



Alternative Beta Strategies: A “Smarter” Way to Invest in Equities?

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- ◆ Alternative beta indexes strive to aggregate market securities based on objective criteria, weighting them in a way that is not limited to their share price or market capitalization. The weighting factors can include company fundamentals, share price volatility, earnings sustainability, or price momentum, in addition to a naïve equal-weighting approach.
- ◆ Alternative beta strategies, which some firms call “smart beta,” seek to outperform the cap-weighted index over a market cycle, or to provide competitive returns at a lower risk level than the broad market. As opposed to traditional indexes, alternative beta indexes rebalance periodically to bring weights back to the level indicated by the index’s methodology, often buying more shares of companies that have underperformed since the last rebalance while trimming those that have outperformed.
- ◆ Most alternative beta strategies are plays on long-standing empirical evidence: value, size, momentum, and low volatility—market premiums that have all shown superior risk/return characteristics compared to broad-market benchmarks and are used by most fundamental and many quantitative equity managers. What is novel about these new strategies is their greater transparency and lower fees compared to traditional active management.
- ◆ While the universe of strategies under this umbrella is large and growing quickly, alternative beta strategies include equal weighted, fundamental weighted, momentum, minimum volatility, and quality.
- ◆ We believe that several of the strategies have the potential to outperform broad indexes; however, the future performance of these strategies, implemented in real markets by managers, will likely be more modest and less consistent than the back-tested performance record suggests. In addition, future relative performance may be influenced by today’s relative valuations for the strategies, and excess returns may erode should assets pile in.
- ◆ While we cannot be certain that alternative beta indexes will offer superior risk/return behavior, we believe the following: equal-weighted strategies will benefit from rebalancing, assuming turnover and transaction costs are well managed; value-weighted strategies will offer long-term benefits from the combination of value exposure and rebalancing; momentum strategies should continue to offer attractive returns for the long term, supported by behavioral investor biases and some degree of differential risks; minimum-volatility strategies appear likely to continue providing better risk-adjusted returns than their low beta would initially imply, supported by behavioral biases and leverage aversion; and quality/profitability returns should be comparable to broad equity indexes over long periods, though these strategies should exhibit moderately defensive characteristics.
- ◆ Investors that struggle today to build portfolios of highly active fundamental managers (perhaps because of capacity constraints or governance problems such as the inability to hold onto managers when they temporarily underperform) might find alternative beta particularly appealing. ■

Alternative Beta Strategies: A “Smarter” Way to Invest in Equities?

Alternative beta strategies have generated considerable investor enthusiasm via a substantial body of industry and academic research, significant marketing frenzy, low broad-market return expectations, and dissatisfaction with traditional fundamental equity managers. These systematic strategies—sometimes referred to as “smart beta,” “style premiums” or “factor investments”—seek to improve upon the risk/return dynamic of traditional capitalization-weighted indexes. Versions of some alternative beta strategies (particularly low volatility, momentum, and value-based tilts) have been applied by managers for years; the new elements include understandable, clever packaging and the availability of transparent indexes and lower-fee products. While the historical outperformance of the backtested strategies should be discounted somewhat, some of them offer appealing risk/return prospects at reasonable fees, even net of reasonable transaction cost estimates. Some strategies are particularly appealing when combined. That said, some of the strategies currently are richly valued relative to broad market indexes, so investors must choose carefully. Additionally, several strategies have particular factors in common including tilts to small-cap or value stocks, as well as the boost of rebalancing to returns.¹ The prevalence of common factors—rather than differentiated and unique alpha sources—should lead investors to insist on sensible index construction and efficient investment implementation.

In this report we define alternative beta and provide an overview of several established strategies. We also examine future return prospects, return drivers, and return drags; and discuss portfolio implementation considerations and current valuations.

¹ When an index of individual stocks is rebalanced according to a non-price variable (such as company fundamentals or level of volatility), the process tends to sell the stocks that have risen in value and buy the stocks that have fallen in value. Even though it is done without the use of valuation metrics such as price-to-book (P/B), and the index may include substantial allocations to stocks with high valuations, this rebalancing process produces a type of value tilt and has historically driven outperformance for alternative beta strategies.

What Is Alternative Beta?

Alternative to What?

Indexes weighted by market capitalization are widely accepted by institutional investors as the neutral position for their portfolios. They represent the investible market, with exposure proportionate to the market value (or free float market value) of individual companies. As such, they serve as the benchmarks upon which active managers are measured, are the basis for passive allocations, and have a beta of 1.0.² Reasons why cap-weighted benchmarks—and the investible products based upon them—have been and remain popular include: very long data history, including decades of “live” investment; broad exposure to market movements; liquidity; low fees; low turnover; high tax efficiency (as a result of their low turnover); and high transparency.

Critics argue that cap-weighted indexes are overly concentrated in the largest names and subject to momentum. Because price is a direct component of the weighting mechanism, stocks that have performed well have higher weights. The argument is that index investors are buying yesterday’s winners and are thus tilted toward overvalued stocks, subjecting the index to bubbles in hot sectors or regions. A famous example of cap-weighted market distortion occurred during the Japanese equity market bubble in 1989, when new money invested in the global equity indexes allocated upwards of 40% to Japan just before the nation’s bear market. Ten years later, the technology

bubble grossly overweighted expensive large-cap tech stocks, with indexes systematically shunning the less richly valued, smaller-cap companies that turned out to be the outperformers of the ensuing decade.

Alternative Beta Defined

Alternative beta indexes strive to aggregate market securities based on objective criteria, weighting them in a way that is not limited to their share price or market capitalization. The weighting factors can include company fundamentals (such as revenues), share price volatility, earnings sustainability (one definition of quality), or price momentum, in addition to a naïve equal-weighting approach. Many indexes focus on one factor or risk premium, while others combine factors.³ Any individual factor has its own regression slope (or beta), which is different (i.e., an alternative) from the market’s beta.

Alternative beta strategies seek to outperform the cap-weighted index over a market cycle, or to provide competitive returns at a lower risk level than the broad market. As opposed to traditional indexes, alternative beta indexes rebalance periodically to bring weights back to the level indicated by the index’s methodology, often buying more shares of companies that have underperformed since the last rebalance while trimming those that have outperformed. All are systematic and rules based, so some investors may think of these strategies as passive. However, the decision to move away from the neutral, market cap-weighted index is an active deviation from

² A cap-weighted portfolio is typically the default way to access a particular market because it buys the entire market, proportioned by the tradable market cap of its respective companies. Beta, as defined by Nobel Laureate William Sharpe, is the non-diversifiable risk of the overall market. An investment with a beta of 1.0 would be expected to rise 10% if the broad market rose 10%, while a beta of 0.5 and 1.5 would result in 5% and 15% increases, respectively, in a market that rises 10%.

³ Factors are the way that a strategy or portfolio co-moves with another basket of securities, while risk premiums imply a factor with a positive expected return. It is possible to have exposure to a factor with a negative risk premium. Often these terms are used interchangeably because so much academic research has been conducted on factors that consistently generate positive premiums (and it is not always clear that each factor represents incremental risk, besides tracking error).

the market, even if it is implemented in a systematic, rules-based manner.

Most alternative beta strategies are plays on long-standing empirical evidence: value⁴; size^{5,6}; momentum⁷; and low volatility⁸—market premiums that have all shown superior risk/return characteristics compared to broad-market benchmarks. Traditional fundamental active managers implicitly take advantage of these risk premiums when constructing portfolios, and quantitative active managers create multi-factor models around the very same broad factors. While these strategies have been researched and employed in various ways for years, what is novel about the “smart beta” approach is the packaging, particularly the greater transparency and generally lower cost structure than traditional active management.

Figure 1 lists relevant indexes for several alternative beta strategies and lays out the differences between the strategies. While the universe of strategies under this umbrella is large and growing quickly, this report highlights five broad types of alternative beta strategies:

- ◆ **Equal Weighted.** Each security is weighted equally, with the weights rebalanced periodically. Though this strategy has an inherent small-cap bias, it is a simple starting point for investors

interested in systematic alternatives to capitalization weighting; liquidity and capacity can be an issue.

- ◆ **Fundamental Weighted.** An intuitive value-centric approach in which stocks are weighted based on fundamental metrics, such as the firm’s revenue. (Value-weighted strategies employ a different name, but the methodologies are conceptually similar.)
- ◆ **Momentum.** Stocks are weighted based on recent performance, overweighting those that have outperformed their peers recently and underweighting those that have underperformed. Two decades of research into this strategy have begun to win over skeptics, as academic studies have consistently demonstrated that they can add value over the long term, though with substantial short-term volatility.
- ◆ **Minimum Volatility.** Exploits the anomaly that lower-volatility stocks have tended to outperform broad indexes on a risk-adjusted basis; however, relative valuations appear rich today.
- ◆ **Quality.** Stocks with high and consistent profitability are systematically assigned higher weightings. Recent research indicates these stocks have historically outperformed, though evidence is somewhat slim compared to other strategies.

Readers who are not fluent in the details of alternative beta strategies should visit the Appendix for an in-depth discussion of the strategies shown in Figure 1, as well as strategies employing a mix of factors.⁹

⁴ Eugene F. Fama and Kenneth R. French, “The Cross-Section of Expected Stock Returns,” *The Journal of Finance* 47, no. 2 (1992): 427–465.

⁵ Rolf W. Banz, “The Relationship Between Return and Market Value of Common Stocks,” *Journal of Financial Economics* 9 (1981): 3–18.

⁶ Unlike long-standing value and size tilts using indexes such as the Russell 1000® Value Index and the Russell 2000® Small-Cap Index, value and size strategies from alternative beta providers often do not incorporate market capitalization into the weighting process.

⁷ Narasimhan Jegadeesh and Sheridan Titman, “Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency,” *The Journal of Finance* 48, no. 1 (March 1993): 65–91.

⁸ Robert A. Haugen and Nardin L. Baker, “The Efficient Market Inefficiency of Capitalization-Weighted Stock Portfolios,” *The Journal of Portfolio Management* 17, no. 3 (Spring 1991): 35–40.

⁹ We chose these strategies because equal-weighted indexes are a helpful starting point, and the other strategies appear to be gaining traction among some of the large institutions that have embraced alternative beta (these include some large pension plans and other institutions that struggle with active-manager capacity constraints). Other strategies continue to be introduced as well.

