The rebalance buffer is 4% up/down around 20% of the total number of stocks in the eligible universe.

² Basket liquidity is defined as the minimum value of basket turnover levels supported by stocks in the portfolio. The basket turnover level supported by each stock is calculated as its 3M ADVT as of the reference date divided by its corresponding weight in the portfolio, to be effective on the rebalance date.

To understand how small cap works in different market environments, we analyzed the performance of the Q1 small-cap portfolios in up and down months (see Exhibit 4). As we expected, small-cap portfolios had better performance in up markets, with a higher win ratio and a higher average monthly excess return relative to the S&P China A BMI.

Exhibit 4: Performance of Q1 Small-Cap Portfolios in Up and Down Markets



Behavioral finance suggests that the value premium may be the outcome of investors' tendency to extrapolate past company growth rates into the future.

Source: S&P Dow Jones Indices LLC. Performance based on monthly total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Excess returns are calculated relative to the S&P China A BMI.

ENHANCED VALUE

Value investing was first documented in 1934 by Graham and Dodd [9]. The idea was to buy stocks that had lower prices relative to their fundamental values (sales, earnings, book value, dividends, etc.) and sell stocks that had higher prices. According to academic views, value companies may have a higher level of risk, as they tend to have less flexibility in financial distress compared with their growth counterparts, and therefore they may demand a higher risk premium [10]. Behavioral finance suggests that the value premium may be the outcome of investors' tendency to extrapolate past company growth rates into the future [7].

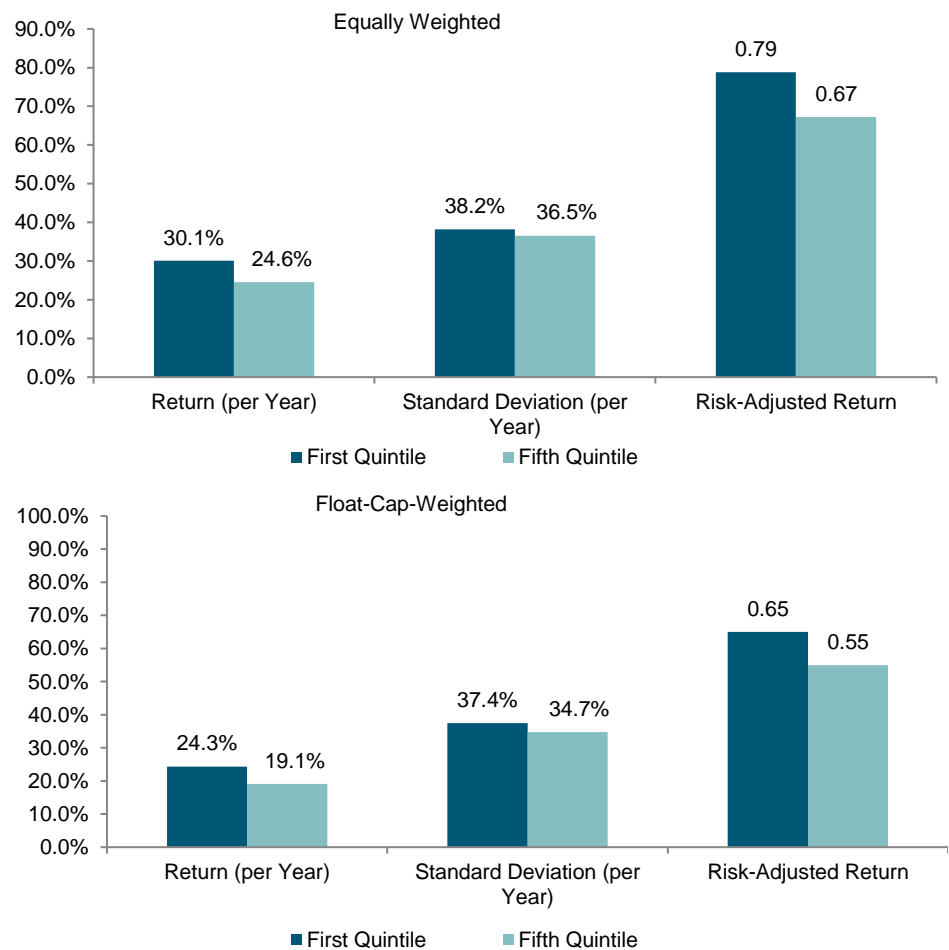
Traditionally, the value factor can be measured by earnings yield, cash flow yield, sales yield, book value-to-price ratio, dividend yield, etc. For this

paper, we built hypothetical value portfolios based on S&P Dow Jones Indices' enhanced value framework, which measures value as the average Z-score of earnings yield, sales yield, and book value-to-price ratio, and then it selects the top quintile of stocks with the highest value scores in the eligible universe.

In Exhibit 5, we examined the risk/return profiles of the first and fifth quintiles based on value scores in the eligible universe from June 30, 2006, to May 29, 2015. We found that high-value portfolios delivered higher absolute and risk-adjusted returns than low-value portfolios. The spread in annualized returns between the Q1 and Q5 value portfolios was slightly higher when the equal-weight method was used.

Exhibit 5: Risk/Return of Enhanced Value Quintile Portfolios

Traditionally, the value factor can be measured by earnings yield, cash flow yield, sales yield, book value-to-price ratio, dividend yield, etc.



Source: S&P Dow Jones Indices LLC. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Next, we checked the Q1 value portfolios and the impact of different weighting methods on their performance. We noted that the top-quintile value portfolio delivered a much higher annualized excess return and

information ratio relative to the S&P China A BMI when the equal-weighting or score-weighting method was used. However, equal-weighted and score-weighted portfolios had higher portfolio turnover and lower basket liquidity.

Exhibit 6: Risk/Return Profiles of Enhanced-Value Portfolios

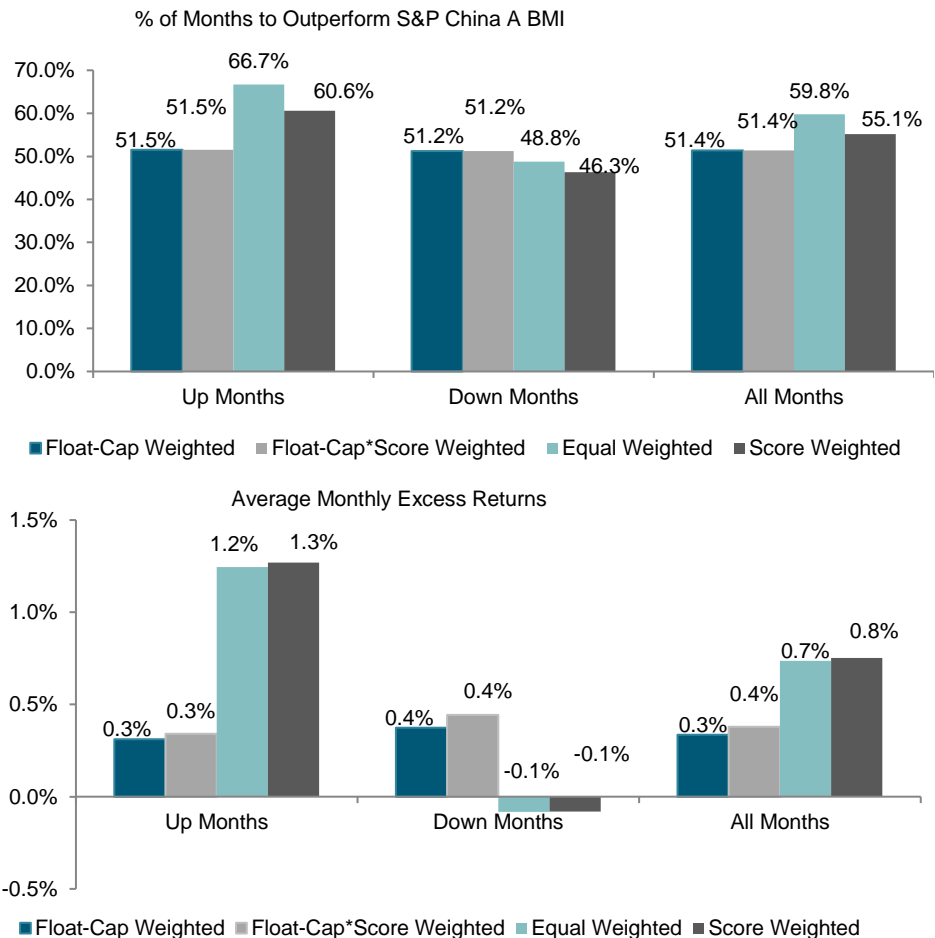
WEIGHTING METHOD	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 ENHANCED-VALUE PORTFOLIOS				
			NO REBALANCE BUFFER				WITH REBALANCE BUFFER
			FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP* SCORE WEIGHTED	EQUAL WEIGHTED
Return (per Year) (%)	21.0	21.1	24.3	24.8	30.1	30.2	24.4
Standard Deviation (per Year) (%)	33.6	33.7	37.4	37.8	38.2	38.4	37.9
Risk-Adjusted Return	0.63	0.63	0.65	0.66	0.79	0.79	0.64
Rolling 12-Month Maximum Drawdown (%)	-67.5	-67.5	-66.1	-66.1	-65.6	-65.7	-66.4
Excess Return (per Year) (%)	-	0.1	3.3	3.8	9.1	9.2	3.3
Tracking Error (per Year) (%)	-	1.5	11.5	12.4	11.0	11.3	12.3
Information Ratio	-	0.05	0.29	0.31	0.83	0.82	0.27
Beta	1.00	1.01	1.03	1.03	1.08	1.08	1.03
Average Annual Turnover (%)	14.9	10.3	43.0	39.0	61.2	57.6	34.1
Latest Basket Liquidity (RMBmm)	-	34,350	17,786	17,988	6,387	8,977	17,721
Average Basket Liquidity (%)	-	100.0	40.1	39.1	23.6	20.0	39.4

The spread in annualized returns between the Q1 and Q5 value portfolios was slightly higher when the equal-weight method was used.

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The eligible universe covers all constituents of the S&P China A BMI Index with a 3M ADVT of no less than RMB 10 million as of the reference dates (last trading day of May and November). Average annual turnover is calculated from 2007 to 2014. The latest basket liquidity is calculated based on data as of the December 2014 rebalance. Basket liquidity (%) is the basket liquidity of the factor portfolio presented as the percentage of the basket liquidity of the eligible universe. Average basket liquidity (%) is calculated from the June 2006 rebalancing to the December 2014 rebalancing. The rebalance buffer is 4% up/down around 20% of the total number of stocks in the eligible universe.

To understand how enhanced value works in different market environments, we analyzed the performance of hypothetical enhanced-value portfolios in up and down months (see Exhibit 7). When market-cap-dominated weighting methods were used, value portfolios exhibited win ratios of more than 50% and positive average monthly excess returns in both up and down months. However, win ratios and excess returns were higher in up markets than in down markets for the equal- and score-weighted versions, due to the small-cap bias.

Exhibit 7: Performance of Q1 Enhanced Value Portfolios in Up and Down Markets



Historically, most of the companies selected in the top quintile by enhanced value have been from the materials, industrials, and consumer discretionary sectors.

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Win ratios and excess returns are calculated relative to the S&P China A BMI.

Historically, most of the companies selected in the top quintile by enhanced value have been from the materials, industrials, and consumer discretionary sectors (see Appendix 1). The number of companies from the financials sector has increased significantly since June 2010, representing 12.5%-19.9% by stock count from June 2010 to December 2014. The series of macro-control policies that started at the beginning of 2010 and aimed to strengthen the regulation and control on the real estate market was the main reason for the contracting valuations of real estate companies and, later, banks.

Enhanced value is measured using earnings yield, sales-to-price ratio, and book value-to-price ratio. In order to understand the contribution of each measure, we constructed the first and fifth quintile portfolios in the eligible universe separately based on each individual measure.

Exhibit 8: Performance Decomposition							
WEIGHTING METHOD	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 PORTFOLIOS				
			NO REBALANCE BUFFER				WITH REBALANCE BUFFER
	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP *SCORE WEIGHTED	EQUAL WEIGHTED	SCORE WEIGHTED	FLOAT-CAP *SCORE WEIGHTED
EARNING-TO-PRICE RATIO							
Return (per Year) (%)	21.0	21.1	22.2	22.3	28.0	28.5	22.6
Excess Return (per Year) (%) Over Q5	N/A	N/A	3.0	2.3	0.7	1.2	N/A
Standard Deviation (per Year) (%)	33.6	33.7	36.6	37.2	37.5	37.8	37.1
Risk-Adjusted Return	0.63	0.63	0.61	0.60	0.75	0.75	0.61
SALES-TO-PRICE RATIO							
Return (per Year) (%)	21.0	21.1	23.7	24.8	30.4	30.2	24.4
Excess Return (per Year) (%) Over Q5	N/A	N/A	4.6	5.7	5.1	5.0	N/A
Standard Deviation (per Year) (%)	33.6	33.7	35.8	36.7	37.3	37.7	36.4
Risk-Adjusted Return	0.63	0.63	0.66	0.68	0.81	0.80	0.67
BOOK VALUE-TO-PRICE RATIO							
Return (per Year) (%)	21.0	21.1	25.3	25.6	29.8	29.5	25.5
Excess Return (per Year) (%) Over Q5	N/A	N/A	6.8	7.2	5.9	5.7	N/A
Standard Deviation (per Year) (%)	33.6	33.7	37.2	37.5	38.1	38.2	37.5
Risk-Adjusted Return	0.63	0.63	0.68	0.68	0.78	0.77	0.68

Source: S&P Dow Jones Indices LLC. Performance based on monthly total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The eligible universe covers all constituents of the S&P China A BMI Index with a 3M ADVT of no less than RMB 10 million, as of the reference dates (last trading day of May and November).