Figure 1. Comparing Traditional and Alternative Indexes

	Example Indexes (Inception)	Annual Turnover	3-Year Tracking Error	# of Stocks	Weighting Method
Market Capitalization	S&P 500 (1957)	3.9%	--	500	Market cap weighted
	MSCI World (1969)	2.4%	--	1,610	
	MSCI Emerging Markets (1988)	6.7%	--	822	
Equal Weighted	S&P 500 Equal Weighted (2003)	17.8%	2.54%	500	Equal weight stocks
	MSCI World Equal Weighted (1973)	22.3%	2.70%	1,610	
	MSCI EM Equal Weighted (2008)	31.6%	4.00%	822	
Fundamental Weighted	FTSE® RAFI 1000 (2005)	~13%	2.33%	1,000	Weight all stocks by fundamental factors (sales, cash flow, book value, dividends)
	FTSE® RAFI Developed 1000 (2007)	~17%	2.61%	1,000	
	FTSE® RAFI Emerging (2007)	~33%	2.31%	350	
Value Weighted	MSCI USA Value Weighted (2010)	15.0%	3.34%	611	Re-weights the constituents of the MSCI parent index on four accounting variables (sales, earnings, cash earnings, book value)
	MSCI World Value Weighted (2010)	16.9%	3.80%	1,610	
	MSCI EM Value Weighted (2010)	16.4%	2.65%	821	
Momentum Weighted	MSCI USA Momentum (2013)	113.8%	2.12%*	125	Weight all stocks by momentum score (12- and 6-month risk-adjusted price momentum) multiplied by market cap weight in parent index
	MSCI ACWI Momentum (2013)	117.8%	3.31%*	500	
Minimum Volatility	MSCI USA Minimum Volatility (2008)	22.8%	8.08%	140	Low volatility as weighting factor; minimize index volatility subject to constraints
	MSCI World Minimum Volatility (2008)	22.5%	9.88%	250	
	MSCI EM Minimum Volatility (2008)	22.4%	5.24%	223	
Quality	MSCI USA Quality (2012)	36.0%	4.43%*	125	Weight all stocks by quality score (return on equity, debt/equity, earnings variability) multiplied by market cap weight in parent index
	MSCI World Quality (2012)	21.9%	5.22%*	300	
	MSCI Emerging Markets Quality (2012)	20.5%	4.19%*	199	

Figure 1. Comparing Traditional and Alternative Indexes (continued)

	Biases	Rebalancing	Pros and Cons
Market Capitalization	Large Cap, Momentum	S&P 500: Changes as needed; no annual or semi-annual reconstitution MSCI World and EM: Quarterly on last business day of Feb, May, Aug, and Nov	+ Low turnover, long record; objectively represents the market - Buy yesterday's winners that are prone to bubbles (e.g., TMT 1999, Japan 1989)
Equal Weighted	Smaller Cap	S&P 500 EW: Quarterly on the third Friday of the quarter-ending month MSCI World and EM EW: Quarterly on last business day of Feb, May, Aug, and Nov	+ Less historic, reflects present - Higher turnover; higher transaction costs; small stock liquidity issues; higher volatility
Fundamental Weighted	Lower Cap, Value	Annually in March	+ More representative, less dependent on market pricing - Value biased; cost; subjectivity of factors
Value Weighted	Mid/Large Cap, Value	Semi-annually (May and Nov)	+ Outperformance in slower market conditions - Underperformance in strong upward markets; mid/large cap tilt based on parent index
Momentum Weighted	Momentum, Volatility, Growth	Semi-annually on last business day of May and Nov; also ad hoc if monthly change in volatility is above 95th percentile of monthly changes in volatility	+ One of few strategies based on technical factors; outperformance in upward trending markets - Underperformance in adverse market conditions; high turnover
Minimum Volatility	Low Beta, Lower Cap, Sector	Semi-annually on last business day of May and Nov; possible ongoing changes based on corporate events	+ Less volatile, lower drawdowns; outperformance in adverse market conditions - Potential for crowding; possible unintended sector bias; higher turnover
Quality	Quality, Large Cap, Sector	Semi-annually on last business day of May and Nov; possible ongoing changes based on corporate events	+ Companies held have durable business models, so there is high liquidity in underlying holdings; lower volatility; outperformance in adverse market conditions - Underperformance in strong up markets; subjectivity

* Tracking error figures calculated using a backtest for indexes inception less than three years ago.

Notes: Most data are as of December 31, 2013. Exceptions are estimated figures (marked by ~), which are estimated based on turnover figures for ETFs tracking the index (in the case of FTSE® RAFI indexes). Tracking error is relative to the appropriate cap-weighted index, as determined by geography.

Return Considerations

Does Alternative Beta Add Value?

Proponents of “alternative beta” typically brand the products as “smart beta” and strongly suggest that traditional cap-weighted indexes represent an outmoded approach to managing money. They describe smart beta as an obvious choice because of higher long-run expected returns, a superior Sharpe ratio, or both. We believe that several of the strategies have the potential to outperform broad indexes; however, the future performance of these strategies, implemented in real markets by managers, will likely be more modest and less consistent than the backtested performance record suggests. In addition, relative performance from this starting point may be influenced by today’s relative valuations for the strategies, and excess returns may erode should assets pile in. Finally, investors should be aware that some of the historical outperformance is coming from systematic rebalancing.

While historical returns seem impressive (as shown in the coming pages), potential investors should keep in mind the following qualifiers:

- ◆ The claimed historical returns of these strategies are mostly backtests, with little or no assets explicitly managed until recently. Backtests are notorious for building and then dashing expectations.¹⁰ What size haircut should the

¹⁰ We have yet to see a backtested return series presented by a manager or index provider that was unattractive; subsequent live returns are sometimes another story. The researcher will likely tweak the strategy multiple times, and invariably the best result is the one that gets published. Furthermore, if money floods into the strategy, market impact from transaction costs (and from front-running, if the strategy is transparent) can damp down returns. For more on the dangers of relying on backtests, please see David H. Bailey et al., “Pseudo-Mathematics and Financial Charlatanism: The Effects of Backtest Overfitting on Out-of-Sample Performance,”

backtest results receive to reflect the risk that out-of-sample results will be different?¹¹

- ◆ The backtests generally do not incorporate any assumption for transaction costs. These may be material for some strategies, where a significant proportion of the assumed historical return may be coming from rebalancing and where annual turnover is high. For example, annual turnover of 50% and a roundtrip transaction cost (including market impact, bid/offer spread, and brokerage commissions) of 100 bps would lower the strategy’s actual return by 50 bps per year relative to the hypothetical backtest. While transaction costs are not baked into historical analysis of cap-weighted indexes either, cap-weighted indexes of large-cap stocks often have turnover of less than 5%.
- ◆ Because these strategies are not yet commoditized like cap-weighted indexes, management fees¹² command a moderate premium (typically they fall between the fees for passive products and the fees for traditional, fundamental active products). Those fees would cut into net returns for alternative beta strategies to a greater degree than the very low fees for most cap-weighted index funds.
- ◆ Returns are highly cyclical and will go through long periods of underper-

Working Paper, accessed at www.davidhbailey.com/dhbpapers/backtest-pseudo.pdf on May 15, 2014.

¹¹ We do not have a good estimate of this, but the right number could be substantial. One quantitatively oriented money management firm evaluating a backtest applied a roughly 1,000 bp discount of the simulated returns to reflect the uncertainty around whether in-sample results will persist (in addition to the discount reflecting transaction costs). This was a backtest of a leveraged strategy with multiple return streams, so we are not suggesting that 1,000 bps is the correct “haircut” for a relatively simpler alternative beta strategy.

¹² When investors invest via separately managed accounts, they typically will also pay licensing fees to index providers (these are already incorporated into the fee structure of most traditional index funds and exchange-traded funds).

mance relative to the cap-weighted benchmarks. For example, value stocks underperformed growth stocks during the 1990s tech bubble but subsequently outperformed during the early 2000s. Alternative strategies based on a single risk premium will be subject to long periods of underperformance when that particular factor is out of favor.

Even With a Haircut, Return Prospects Are Worth a Look

With these substantial caveats in mind, Figure 2 illustrates the range of historical rolling three-year outperformance for six alternative beta indexes, both global and US. The median three-year annualized outperformance for the displayed alternative beta strategies ranges from 1.4% to 4.4% for global indexes and 0.7% to 3.1% for US indexes. Market capitalization–weighted small-cap indexes are included in each chart for comparison. The graph’s horizontal axis indicates the historical level of *variability* of each index’s outperformance over time. As stated previously, to evaluate the potential future outperformance of these strategies, haircutting the historical results would be prudent because the displayed histories are primarily in-sample backtests (and thus may be over-fitted or the product of data-mining) and did not incur transaction costs or manager/index-licensing fees.

Figure 3 shows the annualized returns and Sharpe ratios for each strategy over the longest period that is common to all strategies, which is just over 14 years. The returns are highly endpoint-dependent, and investors should not assume that returns or Sharpe ratios for that historical and largely

in-sample period will have any relationship to future returns for the strategies (either in an absolute or even a relative sense).

Rebalancing and Small/Value Factor Tilts Are Major Contributors

Some of the historical excess returns of these strategies appear to stem from systematic rebalancing and from exposure over time to well-recognized risk factors: value, small cap, and, to a lesser degree, momentum. To what degree are these present across strategies, and what are the implications?

Rebalancing. Mechanically rebalancing individual stocks or sectors can add up to outperformance over time (on paper at least, before transaction costs are taken into account) as investors systematically sell securities that have risen in price and buy stocks that have fallen in price. As a simple illustration, imagine an equal-weighted portfolio of the ten S&P 500 economic sectors (rebalancing each sector back to a 10% weight on a quarterly basis): this equal-sector-weight portfolio would have returned 10.4% annually since 1990, beating the average return of its component sectors by 90 bps annualized.¹³ Even accounting for moderate transaction costs, this is a significant level of outperformance. (These levels of outperformance are consistent across other equal-weighted strategies, though transaction costs can be higher.)