As shown in Exhibit 8, all three single-factor measures contributed positively to the outperformance of the enhanced-value portfolios from June 30, 2006, to May 29, 2015. Of these measures, the book value-to-price ratio performed the best.

LOW VOLATILITY

Although it is contradictory to one of the basic finance principles that says riskier assets demand higher returns, the inverse relationship between equity volatility and long-term return was documented much earlier [11, 12], and extensive studies in the late 1990s and early 2000s provided ample empirical evidence for the existence and persistence of the low-volatility effect in the U.S. and global markets [13-17]. The academic explanations for the low-volatility premium mainly focused on the behavioral biases that

Enhanced value is measured using earnings yield, sales-to-price ratio, and book value-to-price ratio.

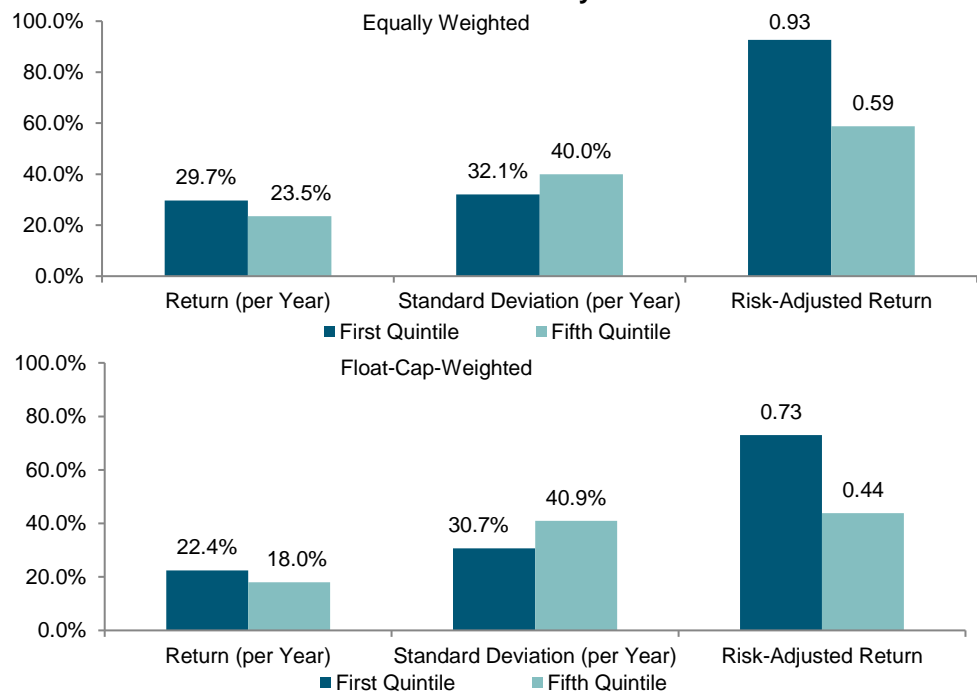
drive excess demand for high-risk stocks and the limitation on arbitrage in practice [18].

Two camps have formed in the metrics used to measure volatility: realized volatility, and the combination of predicted volatility and covariance. For this paper, we constructed a hypothetical low-volatility portfolio based on 252-day annualized volatility.

The academic explanations for the low-volatility premium mainly focused on the behavioral biases that drive excess demand for high-risk stocks and the limitation on arbitrage in practice.

We examined the risk/return characteristics of the first and fifth quintiles based on the inverse volatility in the eligible universe from June 30, 2006, to May 29, 2015. As shown in Exhibit 9, portfolios with low realized volatility delivered higher absolute and risk-adjusted returns than high-volatility portfolios. The spread in annualized returns between the Q1 and Q5 portfolios was higher when using the equal-weighted method.

Exhibit 9: Risk/Return Profiles of Low-Volatility Quintile Portfolios



Source: S&P Dow Jones Indices LLC. Performance based on monthly total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 10, we examined the performance of the top quintile of the low-volatility portfolios and the impact of employing different weighting schemes. We found that the top quintile of the low-volatility portfolios delivered a much higher annualized excess return and information ratio when the equal-weighting or score-weighting method was used.

Nevertheless, the volatility reduction of the low-volatility baskets in China was not as significant as those for the developed markets.

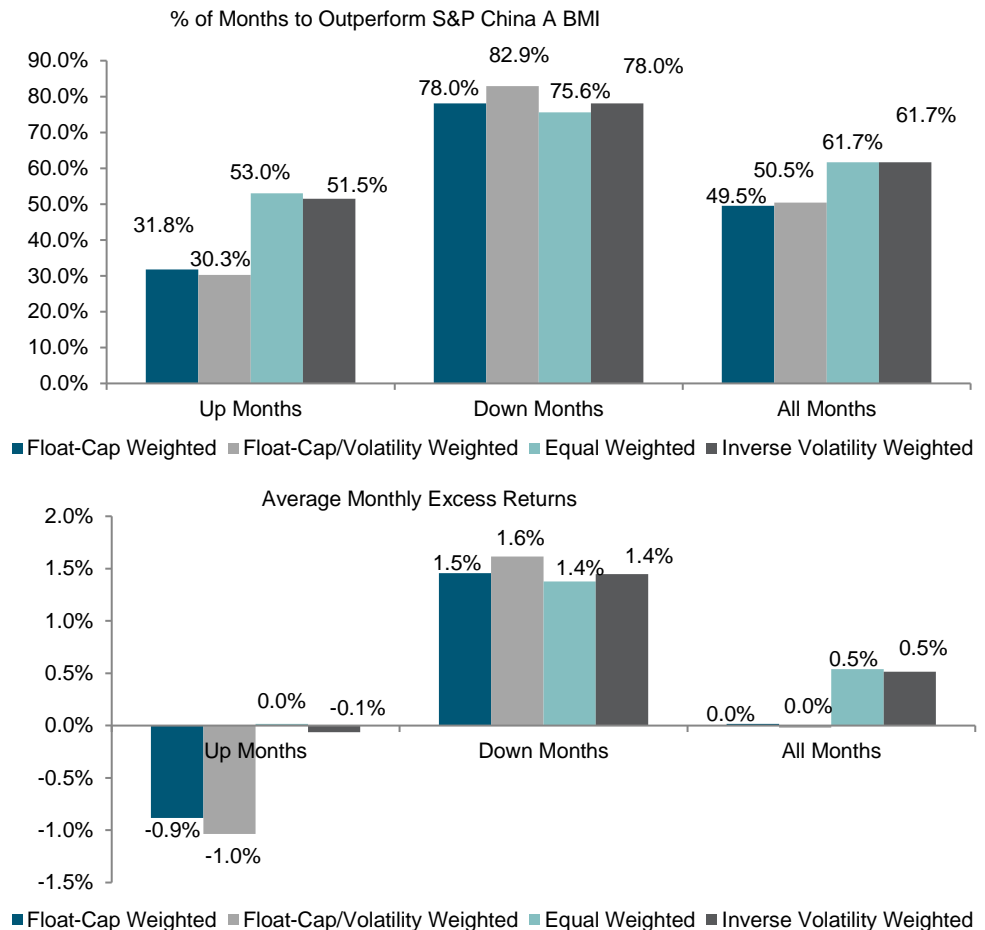
Exhibit 10: Risk/Return Profiles of Low-Volatility Portfolios

WEIGHTING METHOD	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 LOW-VOLATILITY PORTFOLIOS					WITH REBALANCE BUFFER
			NO REBALANCE BUFFER				INVERSE	
	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP/VOLATILITY WEIGHTED	EQUAL WEIGHTED	VOLATILITY WEIGHTED	INVERSE VOLATILITY WEIGHTED	
Return (per Year) (%)	21.0	21.1	22.4	22.0	29.7	29.5	29.8	
Standard Deviation (per Year) (%)	33.6	33.7	30.7	30.4	32.1	31.8	32.2	
Risk-Adjusted Return	0.63	0.63	0.73	0.72	0.93	0.93	0.92	
Rolling 12-Month Maximum Drawdown (%)	-67.5	-67.5	-64.1	-63.8	-61.9	-61.9	-61.5	
Excess Return (per Year) (%)	-	0.1	1.4	1.0	8.7	8.4	8.7	
Tracking Error (per Year) (%)	-	1.5	10.8	11.6	9.9	9.8	10.1	
Information Ratio	-	0.05	0.13	0.09	0.88	0.86	0.87	
Beta	1.00	1.01	0.88	0.87	0.90	0.90	0.90	
Average Annual Turnover (%)	14.9	10.3	52.6	50.0	78.0	76.5	76.0	
Latest Basket Liquidity (RMBmm)	-	34,350	18,991	17,883	4,958	4,020	3,994	
Average Basket Liquidity (%)	-	100.00	37.2	28.7	20.0	16.4	16.3	

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The eligible universe covers all constituents of the S&P China A BMI with a 3M ADVT of no less than RMB 10 million as of the reference dates (last trading day of May and November). Average annual turnover is calculated from 2007 to 2014. The latest basket liquidity is calculated based on data as of the December 2014 rebalance. Basket liquidity (%) is the basket liquidity of the factor portfolio presented as the percentage of the basket liquidity of the eligible universe. Average basket liquidity (%) is calculated from the June 2006 rebalancing to the December 2014 rebalancing. The rebalance buffer is 4% up/down around 20% of the total number of stocks in the eligible universe.

In order to understand how the low-volatility factor works in different market environments, we analyzed the performance of the low-volatility portfolios in up and down months. As shown in Exhibit 11, the low-volatility portfolio had better performance in down markets, with a higher win ratio and a higher average monthly excess return relative to the S&P China A BMI.

Exhibit 11: Performance of Q1 Low-Volatility Portfolios in Up and Down Markets



Momentum may arise if investors overreact or underreact to news.

Source: S&P Dow Jones Indices LLC. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Win ratios and excess returns are calculated relative to the S&P China A BMI.

Historically, most of the companies selected for the top-quintile, low-volatility portfolio have been from the materials, industrials, and consumer discretionary sectors (see Appendix 2). However, when constituents were weighted by float cap or the inverse volatility-adjusted float cap, the sector weighting of the top-quintile portfolio was dominated by financials.

MOMENTUM

The most cited early document on momentum (written by Jegadeesh and Titman on the U.S. market in 1993 [19]) found that stock price trends extended over certain periods, meaning winners continued to win and losers continued to lose. The momentum effect was also found in other markets [20]. Theories behind the momentum effect were mainly behavioral. Momentum may arise if investors overreact or underreact to news [21-22]. Vayanos and Woolley proposed a theory in 2011 to show

that momentum could arise in markets even with rational agents. In this theory, they assume investors delegate the management of their portfolios to financial institutions. The negative shock to the fundamental value of assets can trigger outflows from investment funds holding these assets, and the following asset sales could amplify the original shock. Momentum can arise if the outflows are gradual due to investor inertia or investment constraints [23].

Traditional measures of momentum are past price returns over certain periods in the range of 3 to 12 months. Typically the last month is dropped to avoid the one-month reversal effect. Some also use risk-adjusted return as a momentum measure, which is calculated as the price return over a given period as of one month prior divided by the standard deviation of daily price returns during the same period.

The negative shock to the fundamental value of assets can trigger outflows from investment funds holding these assets, and the following asset sales could amplify the original shock.

To test the momentum effect in China's A-share market, we constructed the first and fifth quintile portfolios based on different momentum measures in the eligible universe and examined the portfolio risk/return characteristics from June 30, 2006, to May 29, 2015. As shown in Exhibit 12, the first quintile momentum portfolios measured by six-month momentum had the best performance with the highest absolute and risk adjusted returns and information ratios under both equally weighted and float-cap-weighted schemes. However, the shorter the duration used, the higher the portfolio turnover produced.

Compared with using absolute price returns as a momentum measure, employing a risk-adjusted momentum measure could generate portfolios with lower volatility and lower tracking error.

Exhibit 12: Performance of Momentum Quintile Portfolios

3-MONTH MOMENTUM	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 MOMENTUM PORTFOLIOS			
			ABSOLUTE PRICE CHANGE		RISK-ADJUSTED PRICE CHANGE	
	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT- CAP WEIGHTED
Return (per Year) (%)	21.0	21.1	24.6	18.5	26.3	21.1
Q1-Q5 Return Spread (per Year) (%)	-	-	-0.4	-3.1	1.4	0.9
Standard Deviation (per Year) (%)	33.6	33.7	37.0	35.0	36.6	34.2
Risk-Adjusted Return	0.63	0.63	0.67	0.53	0.72	0.62
Excess Return (per Year) (%)	-	0.1	3.6	-2.5	5.3	0.1
Tracking Error (per Year) (%)	-	1.5	14.5	12.7	13.4	11.4
Information Ratio	-	0.05	0.25	-0.20	0.39	0.01
Average Annual Turnover (%)	14.9	10.3	143.1	140.4	142.1	137.0

Source: S&P Dow Jones Indices LLC. Performance based on monthly total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 12: Performance of Momentum Quintile Portfolios (cont.)