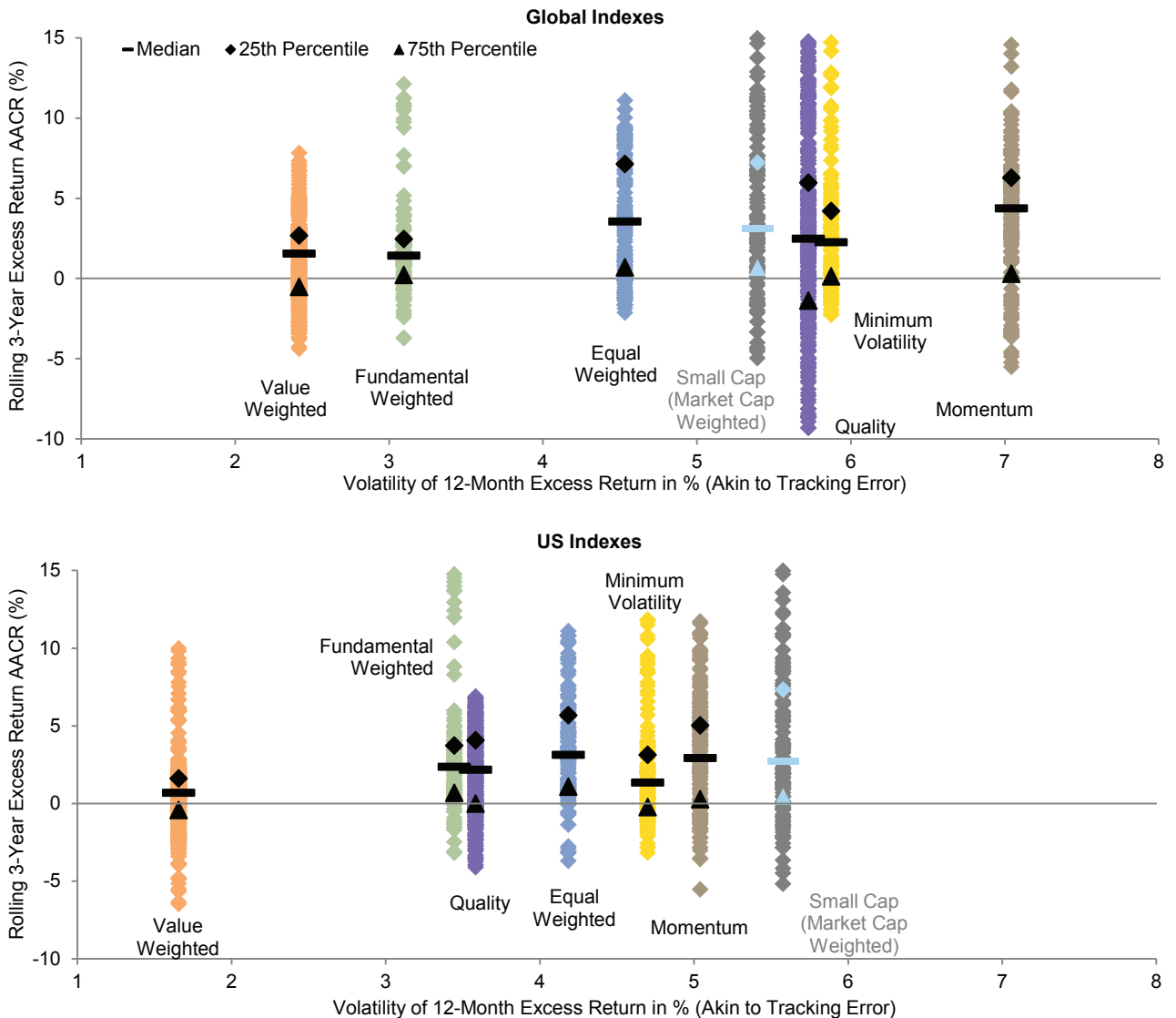
Because alternative beta strategies are typically not capitalization weighted, they benefit from rebalancing their individual stock components periodically. As in our example

¹³ The S&P 500 Equal-Weight Index, which holds equal weights in each underlying stock, further improves the returns by an additional 90 bps in this example, to 11.3% annually.

Figure 2. Historical Excess Returns for Alternative Beta Indexes

Index Inception – June 30, 2014

Historical excess returns as illustrated here may be elevated compared to the future returns that investors experience, due to numerous factors not necessarily reflected in the periods shown, including: transaction costs, manager fees, back-test bias, and current relative valuations

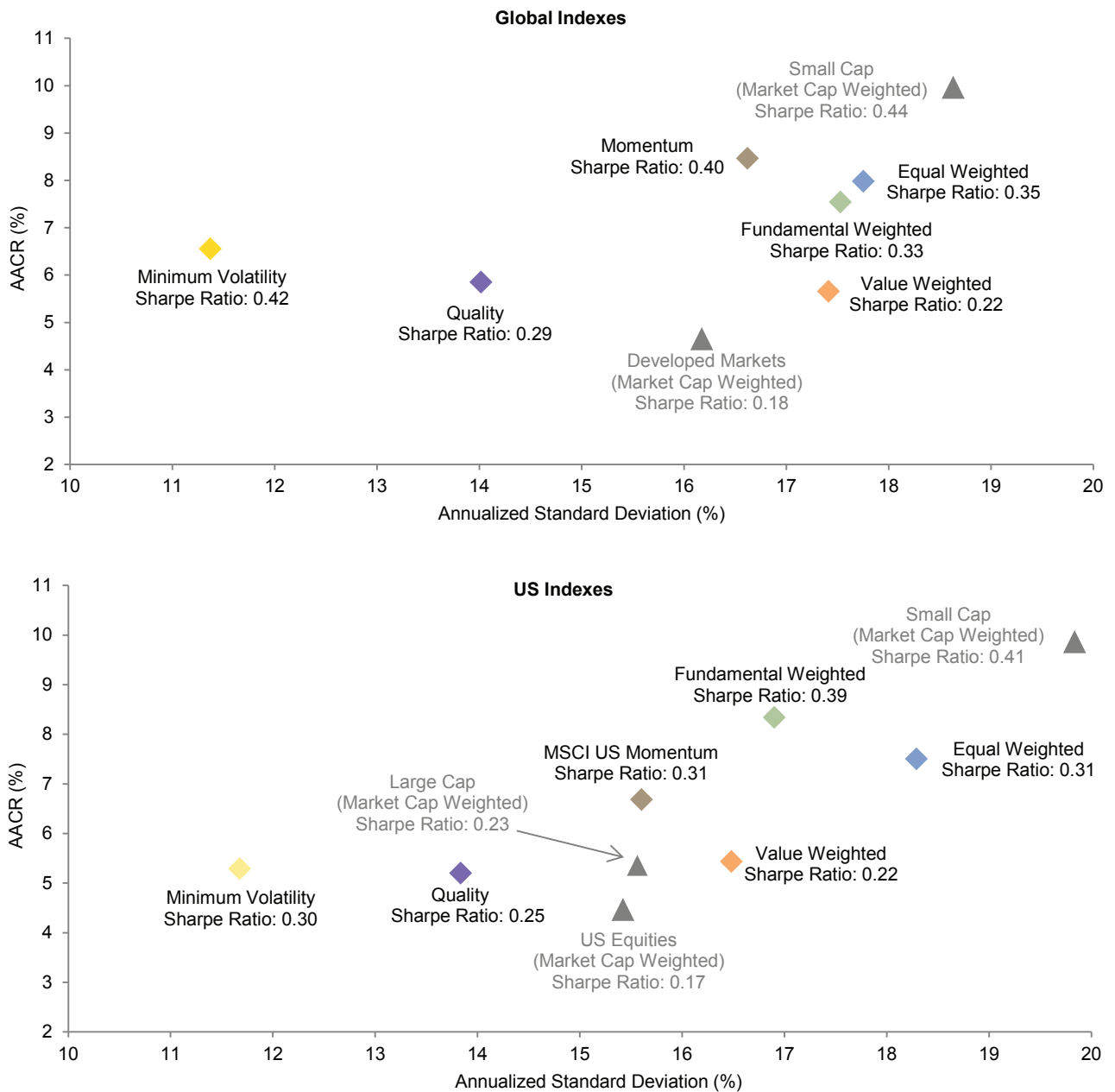


Sources: FTSE International Limited, MSCI Inc., and Thomson Reuters Datastream. MSCI data provided "as is" without any express or implied warranties. Notes: Volatility of 12-month excess return calculated by taking the median of the absolute values of all overlapping 12-month excess returns. MSCI World Small Cap and MSCI US Small Cap are the market-cap weighted indexes shown for comparison. The inception date for each strategy, together with the excess return AACR for each strategy since inception, are as follows:
Global Indexes: FTSE® RAFI Developed 1000 [Fundamental] (December 31, 1999; 2.9), MSCI All Country World Momentum (May 31, 1991; 3.2), MSCI World Equal Weighted (December 31, 1998; 3.3), MSCI World Minimum Volatility (December 31, 1998; 1.2), MSCI World Quality (December 31, 1981; 2.3), MSCI World Small Cap (December 31, 2000; 5.1), and MSCI World Value Weighted (November 30, 1976; 1.2).
US Indexes: FTSE® RAFI US 1000 [Fundamental] (December 31, 1999; 4.2), MSCI US Equal Weighted (December 31, 1998; 3.3), MSCI US Minimum Volatility (December 31, 1998; 1.1), MSCI US Momentum (December 31, 1976; 2.7), MSCI US Quality (December 31, 1981; 1.6), MSCI US Small Cap (December 31, 2000; 5.2), and MSCI US Value Weighted (November 30, 1976; 0.7).



Figure 3. Alternative Beta AACRs vs Annualized Standard Deviations

January 31, 2001 – June 30, 2014



Sources: Frank Russell Company, FTSE International Limited, MSCI Inc., and Thomson Reuters Datastream. MSCI data provided "as is" without any express or implied warranties.

Notes: The indexes used are as follows:

Global Indexes: FTSE® RAFI Developed 1000 [Fundamental], MSCI All Country World Momentum, MSCI World Equal Weighted, MSCI World Minimum Volatility, MSCI World [Developed Markets], MSCI World Quality, MSCI World Small Cap, and MSCI World Value Weighted.

US Indexes: FTSE® RAFI US 1000 [Fundamental], MSCI US [US Equities], MSCI US Equal Weighted, MSCI US Minimum Volatility, MSCI US Momentum, MSCI US Quality, MSCI US Small Cap, MSCI US Value Weighted, and Russell 1000® [Large Cap].

above, transaction costs will diminish the backtested rebalancing premium.

Value and Small-Cap Tilts. Academics and practitioners have long recognized that stocks with low valuations tend to outperform over the long term. The value anomaly has a long out-of-sample history, as does the small-cap anomaly, though there is some debate about whether small caps offer higher performance than indicated by their elevated risk level. Regardless, many investors have criticized alternative beta strategies as simply being expensive ways to execute a small/value tilt. Indeed, many of these strategies tend to have exposure to small and value, when measured over long periods.

An important paper published last year¹⁴ found that equal-weighted, minimum variance, and fundamental strategies all had substantial small and value exposure for the period from 1964 to 2012. This is not particularly surprising—the researchers also found that 100 randomly created “Malkiel’s Monkey” portfolios also had small and value tilts. Portfolios that structurally underweight the large, successful companies at the top of the capitalization-weighted index will naturally tend to have these tilts. However, the small and value exposure of alternative beta indexes is not necessarily steady—it ebbs and flows (Figure 4). Some strategies have more of these tilts than others. It strikes us that engineering these performance streams on a forward-looking basis is likely not as simple as allocating to small caps and value stocks.¹⁵

¹⁴ Robert D. Arnott, Jason Hsu, Vitali Kalesnik, and Phil Tindall, “The Surprising Alpha from Malkiel’s Monkey and Upside-Down Strategies,” *The Journal of Portfolio Management* 39, no. 4 (Summer 2013): 91–105.

¹⁵ One of the unexpected conclusions of the “Malkiel’s Monkey” paper (unexpected, given that three of the four authors are affiliated with a pioneering alternative beta

Clearly, there are numerous contributors to these index returns. They naturally capture some broad-market beta, have benefited from rebalancing, and many are exposed (at least periodically) to small-cap and value factors that have tended to outperform historically.¹⁶ Additionally, they are exposed to the factors trumpeted in their names, which may or may not command a risk/return premium.

Future Prospects for Returns

While we cannot be certain that alternative beta indexes will offer superior “live” risk/return behavior, we believe the following:

- ◆ **Equal-weighted** strategies will benefit from rebalancing, assuming turnover and transaction costs are well managed. Given higher transaction costs for less liquid asset classes such as small caps and emerging markets stocks, equal-weighted strategies are most useful for larger-cap, more liquid asset classes.
- ◆ **Value-weighted** strategies will offer long-term benefits from the combination of value exposure and rebalancing, as an approach that weights by company fundamentals should be more effective than a traditional value index that merely cap weights a population of value stocks. However, turnover is moderately higher in a value-weighted index.

asset management firm) was that the alternative beta strategies, random strategies, and even the inverse of alternative beta strategies, are valuable in large part because of their small-cap and value exposures, and that investors should simply choose the strategy that provides the exposure efficiently. We disagree that all such strategies are simply different degrees of small and value; Figure 4 indicates that at a minimum, the strategies differ in their factor exposures over time and thus are far from identical commodities.

¹⁶ The existence of the small-cap premium is being debated (please see our May 2014 research note *The US Size Effect: How Long Will It Defy Gravity?*), but few investors or academics question that stocks with low starting valuations should generate higher returns.

Figure 4. Exposure to Value and Small-Cap Premiums Across Alternative Beta Indexes

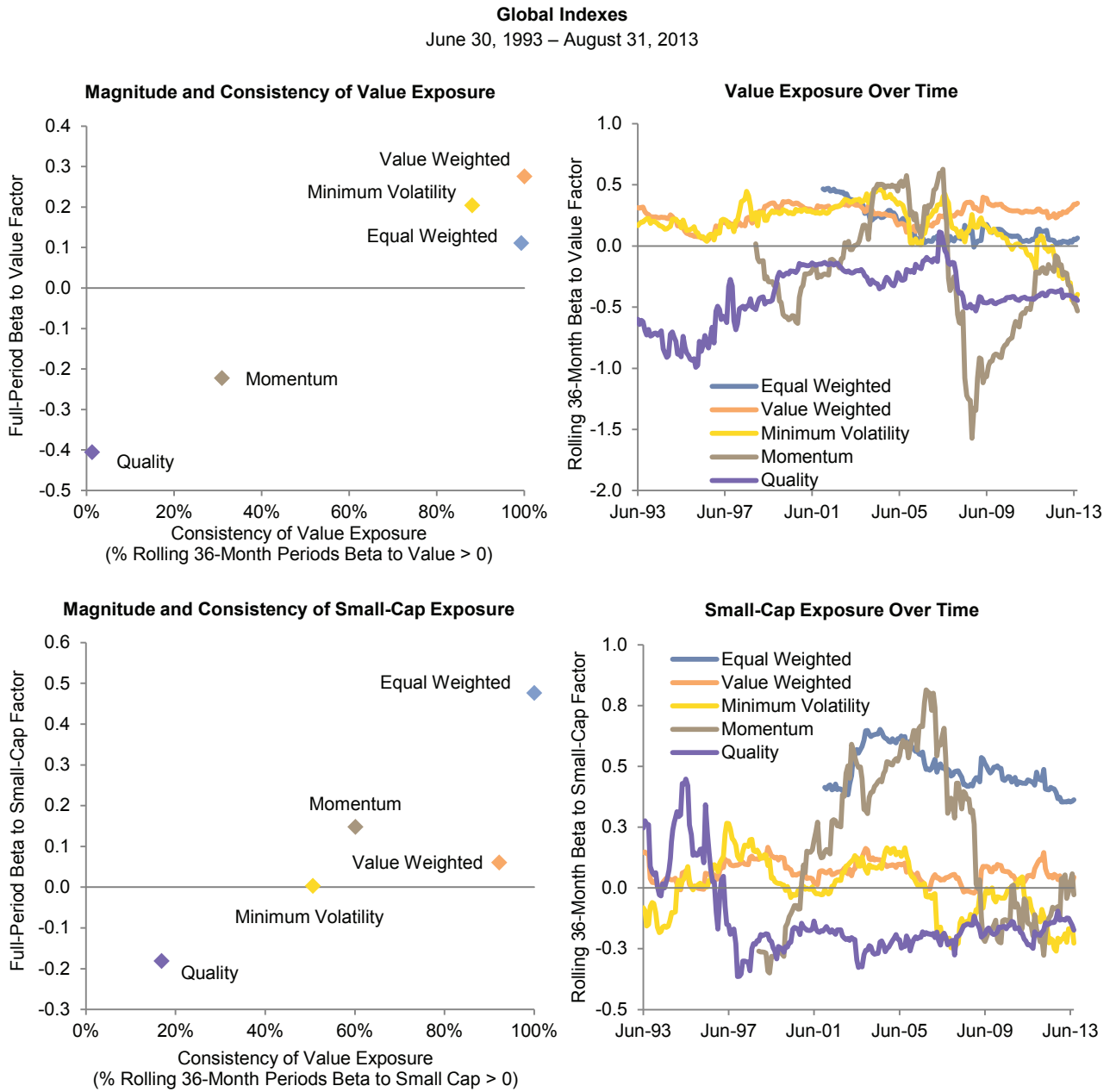
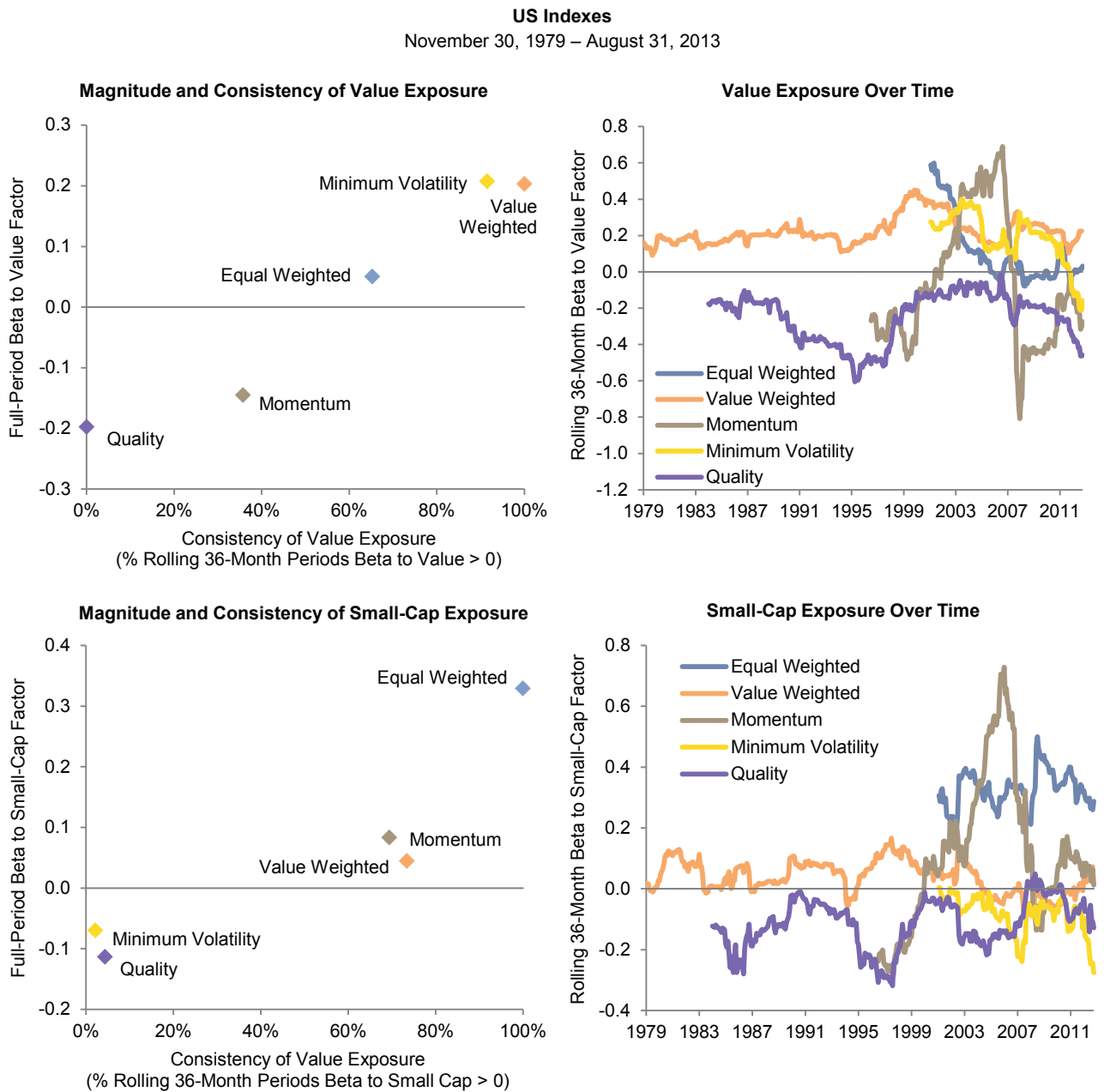


Figure 4. Exposure to Value and Small-Cap Premiums Across Alternative Beta Indexes (continued)



Sources: MSCI Inc. and the Online Data Library of Dartmouth Professor Kenneth French. MSCI data provided "as is" without any express or implied warranties.

Notes: The factors shown are long/short terciles (for example, the value factor is long the one-third of equities with the lowest valuations and is short the highest-valued third). The indexes used are as follows:

Global Indexes: MSCI All Country World Momentum, MSCI World Equal Weighted, MSCI World Minimum Volatility, MSCI World Quality, and MSCI World Value Weighted.

US Indexes: MSCI US Equal Weighted, MSCI US Minimum Volatility, MSCI US Momentum, MSCI US Quality, and MSCI US Value Weighted.



- ◆ **Momentum** strategies should continue to offer attractive returns for the long term, supported by behavioral investor biases and some degree of differential risks. Correlations with value are also low, which is beneficial; however, investors must watch transaction costs and expect volatility.
- ◆ **Minimum-volatility** strategies appear likely to continue providing better risk-adjusted returns than their low beta would initially imply, supported by behavioral biases and leverage aversion. That said, given today's rich relative valuations, a continuation of the recent trend of strong outperformance is less likely.
- ◆ **Quality/profitability** strategies are the new kids on the block, with limited research support and widely disparate methodologies. We expect returns to be comparable to broad equity indexes over long periods, though these strategies should exhibit moderately defensive characteristics.

As mentioned before, all of these risk premiums are factors that some fundamental and many quantitative equity managers already exploit. What is novel about these new strategies is their greater transparency and lower fees compared to traditional active management.

Portfolio Implementation and Relative Valuations

Can Alternative Beta Strategies Play Well With Others?

A well-chosen portfolio of high conviction, active managers can add significant alpha. Our recently published research report *Hallmarks of Successful Active Equity Managers* highlights how investors might enhance their manager selection process using characteristics including active share. For many investors, passive index products that offer market exposure for a low fee can also play a role in their portfolio.

So how can alternative beta strategies be used, if at all, within a larger portfolio of active and passive products?

- ◆ Alternative beta approaches can augment an existing combination of passive and active products to hedge and/or enhance factor exposures. For example, if an overall portfolio has an overweight to active, alpha-generating value managers, adding systematic momentum exposure (using either an active quantitative manager or an alternative beta strategy) would increase portfolio diversification, and the negative correlations of value and momentum excess returns may work together to smooth the overall pattern of manager outperformance over time.
- ◆ Capacity constraints often close or limit the assets of highly desirable active managers. If an attractive product is closed, an alternative beta product could be a substitute for that manager's factor

exposure.¹⁷ (For example, using a value-centric alternative beta strategy when a desired value manager is closed.)