3-MONTH MOMENTUM	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 MOMENTUM PORTFOLIOS			
			ABSOLUTE PRICE CHANGE		RISK-ADJUSTED PRICE CHANGE	
	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT-CAP WEIGHTED	EQUAL WEIGHTED	FLOAT- CAP WEIGHTED
6-MONTH MOMENTUM						
Return (per Year) (%)	21.0	21.1	28.2	22.5	28.7	22.4
Q1-Q5 Return Spread (per Year) (%)	-	-	2.6	3.4	3.2	2.9
Standard Deviation (per Year) (%)	33.6	33.7	38.6	38.9	38.1	35.2
Risk-Adjusted Return	0.63	0.63	0.73	0.58	0.75	0.64
Excess Return (per Year) (%)	-	0.1	7.1	1.5	7.7	1.4
Tracking Error (per Year) (%)	-	1.5	15.4	15.9	14.7	10.9
Information Ratio	-	0.05	0.46	0.10	0.52	0.13
Average Annual Turnover (%)	14.9	10.3	141.6	130.7	142.5	146.0
9-MONTH MOMENTUM						
Return (per Year) (%)	21.0	21.1	25.4	20.6	25.6	19.9
Q1-Q5 Return Spread (per Year) (%)	-	-	-0.5	2.2	0.0	1.5
Standard Deviation (per Year) (%)	33.6	33.7	37.7	35.9	37.8	35.1
Risk-Adjusted Return	0.63	0.63	0.67	0.57	0.68	0.57
Excess Return (per Year) (%)	-	0.1	4.4	-0.4	4.6	-1.2
Tracking Error (per Year) (%)	-	1.5	14.4	12.1	13.9	11.0
Information Ratio	-	0.05	0.30	-0.03	0.33	-0.11
Average Annual Turnover (%)	14.9	10.3	121.4	117.5	121.1	120.7
12-MONTH MOMENTUM						
Return (per Year) (%)	21.0	21.1	23.5	19.5	23.5	17.3
Q1-Q5 Return Spread (per Year) (%)	-	-	-6.0	-3.6	-4.9	-4.4
Standard Deviation (per Year) (%)	33.6	33.7	37.8	35.6	37.7	34.6
Risk-Adjusted Return	0.63	0.63	0.62	0.55	0.62	0.50
Excess Return (per Year) (%)	-	0.1	2.4	-1.5	2.5	-3.7
Tracking Error (per Year) (%)	-	1.5	15.2	12.9	14.8	12.2
Information Ratio	-	0.05	0.16	-0.11	0.17	-0.31
Average Annual Turnover (%)	14.9	10.3	109.6	103.0	110.9	106.0

Source: S&P Dow Jones Indices LLC. Performance based on monthly total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 13, we used a six-month, risk-adjusted momentum measure and examined the performance of the top-quintile portfolios by employing different weighting methods. The top-quintile momentum portfolio delivered a much higher excess return and information ratio when the equal-weighting or score-weighting method was used.

Traditional measures of momentum are past price returns over certain periods in the range of 3 to 12 months.

Momentum portfolios generated much higher turnover compared with other factor portfolios. The basket liquidity of the momentum portfolio was lower when using the equal- or score-weighted method.

Exhibit 13: Risk/Return Profiles of Momentum Portfolios

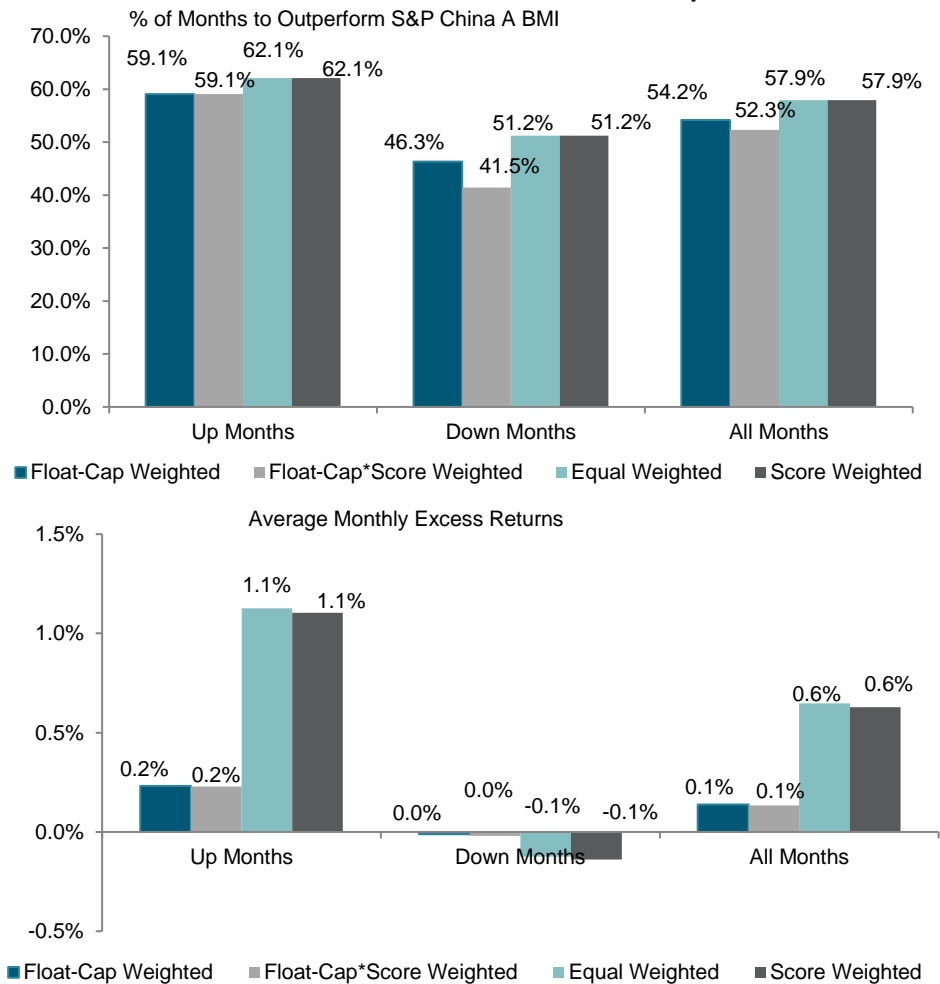
WEIGHTING METHOD	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 6-MONTH, RISK-ADJUSTED MOMENTUM PORTFOLIOS				
			NO REBALANCE BUFFER				WITH REBALANCE BUFFER
			FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP SCORE WEIGHTED	EQUAL WEIGHTED
Return (per Year) (%)	21.0	21.1	22.4	22.2	28.7	28.3	27.7
Standard Deviation (per Year) (%)	33.6	33.7	35.2	35.4	38.1	38.2	38.2
Risk-Adjusted Return	0.63	0.63	0.64	0.63	0.75	0.74	0.73
Rolling 12-Month Maximum Drawdown (%)	-67.5	-67.5	-69.6	-69.8	-69.4	-69.6	-69.8
Excess Return (per Year) (%)	-	0.1	1.4	1.2	7.7	7.3	6.7
Tracking Error (per Year) (%)	-	1.5	10.9	11.4	14.7	14.9	14.9
Information Ratio	-	0.05	0.13	0.11	0.52	0.49	0.45
Beta	1.00	0.99	0.99	0.99	1.02	1.02	1.02
Average Annual Turnover (%)	14.9	10.3	106.0	105.0	110.9	109.2	103.3
Latest Basket Liquidity (RMBmm)	-	34,350	10,480	8,866	5068	4,282	8,906
Average Basket Liquidity (%)	-	100.00	34.2	34.7	22.4	20.2	34.9

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Momentum is measured by six-month, risk-adjusted price returns. The eligible universe covers all constituents of the S&P China A BMI with a 3M ADVT of no less than RMB 10 million, as of reference dates (last trading day of May and November). Average annual turnover is calculated from 2007 to 2014. The latest basket liquidity is calculated based on data as of the December 2014 rebalance. Basket liquidity (%) is the basket liquidity of the factor portfolio presented as the percentage of the basket liquidity of the eligible universe. Average basket liquidity (%) is calculated from the June 2006 rebalancing to the December 2014 rebalancing. The rebalance buffer is 4% up/down around 20% of the total number of stocks in the eligible universe.

To understand how the momentum factor works in different market environments, we analyzed the performance of momentum portfolios in up and down months. As shown in Exhibit 14, the momentum portfolios had better performance in up markets, with a higher win ratio and higher average monthly excess returns.

Compared with using absolute price returns as a momentum measure, employing a risk-adjusted momentum measure could generate portfolios with lower volatility and lower tracking error.

Exhibit 14: Performance of Q1 Momentum Portfolios in Up and Down Markets



The performance of high-quality companies can't be fully explained by classical risk factors such as size, value, momentum, and volatility, which suggests that quality could serve as a separate dimension on its own.

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Momentum is measured by six-month, risk-adjusted price returns. Win ratios and excess returns are calculated relative to the S&P China A BMI.

Historically, most companies selected for the top-quintile momentum portfolio have been from the materials, industrials, and consumer discretionary sectors (see Appendix 3).

QUALITY

Quality investing has gained increasing attention in recent years. The performance of high-quality companies can't be fully explained by classical risk factors such as size, value, momentum, and volatility, which suggests that quality could serve as a separate dimension on its own.

However, a consensus has not been reached on how to define and measure quality. In this paper, we utilized the S&P Quality Indices framework,³ which identifies three distinct but measurable metrics to quantify quality in a systematic way: return on equity (ROE), the balance sheet accruals (BSA) ratio, and financial leverage. These metrics are used to measure a company's profitability, earning quality, and financial robustness, respectively [24].

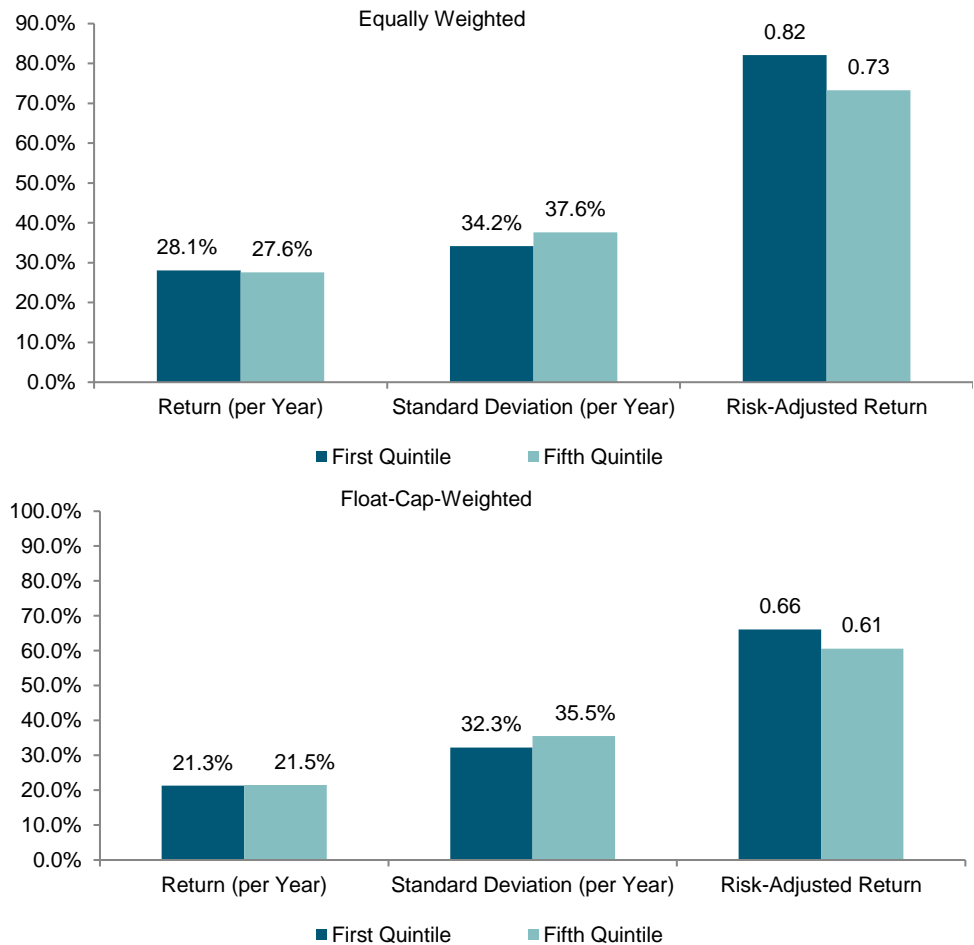
The rationale behind ROE as a quality measure is that higher ROE companies are usually able to sustain certain competitive advantages, and therefore are likely to remain profitable in the future.

The rationale behind ROE as a quality measure is that higher ROE companies are usually able to sustain certain competitive advantages, and therefore are likely to remain profitable in the future. The BSA ratio is able to indicate a company's earnings quality. The higher the BSA ratio, the less reliable the financial information reported. Companies with high financial leverage are more vulnerable to financial distress, and therefore are less healthy [24].

In Exhibit 15, we constructed the first and fifth quintile portfolios based on the average of the Z-scores of ROE, the BSA ratio, and financial leverage in the eligible universe, and we examined the risk and return of the resulting portfolios from June 30, 2006, to May 29, 2015. As shown in the graph, the equally weighted, high-quality portfolio delivered higher absolute and risk-adjusted returns than the equally weighted, low-quality portfolio. When constituents were float-cap weighted, the excess return was only observed in risk-adjusted terms. Under both weighting schemes, the high-quality portfolios exhibited lower volatility.

³ In the S&P Quality Indices framework, three fundamental ratios (ROE, BSA, and financial leverage) are computed for each company in the eligible universe. These ratios are then normalized to Z-scores and averaged to derive an overall quality score. The top quintile stocks with the highest quality score form the quality portfolio. Among the three quality metrics, ROE is defined as the trailing 12-month income as measured by the company's book value. The BSA ratio is defined as the ratio of the change in the net operating assets over the previous 12-months and the average net operating assets over the same period. Financial leverage is defined as a company's latest total debt as measured by its book value.