- ◆ Large investment pools may struggle to place the desired level of assets with active managers because their size could overwhelm the manager. Because alternative beta strategies are not currently capacity constrained, investors can use them to get exposure to risk premiums they expected to get with active managers.
- ◆ Closet indexers are mutual fund managers that charge active fees for returns that are essentially that of the index. Avoid them! Rather than pay large fees for index-like returns, use either an alternative beta product with lower fees or a better, alpha-focused active manager that's not afraid to deviate materially from the index.

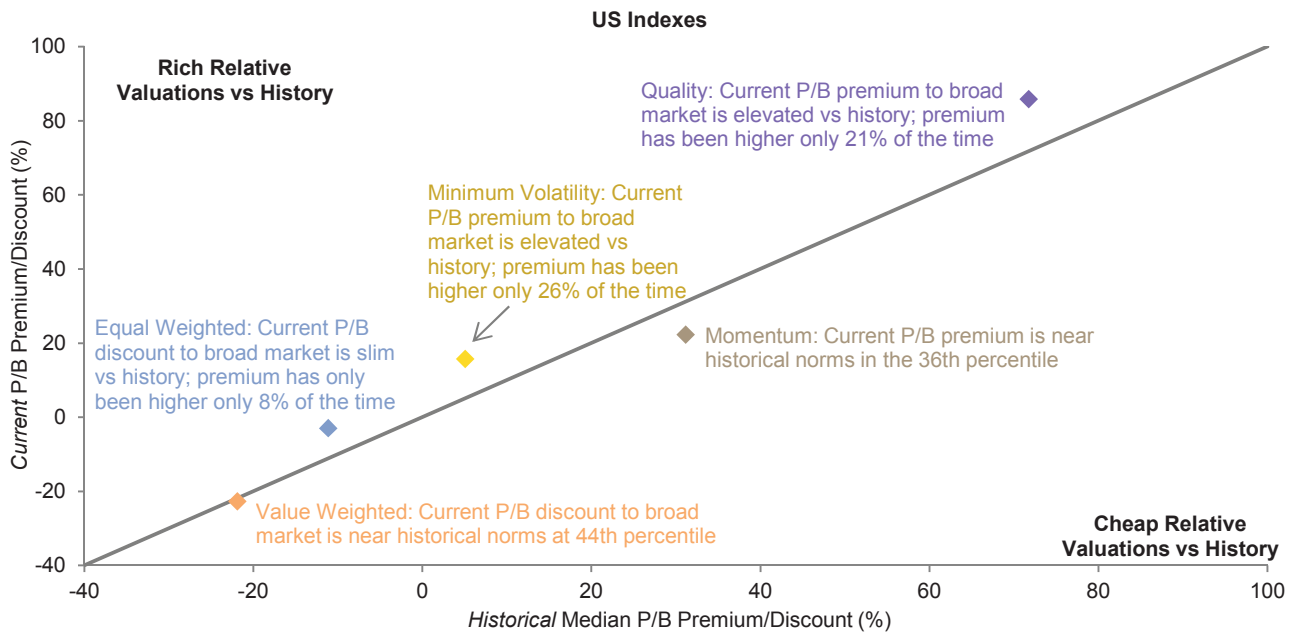
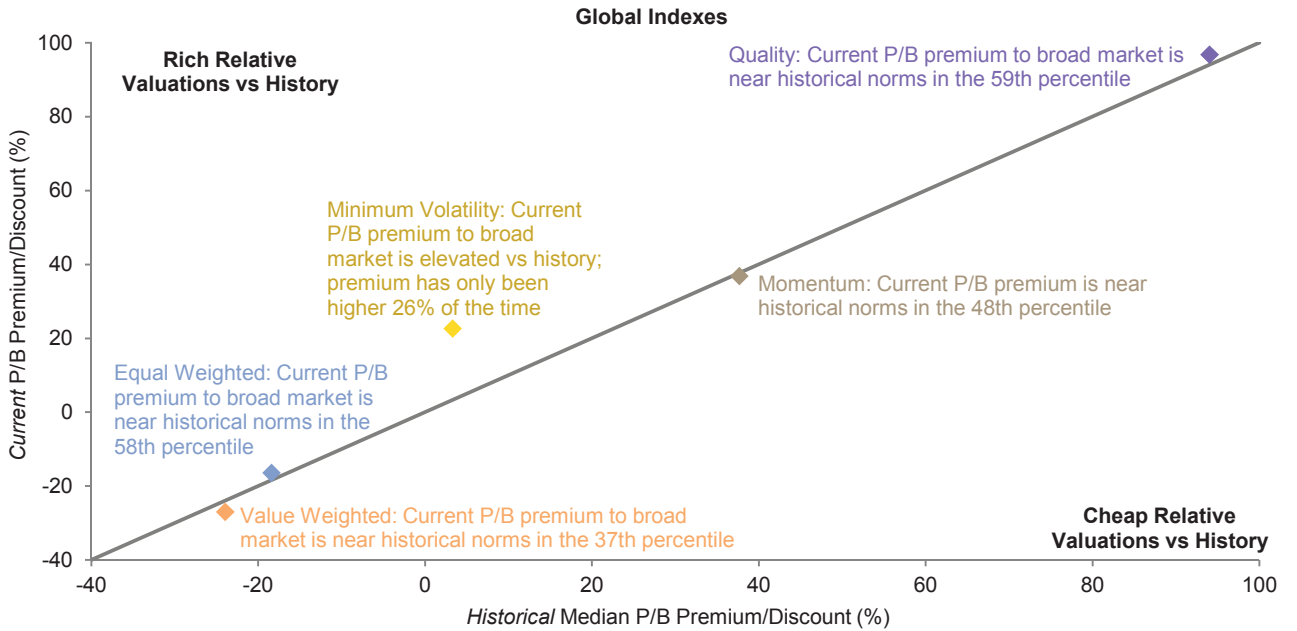
What Are Relative Valuations Telling Us?

While the “live” histories of many alternative beta strategies are limited, the future outperformance or underperformance of a given strategy is likely influenced by its starting level of relative valuations (compared to a broad index). However, the starting relative valuation is only part of the puzzle. On a P/B basis, some alternative beta strategies tend to trade at a *persistent* premium or discount to broad markets, so the strategy's current valuation discount or premium versus the broad market may only tell investors part of what they need to know.

¹⁷ Of course, investors would typically seek to get actual alpha from traditional active managers and not just risk premiums, otherwise they should choose cheaper alternative beta strategies, even when capacity constraints across traditional active managers are *not* an issue.

Figure 5. Valuation Premium/Discount of Alternative Beta Indexes to Broad Market

January 31, 1999 – June 30, 2014



Sources: MSCI Inc. and Thomson Reuters Datastream. MSCI data provided "as is" without any express or implied warranties.

Notes: The indexes used are as follows:

Global Indexes: MSCI All Country World Momentum, MSCI World Equal Weighted, MSCI World Minimum Volatility, MSCI World Quality, and MSCI World Value Weighted.

US Indexes: MSCI US Equal Weighted, MSCI US Minimum Volatility, MSCI US Momentum, MSCI US Quality, and MSCI US Value Weighted.



Figure 5 compares each alternative beta strategy's *historical* level of discount or premium over the past 15 years with *today's* discount or premium. The US value-weighted strategy, for example, currently trades at approximately a 26% discount to the value-weighted MSCI ACWI Index, which is very similar to the strategy's 27% historical average discount. Momentum, quality, and equal-weighted strategies trade close to their historical median premium/discount today for global indexes.

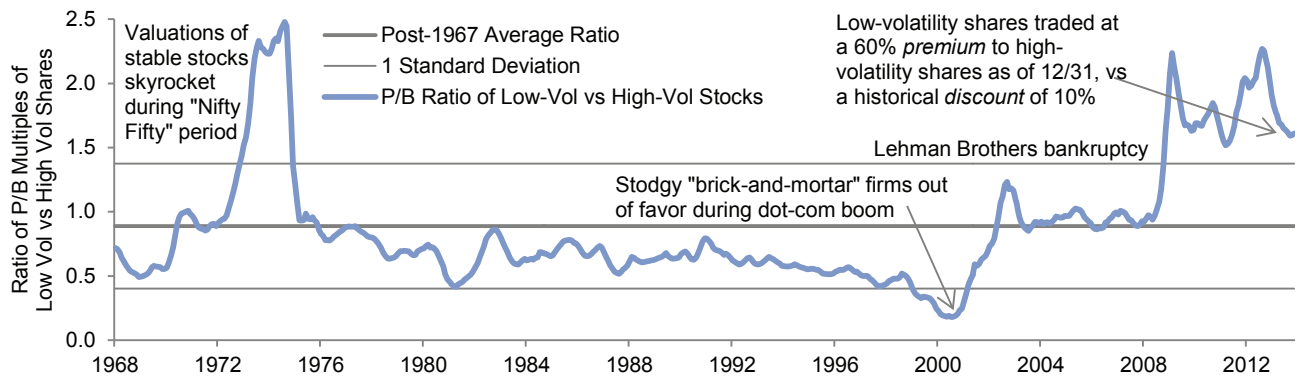
Current valuation premiums are richer than average for minimum volatility; this is clear in Figure 5 but also evident in other data sets with longer histories. Data shared with us by four authors of a working paper were used to compile Figures 6 and 7. Figure 6 shows that valuation *discounts* have been the rule for low-volatility US stocks over the past several decades, compared to a very high *premium* over the past few years. Low-volatility

stocks traded at a valuation discount to high-volatility stocks about 80% of the time since 1968, and we believe that this valuation differential (which has been reversed today) explains much of the historical outperformance of minimum-volatility strategies. Figure 7 illustrates that the initial level of discount or premium for low-volatility stocks versus high-volatility stocks influences the subsequent level of outperformance for the MSCI USA Minimum Volatility Index.

Depending on the chosen data source, low-volatility stocks are currently either moderately overvalued or very overvalued compared to historical relative valuations—neither points to excess returns continuing to be as strong. That said, some investors might be perfectly comfortable with returns that are somewhat below those of broad equities, as long as volatility is substantially lower (i.e., if Sharpe ratios remain appealing compared to broad equities).