Exhibit 15: Risk/Return Profiles of Quality Quintile Portfolios



When constituents were float-cap weighted, the excess return was only observed in risk-adjusted terms.

Source: S&P Dow Jones Indices LLC. Performance based on monthly total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

We then tested the impact of different weighting methods on the performance of the top-quintile quality portfolios (see Exhibit 16). We found that the top-quintile quality portfolio delivered a much higher annualized excess return and information ratio when the equal- or score-weighting method was used. Under all weighting schemes, the high-quality portfolios generated lower maximum drawdown and exhibited slightly lower beta relative to the market benchmark.

Exhibit 16: Risk/Return Profiles of Quality Portfolios

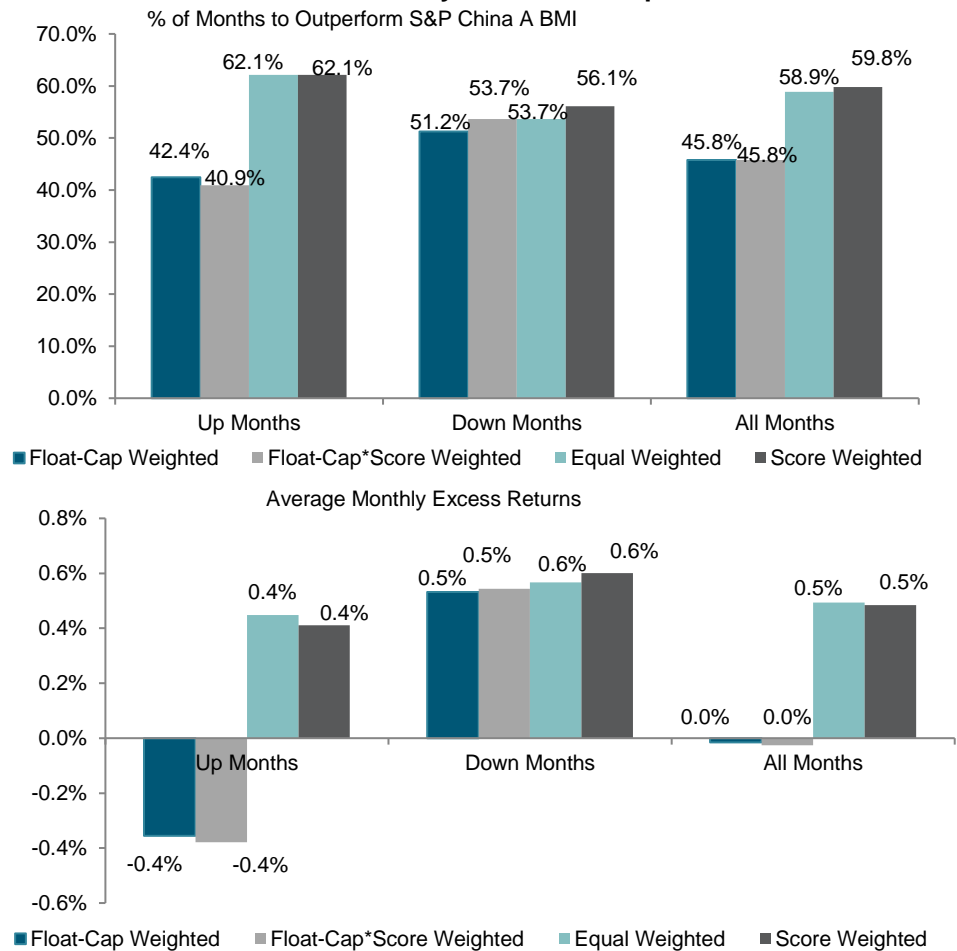
CATEGORY	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 QUALITY PORTFOLIOS					WITH REBALANCE BUFFER
			NO REBALANCE BUFFER					
			FLOAT- CAP WEIGHTED	FLOAT- CAP WEIGHTED	FLOAT- CAP WEIGHTED	FLOAT- CAP* SCORE WEIGHTED	EQUAL WEIGHTED	
Return (per Year) (%)	21.0	21.1	21.3	21.2	28.1	28.0	21.3	
Standard Deviation (per Year) (%)	33.6	33.7	32.3	32.1	34.2	34.0	32.1	
Risk-Adjusted Return	0.63	0.63	0.66	0.66	0.82	0.82	0.66	
Rolling 12-Month Maximum Drawdown (%)	-67.5	-67.5	-64.8	-64.7	-65.6	-65.5	-64.6	
Excess Return (per Year) (%)	-	0.1	0.3	0.2	7.0	7.0	0.3	
Tracking Error (per Year) (%)	-	1.5	7.5	7.4	10.8	10.8	7.1	
Information Ratio	-	0.05	0.04	0.03	0.65	0.64	0.04	
Beta	1.00	0.99	0.95	0.95	0.99	0.98	0.95	
Average Annual Turnover (%)	14.9	10.3	56.5	56.4	75.9	76.3	51.3	
Latest Basket Liquidity (RMBmm)	-	34,350	8,169	8,625	6,327	5,676	8,733	
Average Basket Liquidity (%)	-	100.0	32.0	30.3	21.0	15.2	30.0	

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The eligible universe covers all constituents of the S&P China A BMI with a 3M ADVT of no less than RMB 10 million, as of reference dates (last trading day of May and November). Average annual turnover is calculated from 2007 to 2014. The latest basket liquidity is calculated based on data as of the December 2014 rebalance. Basket liquidity (%) is the basket liquidity of the factor portfolio presented as the percentage of the basket liquidity of the eligible universe. Average basket liquidity (%) is calculated from the June 2006 rebalancing to the December 2014 rebalancing. The rebalance buffer is 4% up/down around 20% of the total number of stocks in the eligible universe.

Companies with high financial leverage are more vulnerable to financial distress, and therefore are less healthy

To understand how the quality factor works in different market environments, we analyzed the performance of the quality portfolios in up and down months. As shown in Exhibit 17, the high-quality portfolio performed better in the down markets, with a higher average monthly excess return relative to the S&P China A BMI.

Exhibit 17: Performance of Q1 Quality Portfolios in Up and Down Markets



The high-quality portfolio performed better in the down markets, with a higher average monthly excess return relative to the S&P China A BMI.

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Win ratios and charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Historically, the top-quintile quality portfolios have been well diversified across all sectors. Weighting methods did not have a significant impact on the sector breakdown (see Appendix 4).

To understand the contribution of ROE, the BSA ratio, and financial leverage to the overall performance of quality portfolios, we constructed the Q1 and Q5 portfolios in the eligible universe based on each individual measure.

Exhibit 18: Factor Attribution Analysis								
WEIGHTING METHOD	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 PORTFOLIOS					WITH REBALANCE BUFFER
			NO REBALANCE BUFFER				SCORE WEIGHTED	
	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP*SCORE WEIGHTED	EQUAL WEIGHTED	SCORE WEIGHTED		FLOAT-CAP*SCORE WEIGHTED
BSA RATIO								
Return (per Year) (%)	21.0	21.1	22.8	22.4	29.9	29.6	22.3	
Excess Return (per Year) Over Q5 (%)	N/A	N/A	0.5	-0.4	1.7	1.5	N/A	
Standard Deviation (per Year) (%)	33.6	33.7	34.9	35.2	36.8	36.8	34.9	
Risk-Adjusted Return	0.63	0.63	0.65	0.64	0.81	0.81	0.64	
FINANCIAL LEVERAGE								
Return (per Year) (%)	21.0	21.1	22.7	22.7	29.7	29.7	22.1	
Excess Return (per Year) Over Q5 (%)	N/A	N/A	3.1	3.4	3.3	2.9	N/A	
Standard Deviation (per Year) (%)	33.6	33.7	31.9	31.9	35.1	35.0	31.8	
Risk-Adjusted Return	0.63	0.63	0.71	0.71	0.85	0.85	0.69	
ROE								
Return (per Year) (%)	21.0	21.1	19.9	19.3	25.7	25.2	19.1	
Excess Return (per Year) Over Q5 (%)	N/A	N/A	-2.0	-2.2	-3.0	-2.5	N/A	
Standard Deviation (per Year) (%)	33.6	33.7	33.6	33.6	34.6	34.7	33.7	
Risk-Adjusted Return	0.63	0.63	0.59	0.57	0.74	0.73	0.57	

Source: S&P Dow Jones Indices LLC. Performance based on monthly total returns in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The eligible universe covers all constituents of the S&P China A BMI with a 3M ADVT of no less than RMB 10 million, as of reference dates (last trading day of May and November).

As shown in Exhibit 18, the BSA ratio and financial leverage contributed positively to the outperformance of quality portfolios from June 30, 2006, to May 29, 2015, while the high ROE basket did not outperform the market.

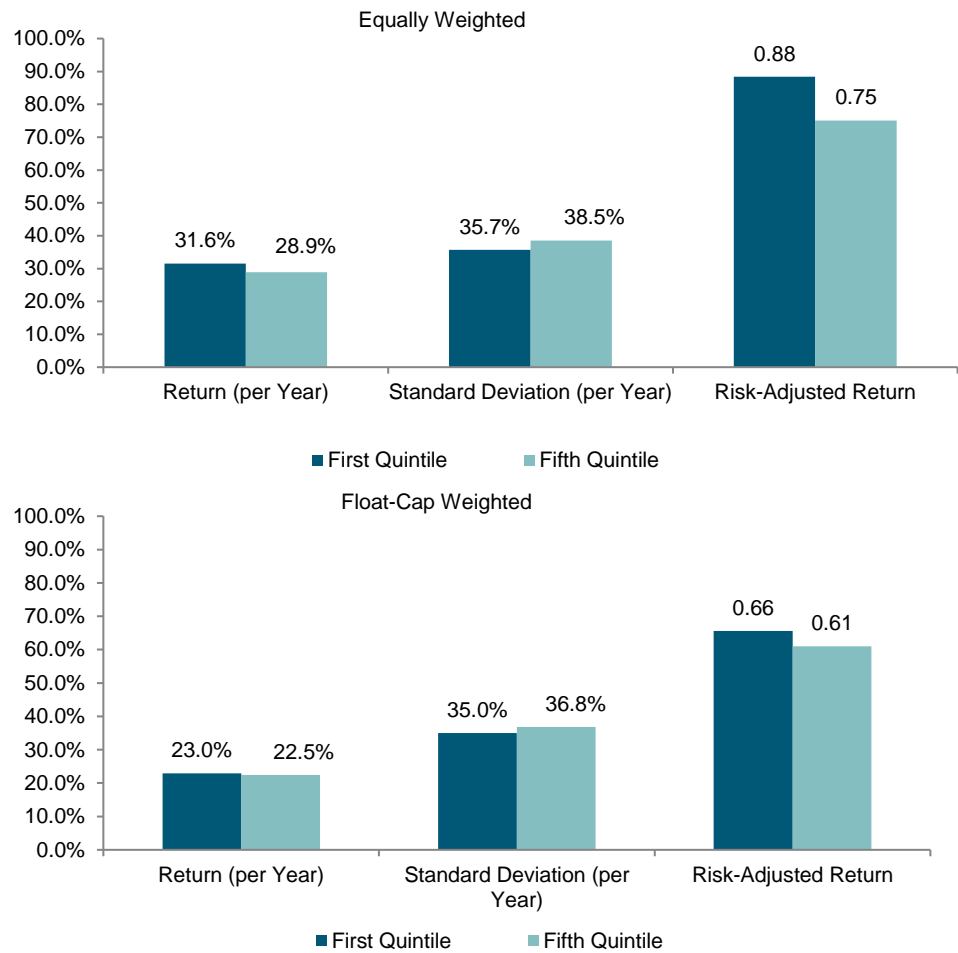
DIVIDEND

Although dividend yield is one of the traditional value metrics, it deserves separate attention, as it exhibits a distinct risk/return profile, and the related products are the main category among smart beta products.

In Exhibit 19, we constructed the first and fifth quintiles based on dividend yield in the eligible universe. From June 30, 2006, to May 29, 2015, the high-dividend-yield portfolio delivered higher absolute and risk-adjusted returns than the low-dividend-yield portfolio under both weighting schemes.

Although dividend yield is one of the traditional value metrics, it deserves separate attention.

Exhibit 19: Risk/Return of Dividend Quintile Portfolios



Dividend yield exhibits a distinct risk/return profile, and the related products are the main category among smart beta products.

Source: S&P Dow Jones Indices LLC. Performance based on monthly total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

We then examined the performance of the top-quintile dividend portfolios by employing different weighting schemes. We found that the top-quintile dividend portfolio delivered a much higher annualized excess return and information ratio when the equal- or dividend-yield-weighted method was used; however, it had a higher portfolio turnover and lower basket liquidity.