Figure 6. Relative Valuation of Low Volatility vs High Volatility US Large-Cap Shares

February 28, 1968 – December 31, 2013

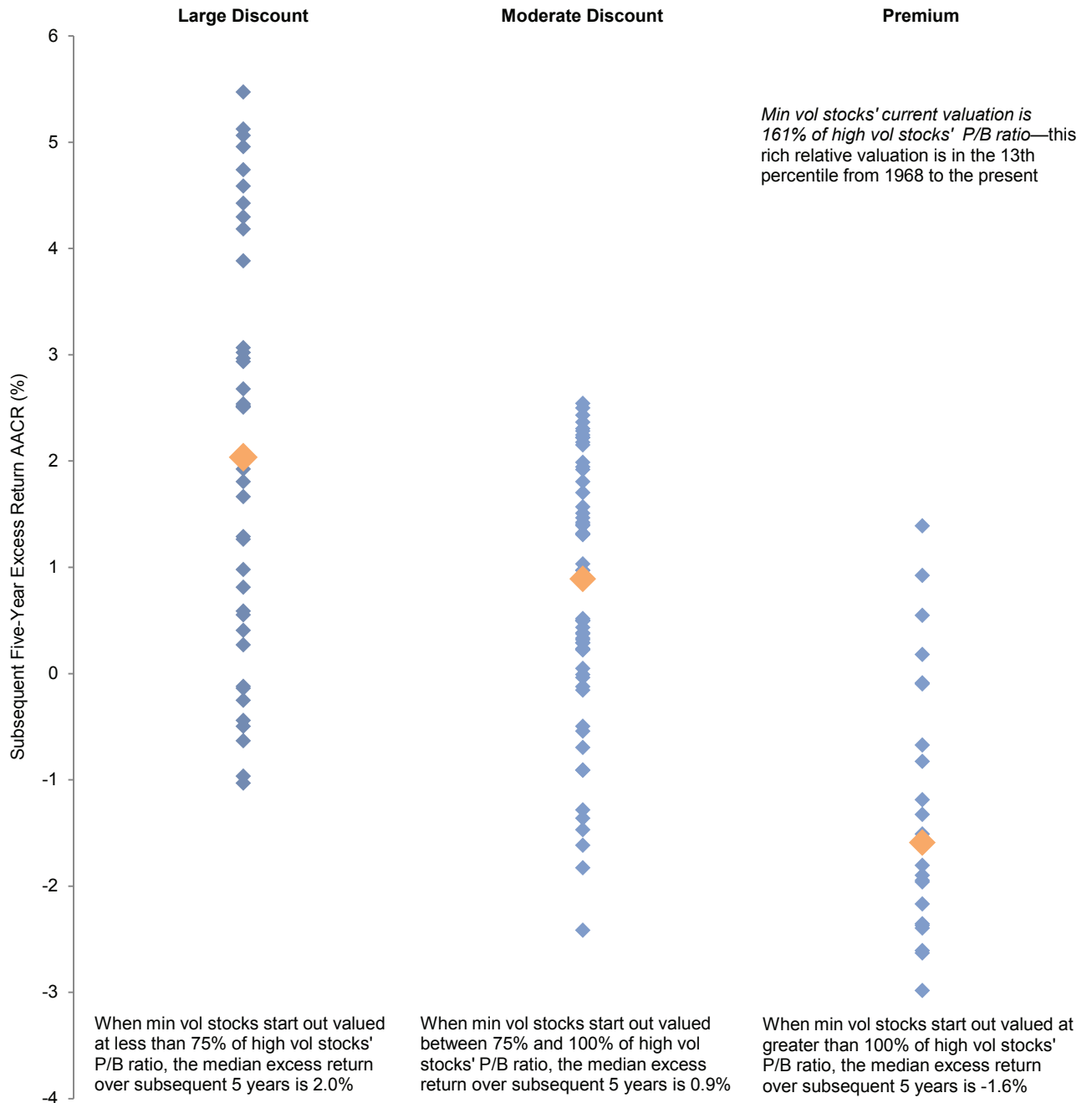


Sources: Center for Research in Securities Prices, Compustat, "Low-Volatility Cycles: The Influence of Valuation and Momentum on Low-Volatility Portfolios" (December 11, 2013, working paper by Luis Garcia-Feijoo, Lawrence Kochard, Rodney Sullivan, and Peng Wang; data provided by Peng Wang and used with his permission), MSCI Inc., and Thomson Reuters Datastream. MSCI data provided "as is" without any express or implied warranties.

Notes: Represents the largest one-third of companies within the CRSP database that have December 31 fiscal-year ends. The fiscal-year stipulation eliminates a material fraction of the universe, including some technology and retail firms.

Figure 7. Initial Relative Valuations and Subsequent 5-Year Excess Returns for US Low Volatility Stocks

December 31, 1998 – April 30, 2009



Sources: Center for Research in Securities Prices, Compustat, "Low-Volatility Cycles: The Influence of Valuation and Momentum on Low-Volatility Portfolios" (December 11, 2013, working paper by Luis Garcia-Feijoo, Lawrence Kochard, Rodney Sullivan, and Peng Wang; data provided by Peng Wang and used with his permission), MSCI Inc., and Thomson Reuters Datastream. MSCI data provided "as is" without any express or implied warranties.

Notes: Represents the largest one-third of companies within the CRSP database that have December 31 fiscal-year ends. The fiscal-year stipulation eliminates a material fraction of the universe, including some technology and retail firms.

Conclusion

While the alternative beta packaging is relatively new and the emphasis on greater transparency and lower fees should be beneficial, most of the research framework supporting the underlying strategies is decades-old. Certain strategies are promising. Fundamental-weighted strategies offer a sensible value tilt and may benefit from rebalancing. Momentum has been extensively researched, and offers strong outperformance that is uncorrelated with value strategies. Low-volatility strategies can be useful as well, particularly for investors that are unable to invest directly in hedge funds; however, the valuation discount historically attached to low-volatility stocks has reversed, which may pressure future relative performance.

Investors that struggle today to build portfolios of highly active fundamental managers (perhaps because of capacity constraints or governance problems such as the inability to hold onto managers when they temporarily underperform) might find alternative beta particularly appealing. ■

Appendix: Five Alternative Beta Strategies in Detail

Alternative beta strategies use systematic non-price-weighting factors in an attempt to deliver higher returns than traditional capitalization-weighted indexes, lower volatility, or both. These creations are often referred to as “smart beta,” “style premiums,” “factor investing,” or “alternative beta” (we use the latter term).¹

The many different varieties of alternative beta strategies share a few key characteristics: they are **systematic**, **rules-based**, and **non-market capitalization weighted**. These strategies can be implemented using bonds, commodities, currencies, and other asset classes. For simplicity’s sake, this report looks only at select *equity* strategies.² The universe of strategies under this umbrella is large and growing quickly; many strategies fall into one of the five types described here or use a multi-factor approach.

Equal Weighted

Equal-weighted indexes are the most simplistic approach to removing the link between share prices and stock weights. These strategies weight the universe of stocks equally and then rebalance back to that standard each quarter or year. These

strategies have been shown to consistently outperform their market cap-weighted brethren in all markets—at least before transaction costs. These strategies have a small- and mid-cap bias, which can create liquidity issues and capacity constraints. For example, in a 600-stock universe, a \$10 billion allocation would buy \$17 million of each stock, which for some small-cap stocks would not be realistic. This also makes the strategy relatively expensive for two reasons: (1) transaction costs for illiquid, smaller-cap names are relatively high compared to large-cap names; and (2) all stocks must be rebalanced periodically, creating trading costs and potentially generating greater realized taxable gains than a market cap-weighted index. All told, equal-weighted strategies may be better suited as a proof point or analytical tool than as an investment strategy.³

The equal-weighting methodology is more of a default re-weighting strategy than an intuitive one, and its results are sometimes counterintuitive. Mergers and spin-offs can result in odd weighting changes: two companies that merge into one would see their combined index weight cut almost in half, and a company that splits into two different publicly traded units would see the companies’ combined index weight nearly double.

Most of the added value from equal weighting comes from the systematic exposure to smaller-cap stocks that have outperformed large-cap stocks over time. Additional value added comes from the rebalancing mechanism that causes a

¹ This differs from the longstanding interest in small-cap and value-tilted exposure because traditional small-cap and value indexes are market capitalization-weighted and typically use a different or narrowed population of stocks compared to the broad index. Most of the strategies we discuss are weighted by the relevant factor (such as the stock’s momentum or its volatility), or in some cases by the combination of the stock’s market capitalization and the factor. That said, many alternative beta strategies share tilts with traditional small-cap and value indexes.

² We chose these strategies because equal-weighted indexes are a helpful starting point, and the other strategies appear to be gaining traction among some of the large institutions that have embraced alternative beta (these include some large pension plans and other institutions that struggle with active-manager capacity constraints). Other strategies continue to be introduced as well. Notably, there are several different approaches to systematic lower-volatility investing, including strategies that weight portfolios by each stock’s level of recent volatility or equity beta, strategies that aim to allocate portfolio risk evenly across sectors, and strategies that aim to maximize the portfolio’s internal diversification by incorporating high-volatility stocks that remain out of sync with the rest of the index.

³ The strategies are available in the form of exchange-traded funds, but institutional interest in equal-weighted strategies (and institutionally priced products) has been limited.

buy low, sell high process. However, this rebalancing mechanism also leads to higher turnover (20% to 25% versus 5% for most cap-weighted indexes), which creates higher transaction costs. As such, historical value added in backtests likely overstates the net value added that a live strategy would generate.

Equal-weighted strategies generally have higher volatility than broad indexes, and like other alternative beta strategies may be prone to extended periods of underperformance (due in part to the small-cap tilt). On the positive side, an equal-weighted approach may be less prone to bubbles than a cap-weighted strategy (allocations to each company do not increase in lockstep with the company's market capitalization, so the index swims against the current as investor allocations to particular sectors rise and fall).

Fundamental-Weighted Indexing

One of the most intuitive and appealing of the alternative approaches, value- or fundamental-weighting allocates to stocks based on company fundamentals such as revenues or other metrics, rather than by the company's market capitalization.⁴ The FTSE® RAFI Fundamental indexes are probably the most broadly recognized and among the oldest indexes of this type. Created by Research Affiliates, LLC in 2005, these indexes are based on four company fundamental statistics: revenues, book value, cash flow, and dividends. Large companies get top billing, though this is not a function of the companies'

share prices—the companies that produce the largest dollar amount of dividends, revenue, etc., receive the highest weight. For example, AT&T, the third-largest holding of the FTSE® RAFI 1000 Index, is not even in the top-ten holdings of a capitalization-weighted US index.

Our 2006 research report *Fundamental Indexing* pointed out that fundamental-weighted strategies are biased to small-cap and value stocks. Since the index weights are not dictated by price, these strategies gravitate toward securities that are being sold off by the market. The index will rebalance into names as they become out of favor, effectively buying low and selling high (this is an important performance driver for a fundamental-weighted strategy, provided transaction costs are well managed; traditional value indexes do not rebalance and therefore do not incur additional transaction costs). Fundamental-weighted strategies are not a beta substitute for investors seeking passive equity exposure. Further, they have higher transaction costs and turnover than cap-weighted indexes, and they can experience long periods when performance will lag traditional indexes, such as the late 1990s.

Similar value-weighted indexes include Russell fundamental indexes and MSCI's value-weighted indexes, which share many characteristics with the FTSE® RAFI series but incorporate adjustments to both the fundamental metrics⁵ and rebalancing approach. Other firms (notably some WisdomTree indexes) weight stocks by

⁴ The MSCI World Value-Weighted Index has been consistently exposed to the value factor (with a median beta of 0.28 to the value factor over the 1993–2013 period), but because the index is weighted according to company fundamentals such as revenues, its small-cap exposure has been negligible (a beta of 0.06).

⁵ The Russell index, for example, includes the sum of dividends plus share buybacks, while the FTSE® RAFI includes only cash dividends. The Russell index also haircuts revenue based on the company's level of leverage relative to the rest of the market.

the size of their dividend (the value of the dividends paid by the firm, rather than the stock's dividend yield).

The choice of fundamental factors is subjective, and as such the number of variables that can be combined is large. This also means that different providers' products and their performance will vary widely and have different biases, depending on which fundamental factors are used.

Given their value tilt and systematic rebalancing, we believe fundamental or value-weighted approaches should outperform broad indexes over time; however, investors could harvest similar value-tilt and rebalancing benefits from other forms of active management, so choosing a product with efficient and thoughtful implementation is important.⁶

Momentum

Momentum strategies overweight stocks that have recently outperformed and underweight those that have underperformed. Momentum is most often thought of as cross-sectional price momentum, where Stock A has a higher weighting than Stock B because A has a higher recent return than B (and indeed, this is the typical factor used in alternative beta indexes). However, less common momentum metrics exist as well, including time-series momentum (where a stock's recent return pattern is compared to its longer-term pattern) and fundamental momentum (where stocks are ranked based on their earnings momentum, changes in profit margins, or changes in sell-side analyst forecasts). These buy-high strate-

gies are somewhat counterintuitive, but academic studies⁷ have consistently demonstrated that momentum tendencies within and across various asset classes can add value. Typical alternative beta momentum strategies overweight shares that have the highest price increases (or the lowest price drops in a bear market) over single or combined trailing time periods such as the average of the trailing three, six, or 12 months, or over the most recent 12 months minus the most recent month.⁸

There are two primary theories for why momentum outperforms cap-weighted benchmarks. The first is that high-momentum stocks are riskier and therefore command a higher discount rate—a theory in keeping with the efficient market hypothesis. The second rationale is based on behavioral finance and argues that the market underreacts to new information due to anchoring or inattention, and that many investors have a herding instinct.

A significant caveat for momentum strategies is that turnover tends to be very high—sometimes more than 100% per annum. This puts into question whether the backtested value added evident on a gross basis from momentum indexes is sufficient to overcome the high transaction costs and deliver *net* outperformance. Momentum strategies should be engineered or implemented in a way that moderates trading costs because the transaction costs of a completely unconstrained strategy

⁷ See, for example, Narasimhan Jegadeesh and Sheridan Titman, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *The Journal of Finance* 48, no. 1 (March 1993): 65–91.

⁸ MSCI momentum strategies use a blend of short-term and medium-term signals, rather than just 12 minus 1 months. The MSCI momentum strategies may also be more "diluted" than some other momentum metrics (albeit with greater liquidity and capacity) because MSCI weights the stocks in the index by multiplying each stock's momentum score by the stock's market capitalization, rather than using its momentum score as the only factor.

⁶ Efficiency in this case incorporates aspects including manager fees and the approach to rebalancing and trading.

could easily consume all of the strategy's gross outperformance. A well-executed momentum strategy can outperform broad indexes over the long term net of transaction costs and reasonable manager fees; however, performance droughts could be painful (the tracking error of momentum is on average high, though in the strong recent market environment it has been relatively low).

As discussed below, the outperformance of momentum tends to be negatively correlated with the outperformance of fundamental-weighted and other value strategies.

Minimum Volatility

Minimum volatility, minimum variance, and low-volatility strategies use a stock's volatility as a weighting factor, typically alongside correlation analysis, to produce a portfolio with lower overall volatility. These strategies may overweight low-volatility or low beta stocks, or they may be agnostic about a particular stock's volatility in the pursuit of a low-volatility portfolio (e.g., they may incorporate individual high-volatility stocks if they have low correlation to other stocks, in the interests of diversification).

Academic studies⁹ have found that low-volatility stocks have historically produced returns commensurate with broad equity universes while providing lower volatility, resulting in a superior risk/return profile.¹⁰ This anomaly may stem from two factors:

- ◆ Leverage aversion, which compels leverage-constrained portfolio managers to buy high beta shares if they wish to increase market exposure beyond 100% or to offset cash drag.
- ◆ Behavioral investing concepts such as an irrational attraction to lottery ticket-type investments such as companies developing a medicine that has not been thoroughly tested, which may perennially boost valuations for the riskiest shares beyond what is expected.

Historically, low beta stocks have had lower valuation multiples than high beta stocks, accounting for at least some of the attractive historical returns of these strategies, which significantly protected investors during the financial crisis of 2008–09. This trend is reversed in today's markets, with low-volatility stocks trading at a premium to high-volatility stocks and to the broad market for both global and US indexes. If history repeats or at least rhymes, relative returns for low beta or low-volatility strategies may suffer from today's rich starting point.

Low-volatility strategies tend to be highly skewed to defensive sectors such as utilities and consumer staples, though the volatility patterns of sectors can change over time. For example, prior to the 2008 financial crisis, banks had relatively low betas and a significantly higher weighting in low-volatility strategies compared to today. The evidence of large sector overweights, plus the strategy's low market beta, contribute to very significant tracking error versus a broad market index (often greater than 7% annualized) and performance that may lag

⁹ See, for example, Robert A. Haugen and Nardin L. Baker, "The Efficient Market Inefficiency of Capitalization-Weighted Stock Portfolios," *The Journal of Portfolio Management* 17, no. 3 (Spring 1991): 35–40.

¹⁰ Please also see our November 2011 Market Commentary *The Lowdown on Low Vol.*

in fast-rising bull markets and in rising rate environments.¹¹ Investors that define risk as tracking error are ill-suited to this strategy. Investors more interested in achieving a high Sharpe ratio—return relative to volatility—may find these strategies appealing. Low-volatility strategies may be a reasonable choice for investors unable to include portfolio allocations to long/short equity hedge funds (perhaps because the investment pool is not large enough to sufficiently diversify across individual direct partnerships or because of liquidity limitations).¹²

Many low-volatility strategies employ monthly rebalancing, adapting the portfolio as the covariance of component stocks evolves, resulting in relatively high turnover and transaction costs. Investors should discount some of the backtested performance of these strategies to reflect the impact of transaction costs, and taxable investors in the United States should be aware that the high turnover can generate meaningful short-term capital gains. Additionally, investors should evaluate whether the strategy's investment universe is sufficiently liquid (and whether the manager's trading infrastructure is sufficiently robust) to execute the strategy without an unexpectedly adverse impact from transaction costs.

¹¹ Rising rate environments may be challenging to utilities and other sectors offering high dividend yields.

¹² That is not to say that low-volatility return streams would be expected to mimic hedge fund returns; rather, both would be expected to offer long-run returns similar to broad equity indexes, at a lower level of volatility.

Quality

Quality strategies are based on the intuitive notion that high-quality companies should perform better than low-quality companies, although unlike other risk factors there is generally no agreed upon definition of quality. Often, quality is defined using one or more measures of profitability and the level of earnings variability. Many definitions of quality also include a bias against financial leverage and a preference for high levels of return on equity and/or return on assets. Some quality filters also exclude stocks that do not have a long history of stable or rising dividends. While the definitions and methodologies vary, quality strategies tend to tilt toward firms with stable positions in industries that are not overly cyclical (think global toothpaste manufacturers).

Historically, high-quality stocks have traded at valuation premiums to broad equity universes, but they have still managed to offer higher returns. This may be the result, in part, of disciplined rebalancing, as well as quality stocks' tendency to be steady earners that are less prone to speculative price run-ups. Quality-focused indexes generally offer lower volatility relative to the cap-weighted benchmarks and tend to outperform during adverse market conditions.

Some of the drawbacks of trying to implement a quality approach are that definitions of quality vary, performance will lag in strong bull markets, turnover can be relatively high, and there can be some sector biases (such as an aversion to banks and a tilt to consumer staples). While we have long advocated for the inclusion of high-quality

investments in portfolios, at this point we would advise investors to seek out either a traditional, fundamental quality manager, or a systematic approach that has been implemented live for a sustained period. Most quality indexes are too new (and research on systematic quality or profitability strategies too sparse) to give us much conviction about whether these strategies can outperform over longer time periods.

Multi-Factor Combinations

Hot on the heels of an expanding market of alternative beta products, asset managers and index providers have also introduced strategies that combine multiple factors into a single product, attempting to engineer a particular risk-reward pattern over time (for example, combining quality with low volatility). Because the excess returns of many strategies have low or negative correlations with each other (Appendix Figure 1), combining different factors may limit the length and depth of underperformance periods.

One of the more promising combinations may be the pairing of a value/fundamental-weighted strategy with a momentum strategy. Historically, these two factors have been negatively correlated (Appendix Figure 2), and a combination would have outperformed the broad index more often than either of the two strategies individually. The information ratio of the combined strategy (its outperformance divided by its tracking error) would also have been significantly better than either individual strategy. (Currently, there is no such product available in the market. However, portfolios with a heavy tilt toward value could benefit from the introduction of a momentum alternative beta strategy.)

The benefit of combining strategies should reduce investor temptation to abandon an individual strategy at a low point in its performance cycle. For example, the MSCI US Value-Weighted Index outperformed the traditional MSCI US Index by an annualized 182 bps from the end of 1976 through

Appendix Figure 1. Correlations of the Excess Returns of MSCI Alternative Beta Strategies

January 31, 1999 – June 30, 2014

	United States					Global				
	Equal Weighted	Minimum Volatility	Value Weighted	Momentum	Quality	Equal Weighted	Minimum Volatility	Value Weighted	Momentum	Quality
Equal Weighted	1.00					1.00				
Minimum Volatility	-0.05	1.00				0.10	1.00			
Value Weighted	0.65	0.30	1.00			0.67	0.07	1.00		
Momentum	-0.18	0.13	-0.43	1.00		-0.15	0.14	-0.51	1.00	
Quality	-0.50	0.30	-0.41	0.13	1.00	-0.50	0.38	-0.53	0.26	1.00