Exhibit 20: The Risk/Return Profiles of Dividend Portfolios

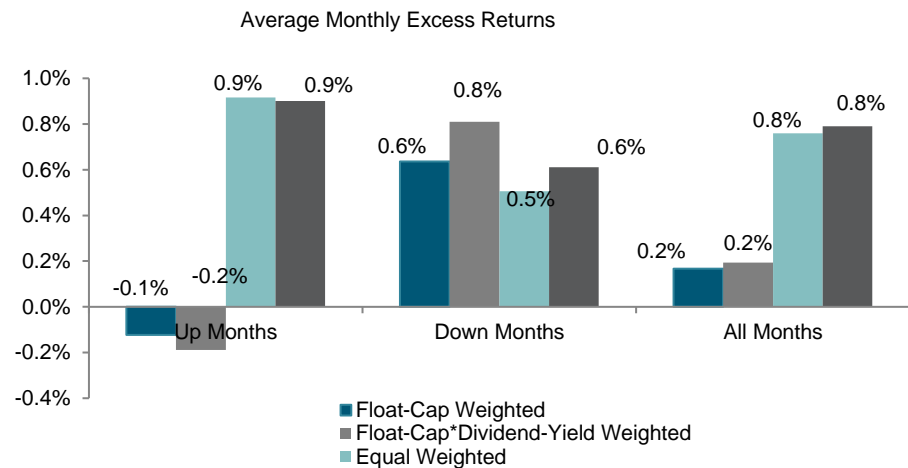
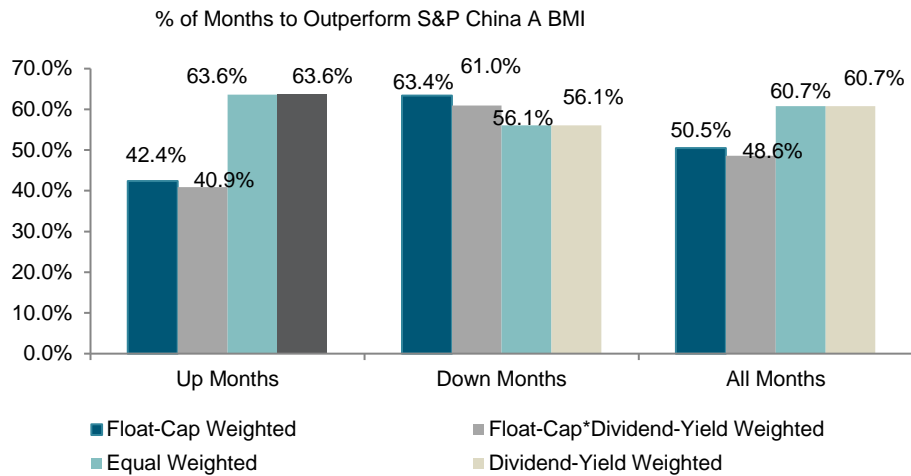
WEIGHTING METHOD	S&P CHINA A BMI	ELIGIBLE UNIVERSE	Q1 DIVIDEND PORTFOLIOS					WITH REBALANCE BUFFER
			NO REBALANCE BUFFER					
			FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP WEIGHTED	FLOAT-CAP* DIVIDEND-YIELD WEIGHTED	EQUAL WEIGHTED	
Return (per Year) (%)	21.0	21.1	23.0	23.3	31.6	32.1	32.2	
Standard Deviation (per Year) (%)	33.6	33.7	35.0	35.2	35.7	35.6	35.6	
Risk-Adjusted Return	0.63	0.63	0.66	0.66	0.88	0.90	0.90	
Rolling 12-Month Maximum Drawdown (%)	-67.5	-67.5	-64.6	-63.6	-63.1	-62.6	-62.7	
Excess Return (per Year) (%)	-	0.1	1.9	2.3	10.5	11.1	11.1	
Tracking Error (per Year) (%)	-	1.5	9.0	10.2	8.6	8.3	8.3	
Information Ratio	-	0.05	0.22	0.22	1.23	1.33	1.35	
Beta	1.00	0.99	0.99	0.97	1.05	1.04	1.04	
Average Annual Turnover (%)	14.9	10.3	42.7	39.9	65.1	63.9	58.5	
Latest Basket Liquidity (RMBmm)	-	34,350	18,169	12,670	8,450	4,373	4,362	
Average Basket Liquidity (%)	-	100.0	44.5	31.2	23.7	14.0	13.9	

Source: S&P Dow Jones Indices LLC. Performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The eligible universe covers all constituents of the S&P China A BMI with a 3M ADVT of no less than RMB 10 million, as of reference dates (last trading day of May and November). Average annual turnover is calculated from 2007 to 2014. The latest basket liquidity is calculated based on data as of the December 2014 rebalance. Basket liquidity (%) is the basket liquidity of the factor portfolio presented as the percentage of the basket liquidity of the eligible universe. Average basket liquidity (%) is calculated from the June 2006 rebalancing to the December 2014 rebalancing. The rebalance buffer is 4% up/down around 20% of total number of stocks in the eligible universe.

When the equal- or score-weighting method was used, high-dividend portfolios performed with a higher win ratio and average monthly return in up markets.

In order to understand how the dividend factor works in different market environments, we analyzed the performance of dividend portfolios in up and down months. As shown in Exhibit 21, when weighted by float cap, the high-dividend-yield portfolio performed better in down markets and had a higher win ratio and average monthly excess return than the S&P China A BMI. In contrast, when the equal- or score-weighting method was used, high-dividend portfolios performed with a higher win ratio and average monthly return in up markets.

Exhibit 21: Performance of Q1 Dividend Portfolios in Up and Down Markets



Each single-factor portfolio had different risk/return profiles and distinct cyclicalities, which suggests that a combination of factors can provide diversified risk exposure.

Source: S&P Dow Jones Indices LLC. Portfolio performance based on total return in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Win ratios and excess returns are calculated relative to the S&P China A BMI.

Historically, most companies selected in the top-quintile dividend portfolio have been from the materials, industrials, and consumer discretionary sectors (see Appendix 5). However, when float-adjusted market cap was incorporated into the weighting scheme, the sector breakdown of the top-dividend quintile was dominated by financials stocks.

MULTI-FACTOR INVESTING

The Benefit of Multi-Factor Investing

Although all single-factor portfolios delivered positive excess returns in the long term, each single-factor portfolio had different risk/return profiles and distinct cyclicalities, which suggests that a combination of factors can provide diversified risk exposure, which may achieve more consistent excess return across different market cycles.

Exhibit 22: Correlation Between Factors

MONTHLY RETURN SPREADS OF Q1 AND Q5 FACTOR PORTFOLIOS (EQUALLY WEIGHTED)						
CORRELATION	SMALL CAP	VALUE	LOW VOLATILITY	MOMENTUM	QUALITY	DIVIDEND
Small Cap	1.00	-	-	-	-	-
Value	-0.37	1.00	-	-	-	-
Low Volatility	-0.36	0.47	1.00	-	-	-
Momentum	0.13	-0.58	-0.27	1.00	-	-
Quality	-0.21	-0.45	0.01	0.29	1.00	-
Dividend	-0.81	0.61	0.53	-0.34	0.23	1.00
MONTHLY RETURN SPREADS OF Q1 AND Q5 FACTOR PORTFOLIOS (FLOAT-CAP WEIGHTED)						
CORRELATION	SMALL CAP	VALUE	LOW VOLATILITY	MOMENTUM	QUALITY	DIVIDEND
Small Cap	1.00	-	-	-	-	-
Value	-0.45	1.00	-	-	-	-
Low Volatility	-0.64	0.48	1.00	-	-	-
Momentum	0.28	-0.64	-0.37	1.00	-	-
Quality	0.41	-0.56	-0.39	0.45	1.00	-
Dividend	-0.82	0.73	0.72	-0.56	-0.44	1.00
MONTHLY EXCESS RETURNS OF Q1 FACTOR PORTFOLIOS (EQUALLY WEIGHTED)						
CORRELATION	SMALL CAP	VALUE	LOW VOLATILITY	MOMENTUM	QUALITY	DIVIDEND
Small Cap	1.00	-	-	-	-	-
Value	0.58	1.00	-	-	-	-
Low Volatility	0.64	0.53	1.00	-	-	-
Momentum	0.82	0.30	0.52	1.00	-	-
Quality	0.80	0.30	0.55	0.81	1.00	-
Dividend	0.72	0.85	0.68	0.56	0.62	1.00
MONTHLY EXCESS RETURNS OF Q1 FACTOR PORTFOLIOS (FLOAT-CAP WEIGHTED)						
CORRELATION	SMALL CAP	VALUE	LOW VOLATILITY	MOMENTUM	QUALITY	DIVIDEND
Small Cap	1.00	-	-	-	-	-
Value	-0.30	1.00	-	-	-	-
Low Volatility	-0.65	0.28	1.00	-	-	-
Momentum	0.37	-0.57	-0.32	1.00	-	-
Quality	0.12	-0.36	-0.12	0.31	1.00	-
Dividend	-0.56	0.79	0.55	-0.64	-0.30	1.00

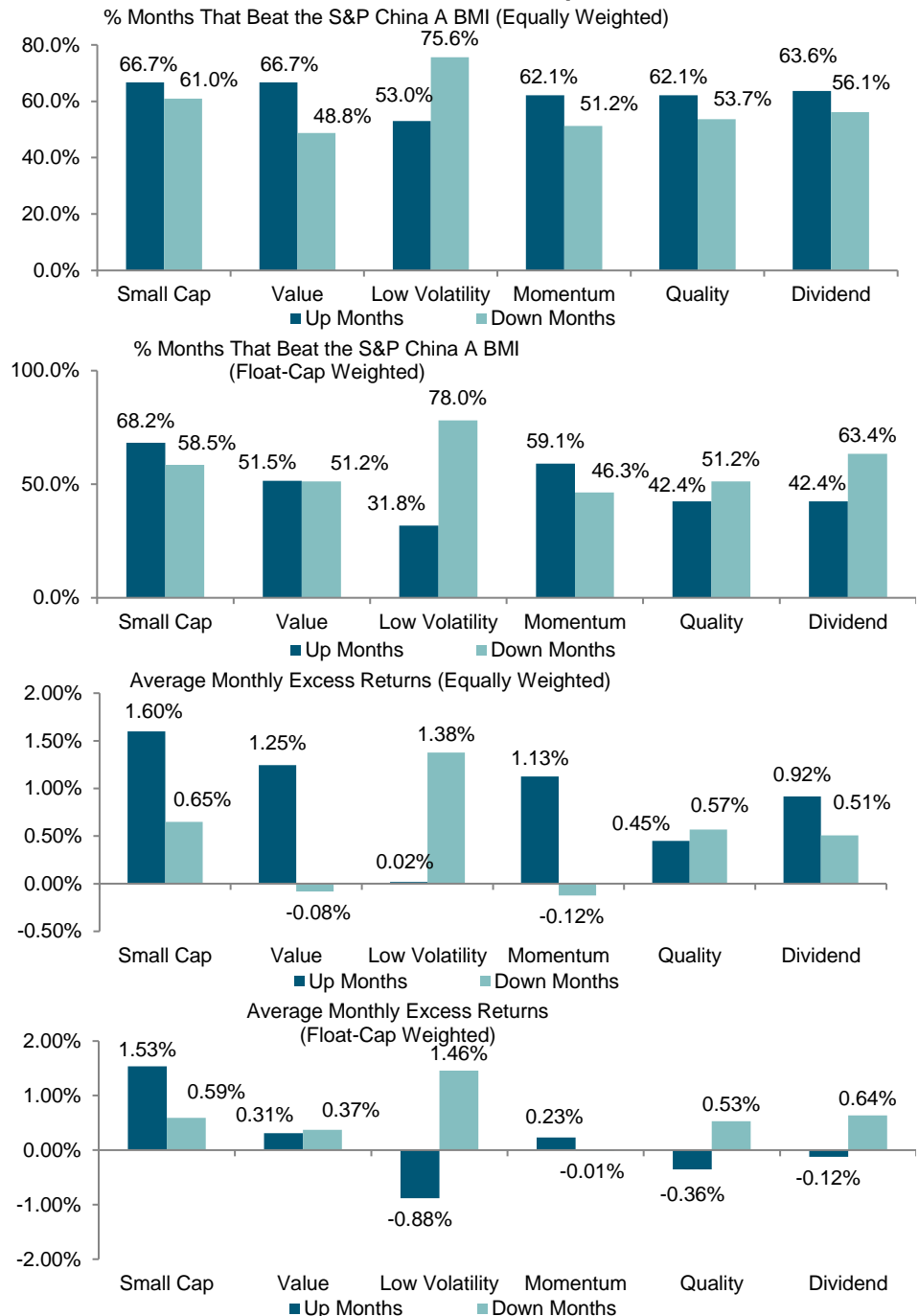
Source: S&P Dow Jones Indices LLC. Performance based on monthly total returns in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Excess returns are calculated relative to the S&P China A BMI. Momentum is measured by six-month, risk-adjusted price returns.

One fact that supports the notion of multi-factor investing is the low correlation between factors. As shown in Exhibit 22, based on monthly returns from June 30, 2006, to May 29, 2015, we found low or even negative correlation between single factors under both the equal-weighted and float-cap-weighted schemes.

Another piece of evidence for multi-factor investing is the differential outperformance/underperformance of single factors in up and down markets.

Another piece of evidence for multi-factor investing is the differential outperformance/underperformance of single factors in up and down markets.

Exhibit 23: Differential Factors Performance in Up and Down Markets



Source: S&P Dow Jones Indices LLC. Performance based on monthly total returns in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Momentum is measured by six-month, risk-adjusted price returns.

As we can see in Exhibit 23, small cap, value, and momentum had better performance in up markets, while low volatility performed best in down markets. This offers the potential for incremental returns or risk reduction by complementing one factor with another.

The combination of single factors takes two forms: factor rotation strategies and multi-factor strategies. For sophisticated investors with a tactical mindset, single-factor portfolios could provide a powerful toolkit. Since single-factor portfolios often display distinct cyclicity without any compromise, they can be easier to predict, and thus may enable investors to implement investment views more accurately. However, the success of factor rotation strategies highly depends on an investors' factor timing skills, which is quite a challenge for unsophisticated investors.