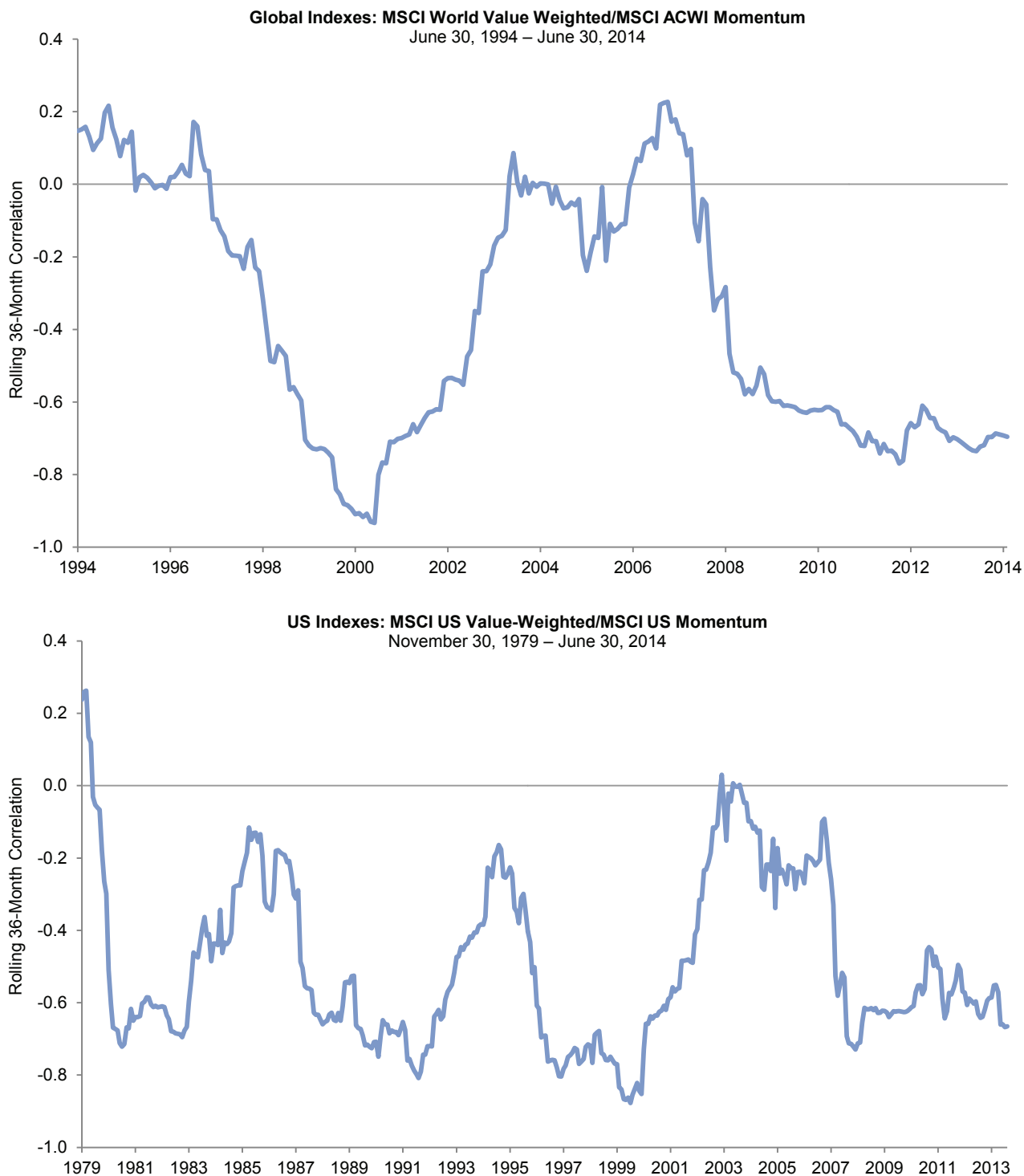
Sources: MSCI Inc. and Thomson Reuters Datastream. MSCI data provided "as is" without any express or implied warranties.

Notes: All data are monthly net total returns. Notes: The indexes used are as follows:

Global Indexes: MSCI All Country World Momentum, MSCI World Equal Weighted, MSCI World Minimum Volatility, MSCI World Quality, and MSCI World Value Weighted.

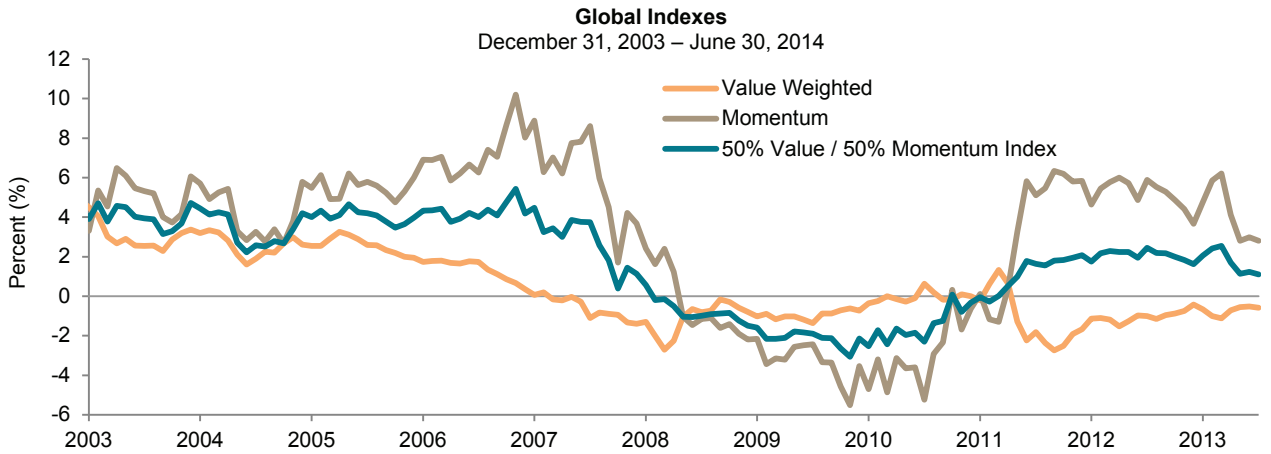
US Indexes: MSCI US Equal Weighted, MSCI US Minimum Volatility, MSCI US Momentum, MSCI US Quality, and MSCI US Value Weighted.

Appendix Figure 2. Rolling 36-Month Correlation of Excess Returns

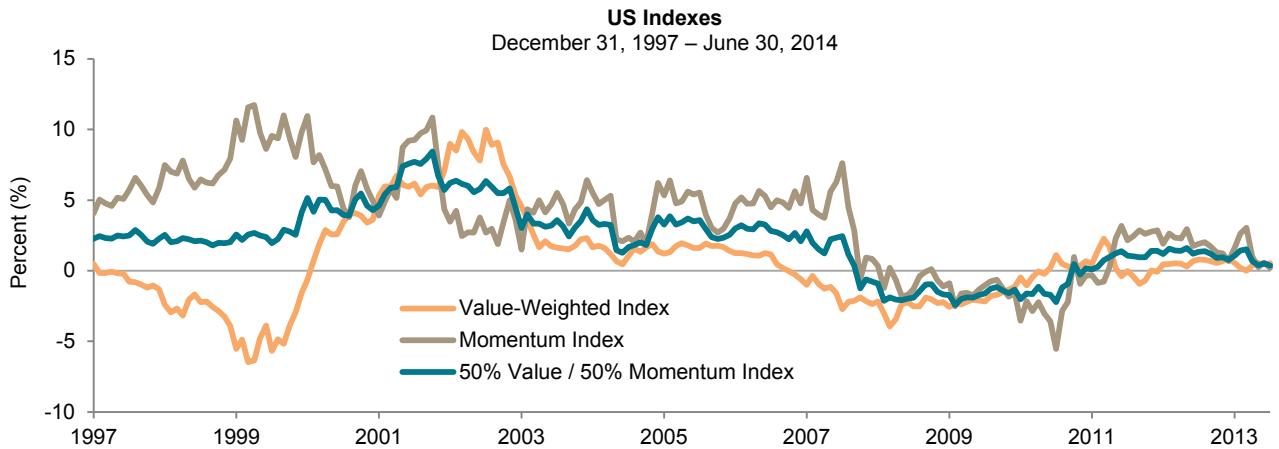


Sources: MSCI Inc. and Thomson Reuters Datastream. MSCI data provided "as is" without any express or implied warranties.
Note: Data are monthly.

Appendix Figure 3. Rolling Three-Year Excess Return AACR for Value-Weighted, Momentum, and Combined Strategies



Since Inception (May 31, 1994)	Value Weighted	Momentum	50% Value 50% Momentum
% of Outperforming Periods	62.4	76.4	78.5
Annualized Tracking Error	3.4	8.1	3.6
Worst 3-Year Underperformance AACR	-4.4	-6.9	-3.1



Since Inception (November 30, 1979)	Value Weighted	Momentum	50% Value 50% Momentum
% of Outperforming Periods	67.5	76.7	81.0
Annualized Tracking Error	3.4	7.4	3.3
Worst 3-Year Underperformance AACR	-6.5	-5.5	-2.4

Sources: MSCI Inc. and Thomson Reuters Datastream. MSCI data provided "as is" without any express or implied warranties.

Notes: Data are monthly. For the global index data in the table, the MSCI ACWI Net Index, which is used in the excess return calculation, begins January 31, 2001. Prior history for the net index has been backfilled by subtracting 4 bps from the MSCI ACWI gross returns each month. The indexes used are as follows:

Global Indexes: MSCI All Country World Momentum and MSCI World Value Weighted.

US Indexes: MSCI US Momentum and MSCI US Value Weighted.

mid-2014; however, on a rolling three-year basis, it was underwater 32% of the time, hitting bottom with a -6.5% annualized underperformance in February 2000 as the tech bubble was near a peak (Appendix Figure 3). Many investors would not be able to hold onto the strategy through such a deep trough given the potential self-doubt and pressure from other stakeholders (of course, no one knew with any certainty that the performance drought was about to reverse, with the strategy outperforming by nearly 10% annualized over the next three years). Combining the momentum strategy with the value-weighted strategy improves the returns pattern considerably. A strategy of one-half value-weighted and one-half momentum outperformed the MSCI World Index by 237 bps annually, and on a rolling three-year basis its excess return was underwater less than 21% of the time, troughing in 2010 with a -3.1% annualized three-year underperformance. This mild performance dip would be much easier for investors to tolerate.¹³ However, we are not currently aware of simple products that incorporate only these two strategies into long-only commingled vehicles without using leverage. Investors combining the strategies would have to either be willing to accept the inclusion of other factors or other asset classes, or would need to engage a money manager to invest a separate account to track a 50/50 index.

While a value-weighted/momentum combination strategy appears to be a reasonable way to boost the chances for outperformance while limiting tracking error, it is

¹³ Please note that as with all backtested data provided in this report, none of these figures includes estimates for transaction costs or fees. The results above incorporate a monthly rebalance back to the 50/50 value-weighted and momentum allocations.

certainly not the only promising combination. Other investors may be interested in pairing strategies in an attempt to engineer a different set of attributes. For example, investors seeking a defensive posture might find a low volatility/quality combination appealing. Investors that desire a low-volatility profile, but are concerned about current valuations for the strategy, might pair a low-volatility strategy with a value-weighted or fundamental strategy, despite a mild positive correlation.

In addition to the low correlation benefit, there may be merit to combining strategies within one investment account or fund, rather than using separate products. Transaction costs may decrease modestly because there would be some natural “crossing” of trades between strategies, such that some trades would be canceled out rather than both sides of a trade being completed for the investor.¹⁴ Implementation of combined strategies is possible but not without difficulty or increased costs if it is highly customized. Many quantitative managers combine such factors, as well as others, to create sophisticated multi-factor models. However, these approaches are likely to be more fluid, less transparent, and have higher fees. ■

¹⁴ The benefit would come if the strategies rebalance at the same time, and it may still likely be fairly limited. MSCI has estimated that the turnover of the value-weighted/momentum combination would have been 52.1% for the two strategies operated as separate mandates, versus 50.8% for a combined mandate from May 1999 to December 2013. Combining strategies into one investment account or fund may also improve the tax efficiency to a small degree.

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