The combination of single factors takes two forms: factor rotation strategies and multi-factor strategies.

Another approach is to package multi-factor strategies into one set that provides better diversification and smoother outperformance across different market environments without the need for factor timing. Multi-factor strategies may be suitable for strategic core holdings over a longer time horizon.

There are two ways to construct multi-factor strategies: the sequential screening approach and the simultaneous screening approach. Sequential screening applies one factor after another. Usually, the first factor that is applied dominates the overall style. The simultaneous screening approach applies only one screen based on a weighted average score of multiple factors, normally the equally weighted Z-score. This approach is more flexible in design but it may not be easy to predict overall portfolio performance or when and which factors outweigh the others.

In the following sections, we will take one example of sequential screening and one of simultaneous screening to demonstrate the potential performance improvement via the combination of both factors.

Low-Volatility, High-Dividend Index

In this section, we constructed a low-volatility, high-dividend portfolio in the large-cap space of the S&P China A BMI by applying certain size, liquidity, and quality screens.⁴ We selected the top 75 stocks with the highest dividend yield in the eligible universe to form the S&P China A BMI DY75 hypothetical portfolio. Then, the 50 least-volatile stocks in the S&P China A BMI DY75 portfolio were selected to form the S&P China A BMI LVHD 50 hypothetical portfolio, and the number of stocks from each GICS® sector was capped at 20. Constituents were weighted by dividend yield with a cap of 25% on sector weights.

⁴ Eligible stocks must be ranked in the top 300 by float cap in the S&P China A BMI as of the reference date, have a float cap no less than RMB 1 billion, and a 3M ADVT of no less than RMB 10 million. Additional quality screens are applied to ensure that the company has a positive previous 12-month net income and positive three-year EPS growth rate. Portfolios are rebalanced semi-annually, effective on the third Friday of June and December. The rebalance reference dates are at the end of May and November.

Exhibit 24: Risk/Return Profiles			
CATEGORY	S&P CHINA A BMI	S&P CHINA A BMI DY75	S&P CHINA A BMI LVHD 50
Return (per Year) (%)	19.6	24.2	26.7
Standard Deviation (per Year) (%)	33.6	35.5	33.7
Risk-Adjusted Return	0.58	0.68	0.79
Rolling 12-Month Maximum Drawdown (%)	-67.9	-63.1	-59.8
Excess Return (per Year) (%)	-	4.5	7.1
Tracking Error (per Year) (%)	-	10.3	12.0
Information Ratio	-	0.44	0.59
Beta	1.00	1.01	0.95
Average Annual Turnover (%)	-	57.3	62.3
Latest Basket Liquidity (RMBmm)	-	7,726	6,243

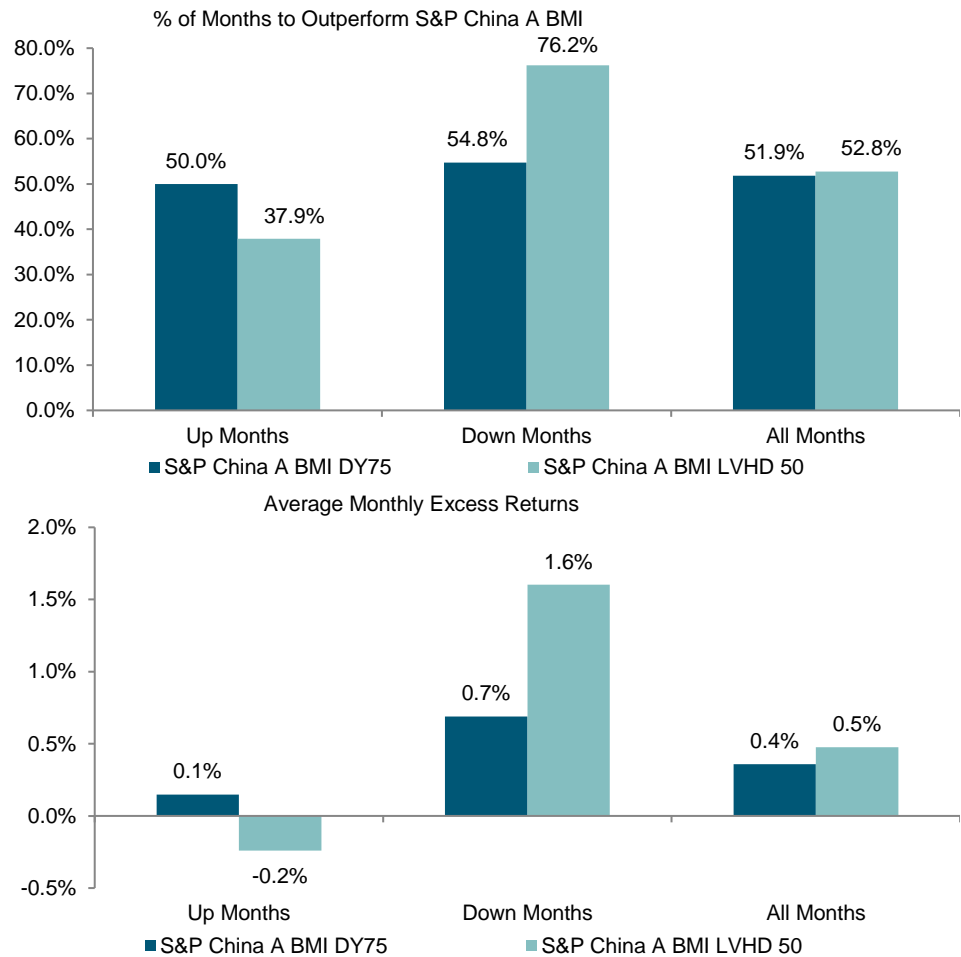
Source: S&P Dow Jones Indices LLC. Performance based on monthly total returns in RMB. Data from June 30, 2006, to June 30, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The latest basket liquidity data is calculated using the constituent weights effective on the third Friday of June 2015 and the 3M ADVT as of May 29, 2015.

For sophisticated investors with a tactical mindset, single-factor portfolios could provide a powerful toolkit.

After applying the secondary factor screen (low volatility), the final portfolio generated higher absolute and risk-adjusted returns compared to the S&P China A BMI DY75 portfolio (see Exhibit 24). On the risk side, the final portfolio had lower volatility, beta, and rolling 12-month maximum drawdown. The only drawbacks of applying a secondary factor screen are a slightly higher tracking error, higher portfolio turnover, and lower basket liquidity.

As indicated in Exhibit 25, the final portfolio became more defensive with a higher win ratio and higher excess returns in down markets. The low-volatility screen seems to have provided an additional layer of downside protection.

Exhibit 25: Performance of S&P China A BMI LVHD 50 in Up and Down Markets



Multi-factor strategies may be suitable for strategic core holdings over a longer time horizon.

Source: S&P Dow Jones Indices LLC. Performance based on total returns in RMB. Data from June 30, 2006, to June 30, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Win ratios and excess returns are calculated relative to the S&P China A BMI.

Quality Value Portfolio

As we discussed previously, the single value screen identified undervalued companies, but not necessarily high-quality companies. Quality screening may pick up companies with high quality that are overvalued. Therefore, high-quality companies with reasonable valuation can be appealing to investors. Since value stocks are cyclical, while high-quality stocks are countercyclical, combining value and quality may produce synergies that can lower tracking error and provide more consistent outperformance.

In this section, we ranked stocks in the eligible universe based on the simple average of quality and value Z-scores and constructed the top-quintile quality value portfolio.

Exhibit 26: Risk/Return Profiles of S&P China A BMI Portfolios

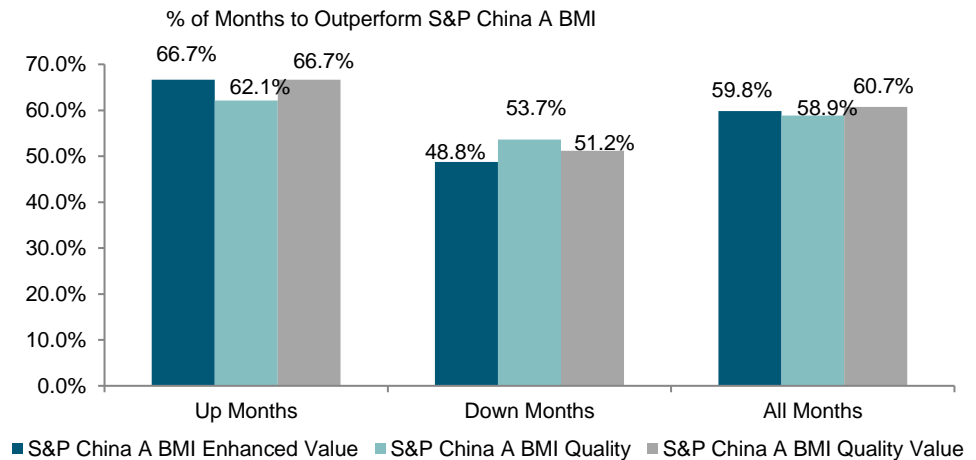
CATEGORY	S&P CHINA A BMI	ELIGIBLE UNIVERSE	S&P CHINA A BMI ENHANCED VALUE	S&P CHINA A BMI QUALITY	S&P CHINA A BMI QUALITY VALUE
		FLOAT-CAP WEIGHTED	EQUALLY WEIGHTED	EQUALLY WEIGHTED	EQUALLY WEIGHTED
Return (per Year) (%)	21.0	21.1	30.1	28.1	29.7
Standard Deviation (per Year) (%)	33.6	33.7	38.2	34.2	36.7
Risk-Adjusted Return	0.63	0.63	0.79	0.82	0.81
Rolling 12-Month Maximum Drawdown (%)	-67.5	-67.5	-65.6	-65.6	-65.0
Excess Return (per Year) (%)	-	0.1	9.1	7.0	8.7
Tracking Error (per Year) (%)	-	1.5	11.0	10.8	9.3
Information Ratio	-	0.05	0.83	0.65	0.93
Beta	1.00	0.99	1.08	0.99	1.06
Average Annual Turnover (%)	14.9	10.3	61.2	75.9	70.7
Latest Basket Liquidity (RMBmm)	-	34,350	6,387	6,327	6,387
Average Basket Liquidity (%)	-	100.0	23.6	21.0	23.2
Average Basket Liquidity (RMBmm)	-	16,891	3,750	3,240	3,632

Source: S&P Dow Jones Indices LLC. Performance based on total returns in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. The eligible universe covers all constituents of the S&P China A BMI with a 3M ADVT of no less than RMB 10 million as of reference dates (last trading day of May and November). Average annual turnover is calculated from 2007 to 2014. The latest basket liquidity is calculated based on data as of the December 2014 rebalance. Basket liquidity (%) is the basket liquidity of the factor portfolio presented as the percentage of the basket liquidity of the eligible universe. Average basket liquidity (%) is calculated from the June 2006 rebalancing to the December 2014 rebalancing.

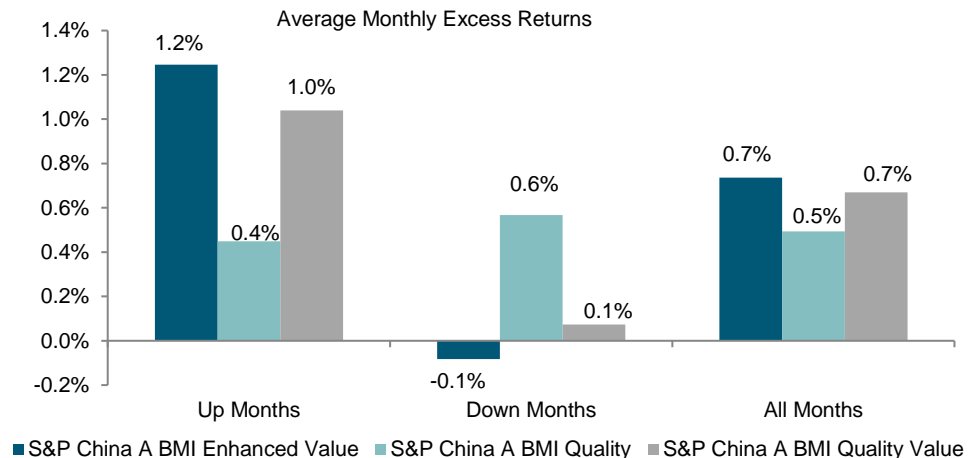
As shown in Exhibits 26 and 27, the simultaneous screen by quality and value lowered the tracking error and improved the information ratio.

Since value stocks are cyclical, while high-quality stocks are countercyclical, combining value and quality may produce synergies that can lower tracking error and provide more consistent outperformance.

Exhibit 27: Performance of S&P China A BMI Quality Value in Up and Down Markets



Quality delivered excess return relative to the eligible universe over the period tested only when constituents were float cap weighted.



Source: S&P Dow Jones Indices LLC. Performance based on monthly returns in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on the S&P China A BMI. Past performance is no guarantee of future results. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Win ratios and excess returns are calculated relative to the S&P China A BMI.

CONCLUSION

In this paper, we analyzed the performance of six single factors, namely small cap, value, low volatility, momentum, quality, and dividends in China's A-share market from June 30, 2006, to May 29, 2015. Compared with the eligible universe, small cap, value, low volatility, and dividend factors produced incremental returns (absolute and risk-adjusted returns) and improved information ratios under both the equal-weighted and float-cap-weighted methods (see Exhibit 28).

Quality delivered excess return relative to the eligible universe over the period tested only when constituents were float cap weighted. However, high-quality portfolios had lower return volatility and smaller return drawdown during down markets. Single measure analysis indicated that

ROE might have contributed negatively to the overall performance over the period studied.

We tested different momentum measures in China's A-share market over the same period. Six-month, risk-adjusted momentum had the best performance in terms of absolute and risk-adjusted returns. However, compared with the eligible universe under the same weighting scheme, the six-month, risk-adjusted momentum produced minor excess returns over the period only when the float-cap-weighted method was used. Momentum generated much higher portfolio turnover than other factors.

Different weighting methods used in the construction of factor portfolios had a significant impact on excess returns and factor investability.

Different weighting methods used in the construction of factor portfolios had a significant impact on excess returns and factor investability. While equal or score weighting delivered higher factor exposure and more significant excess return than market-cap or tilted market-cap-weighting methods, it resulted in higher portfolio turnover and reduced portfolio liquidity.

Single factors exhibited differential cyclical behavior. While small cap, value, and momentum were pro-cyclical, with better performance in up markets, low volatility and quality were countercyclical, with better performance in down markets. The cyclical behavior of the dividend factor is not conclusive, as dividend portfolios with different weighting methods did not demonstrate unique cyclical behavior.

Since each single-factor portfolio had different risk/return profiles and distinct cyclical behavior, as shown in Exhibit 28 below, the multi-factor portfolio provided diversified risk exposure, which may achieve more consistent excess return across different market cycles. Both the low-volatility, high-dividend portfolio and the quality value portfolios showed more enhanced information ratios than their underlying single-factor portfolios.

Exhibit 28: Risk/Return Profiles of Factor Portfolios**EQUALLY WEIGHTED**

SINGLE FACTOR	SMALL CAP	VALUE	LOW VOLATILITY	MOMENTUM	QUALITY	DIVIDEND	ELIGIBLE UNIVERSE
Return (per Year) (%)	37.6	30.1	29.7	28.7	28.1	31.6	28.7
Standard Deviation (per Year) (%)	38.9	38.2	32.1	38.1	34.2	35.7	36.7
Risk-Adjusted Return	0.96	0.79	0.93	0.75	0.82	0.88	0.78
Excess Return (per Year) (%)	16.5	9.1	8.7	7.7	7.0	10.5	7.7
Tracking Error (per Year) (%)	18.6	11.0	9.9	14.7	10.8	8.6	11.5
Information Ratio	0.89	0.83	0.88	0.52	0.65	1.23	0.67
Average Annual Turnover (%)	81.6	61.2	78.0	110.9	75.9	65.1	27.3
Average Basket Liquidity (%)	19.8	23.6	20.0	22.4	21.0	23.7	99.1

FLOAT-CAP WEIGHTED

SINGLE FACTOR	SMALL CAP	VALUE	LOW VOLATILITY	MOMENTUM	QUALITY	DIVIDEND	ELIGIBLE UNIVERSE
Return (per Year) (%)	36.6	24.3	22.4	22.4	21.3	23.0	21.1
Standard Deviation (per Year) (%)	38.8	37.4	30.7	35.2	32.3	35.0	33.7
Risk-Adjusted Return	0.94	0.65	0.73	0.64	0.66	0.66	0.63
Excess Return (per Year) (%)	15.6	3.3	1.4	1.4	0.3	1.9	0.1
Tracking Error (per Year) (%)	18.4	11.5	10.8	10.9	7.5	9.0	1.5
Information Ratio	0.85	0.29	0.13	0.13	0.04	0.22	0.05
Average Annual Turnover (%)	81.8	43.0	52.6	106.0	56.5	42.7	10.3
Average Basket Liquidity (%)	17.1	40.1	37.2	34.2	32.0	44.5	100.0

Source: S&P Dow Jones Indices LLC. Performance based on monthly total returns in RMB. Data from June 30, 2006, to May 29, 2015 using an eligible universe based on 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 Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Excess returns and tracking errors are calculated relative to the S&P China A BMI. Momentum is measured by six-month, risk-adjusted price returns.

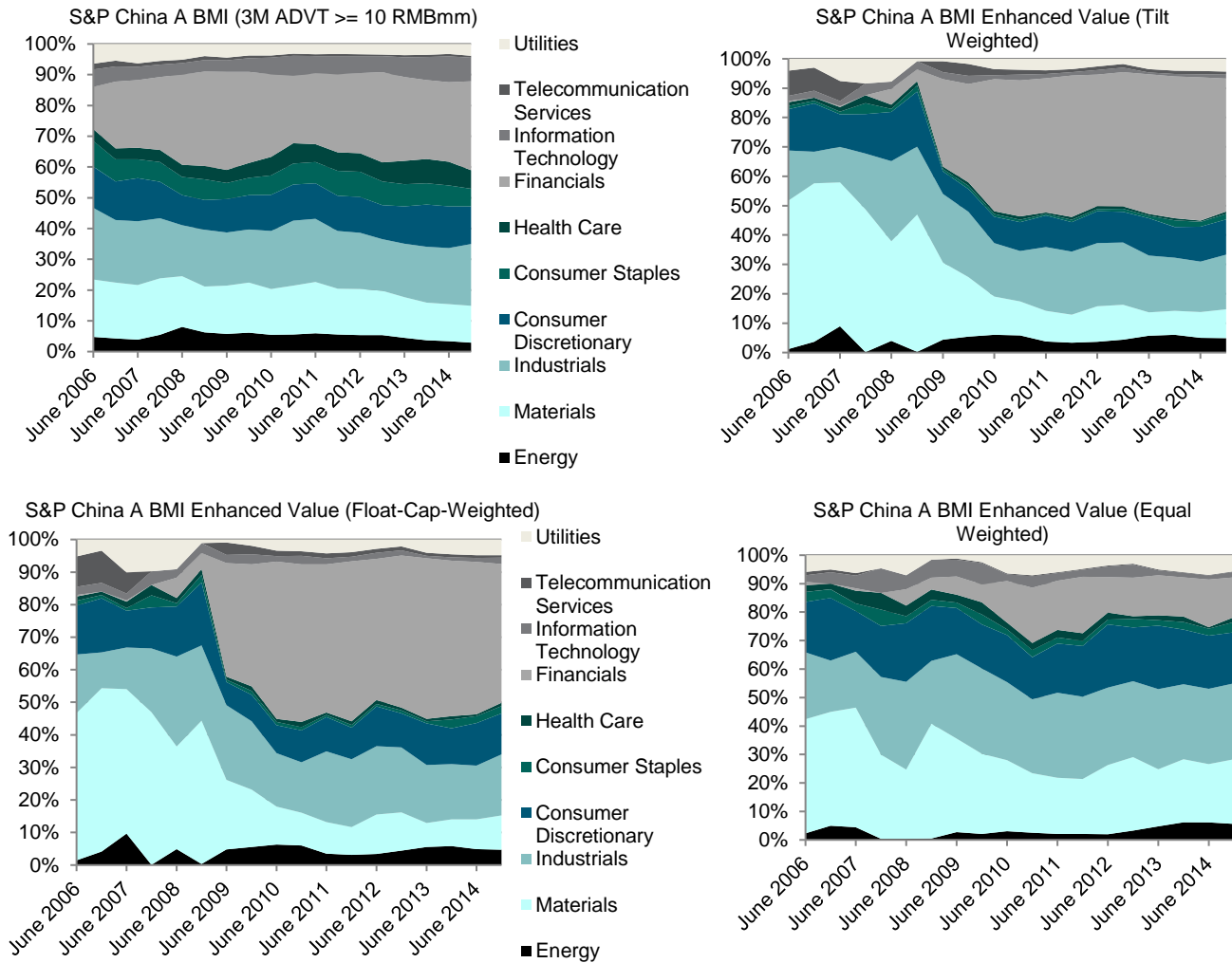
While small cap, value, and momentum were pro-cyclical, with better performance in up markets, low volatility and quality were countercyclical, with better performance in down markets.

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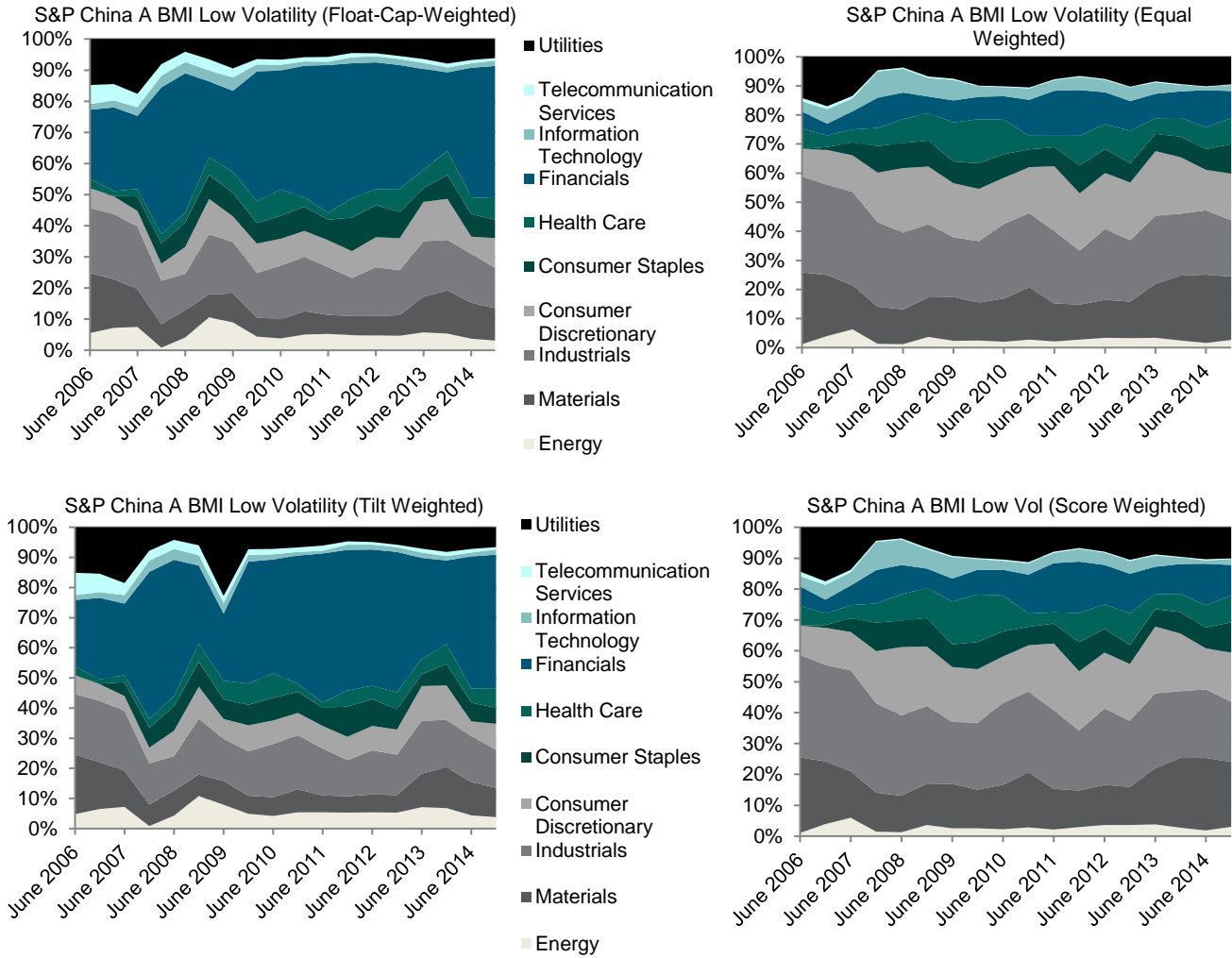
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Appendix 1: Sector Breakdown of Q1 Enhanced-Value Portfolios



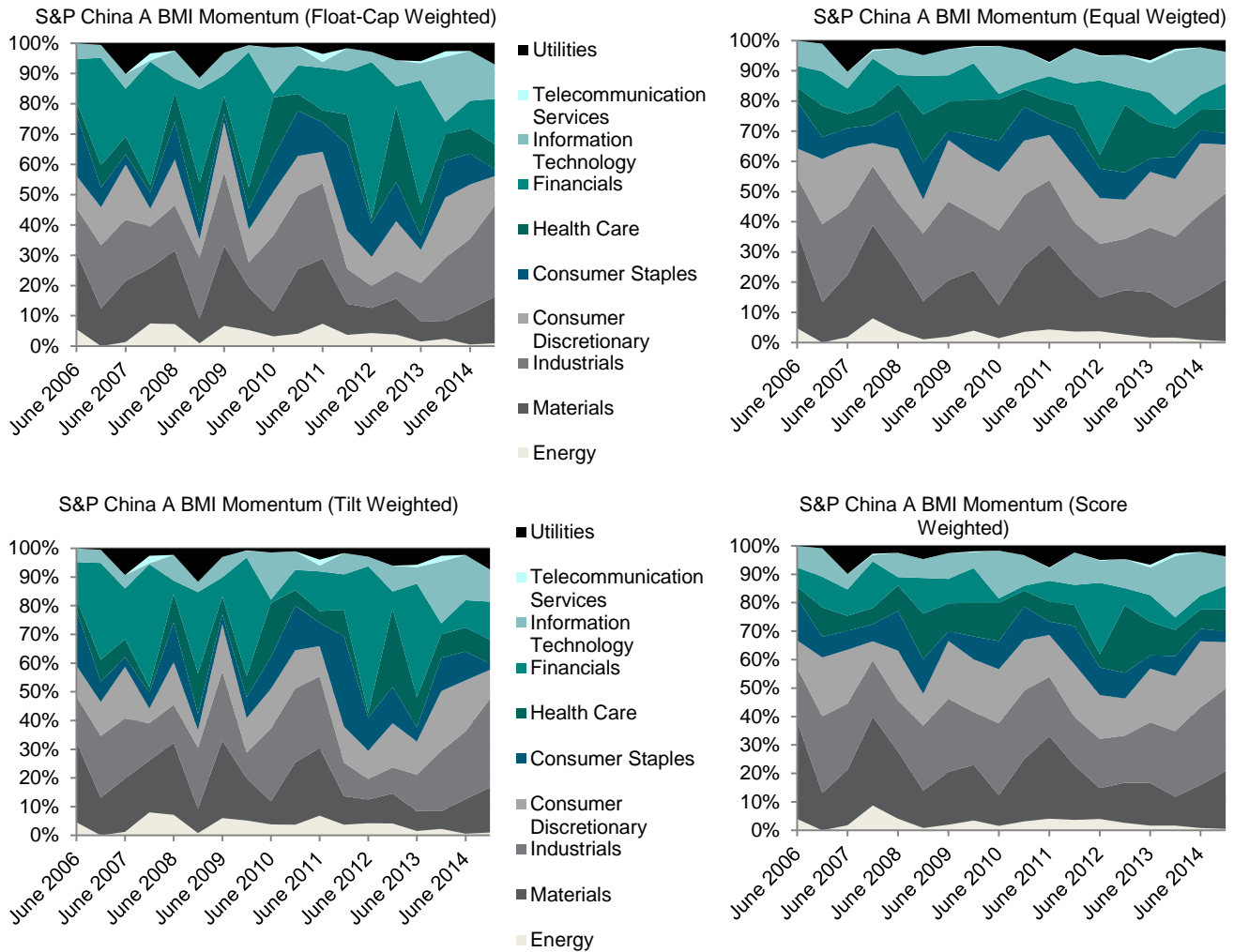
Source: S&P Dow Jones Indices LLC. Data as of semiannual rebalances from 2006 to 2014 using an eligible universe based on the S&P China A BMI. All enhanced value portfolios are the first quintile portfolios by enhanced value score in the eligible universe without applying any rebalance buffer. Constituents of S&P China A BMI Enhanced Value (Tilt) are weighted by float-adjusted market cap (FCap)*(1+Value Z Score). Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Appendix 2: Sector Breakdown of Q1 Low-Volatility Portfolios



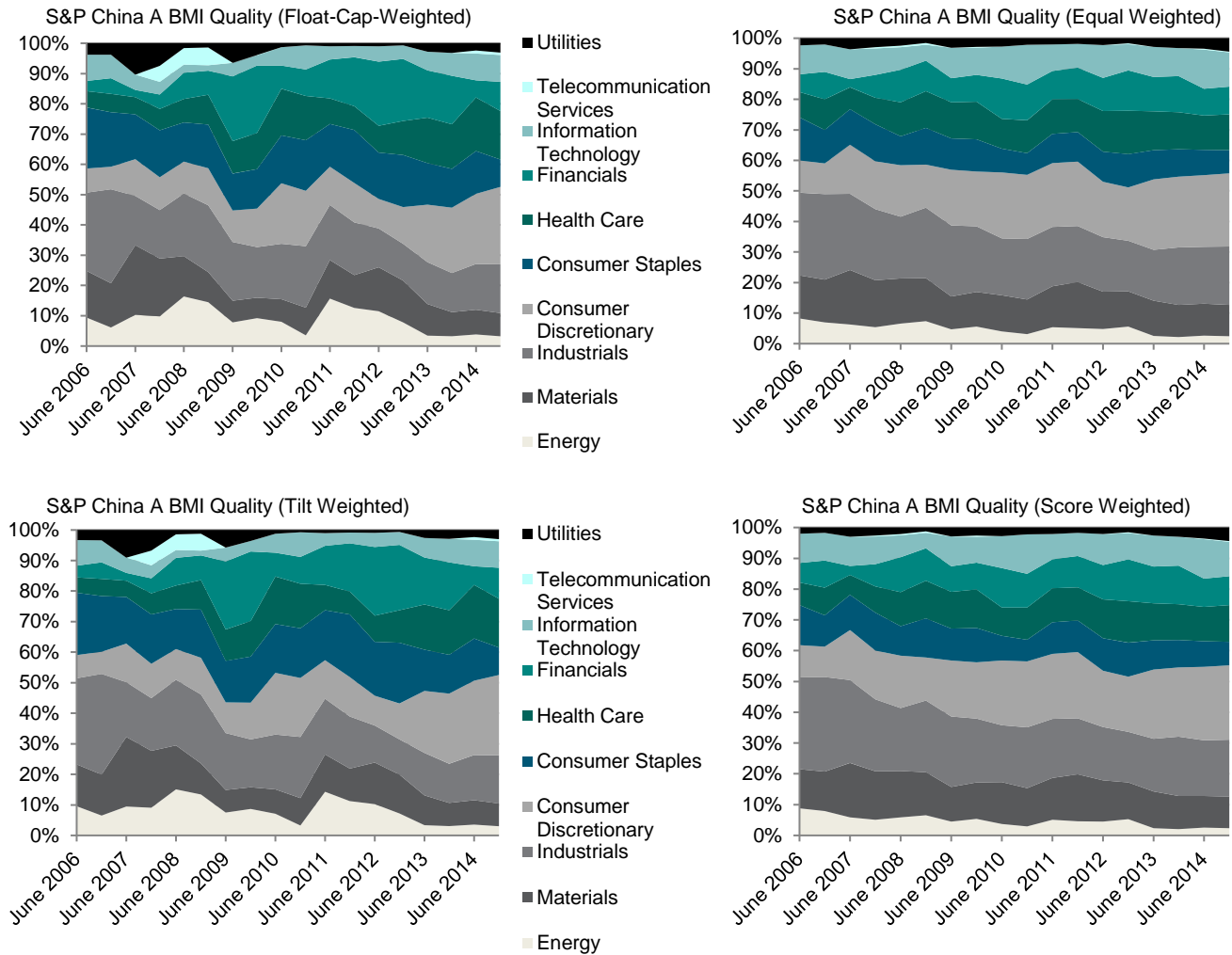
Source: S&P Dow Jones Indices LLC. Data as of semiannual rebalances from 2006 to 2014 using an eligible universe based on the S&P China A BMI. All low-volatility portfolios are the first quintile portfolios by inverse volatility in the eligible universe without applying any rebalance buffer. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Appendix 3: Sector Breakdown of Q1 Momentum Portfolios



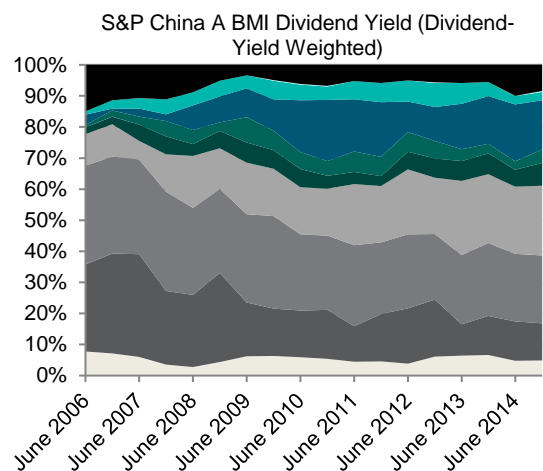
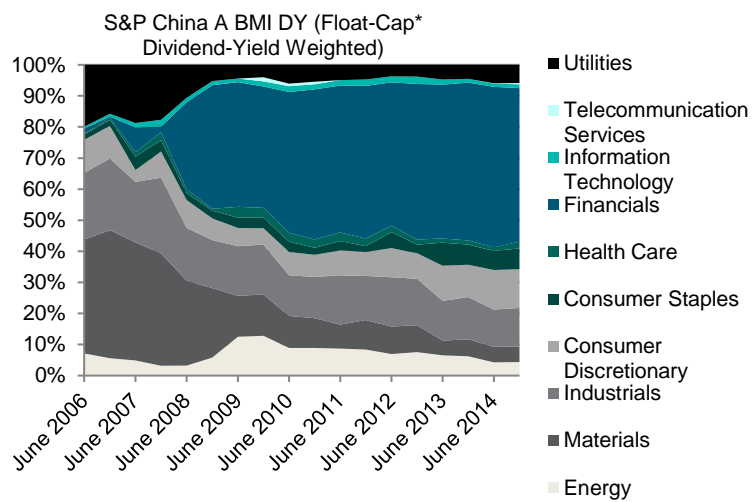
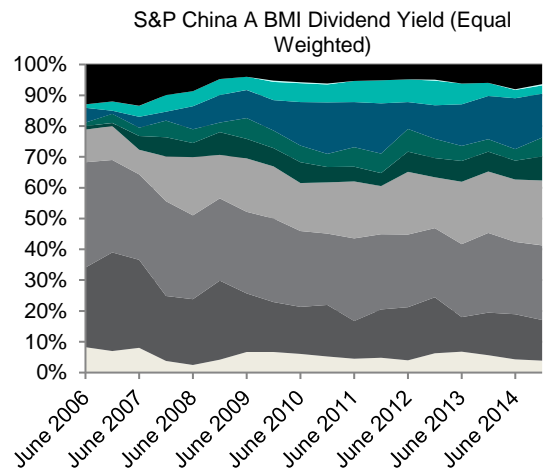
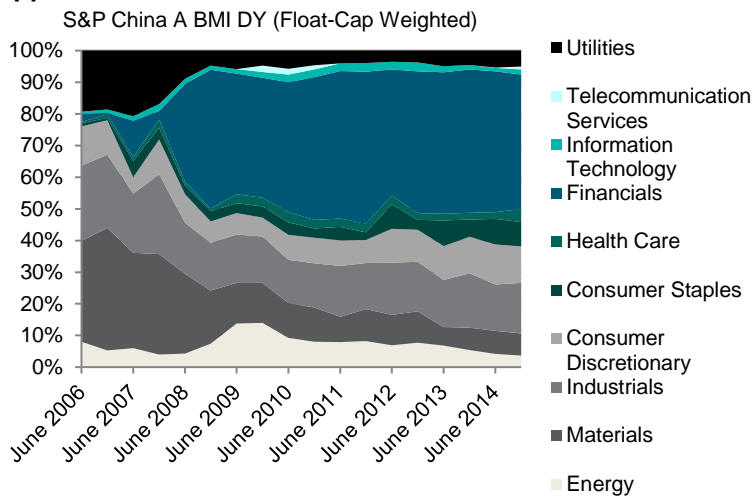
Source: S&P Dow Jones Indices LLC. Data as of semi-annual rebalances from 2006 to 2014 using an eligible universe based on the S&P China A BMI. All momentum portfolios are the first quintile portfolios by six-month, risk-adjusted momentum in the eligible universe without applying any rebalance buffer. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Appendix 4: Sector Breakdown of Q1 Quality Portfolios



Source: S&P Dow Jones Indices LLC. Data as of semiannual rebalances from 2006 to 2014 using an eligible universe based on the S&P China A BMI. All quality portfolios are the first quintile portfolios by quality score in the eligible universe without applying any rebalance buffer. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Appendix 5: Sector Breakdown of Q1 Dividend Portfolios



Source: S&P Dow Jones Indices LLC. Data as of semiannual rebalances from 2006 to 2014 using an eligible universe based on the S&P China A BMI. All dividend portfolios are the first quintile portfolios by dividend yield in the eligible universe without applying any rebalance buffer. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

S&P DJI Research Contributors		
NAME	TITLE	EMAIL
Charles "Chuck" Mounts	Global Head	charles.mounts@spglobal.com
Global Research & Design		
Aye Soe, CFA	Americas Head	aye.soe@spglobal.com
Dennis Badlyans	Associate Director	dennis.badlyans@spglobal.com
Phillip Brzenk, CFA	Director	phillip.brzenk@spglobal.com
Smita Chirputkar	Director	smita.chirputkar@spglobal.com
Rachel Du	Senior Analyst	rachel.du@spglobal.com
Qing Li	Associate Director	qing.li@spglobal.com
Berlinda Liu, CFA	Director	berlinda.liu@spglobal.com
Ryan Poirier	Senior Analyst	ryan.poirier@spglobal.com
Maria Sanchez	Associate Director	maria.sanchez@spglobal.com
Kelly Tang, CFA	Director	kelly.tang@spglobal.com
Peter Tsui	Director	peter.tsui@spglobal.com
Hong Xie, CFA	Director	hong.xie@spglobal.com
Priscilla Luk	APAC Head	priscilla.luk@spglobal.com
Utkarsh Agrawal	Associate Director	utkarsh.agrawal@spglobal.com
Liyu Zeng, CFA	Director	liyu.zeng@spglobal.com
Sunjiv Mainie, CFA, CQF	EMEA Head	sunjiv.mainie@spglobal.com
Daniel Ung, CFA, CAIA, FRM	Director	daniel.ung@spglobal.com
Index Investment Strategy		
Craig Lazzara, CFA	Global Head	craig.lazzara@spglobal.com
Fei Mei Chan	Director	feimei.chan@spglobal.com
Tim Edwards, PhD	Senior Director	tim.edwards@spglobal.com
Howard Silverblatt	Senior Industry Analyst	howard.silverblatt@spglobal.com

PERFORMANCE DISCLOSURE

The S&P China A BMI was launched on Nov. 27, 2013. All information presented for the index prior to the launch date is back-tested, and all information for hypothetical factor indices created by using an eligible universe based on the S&P China A BMI also is backtested. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. Complete index methodology details are available at www.spdji.com. It is not possible to invest directly in an index.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency on their products. 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 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.

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