Long-Term Smart Beta Estimated Forecasts

March 31, 2018

We advocate using Smart Beta investments as a means to potentially boost returns, increase transparency and manage risk, while keeping costs in check. Although many investors have embraced Smart Beta, few have spent time developing a method to forecast their returns. We hope and trust that our clients will find this analysis helpful as they refine their own strategic asset allocations.

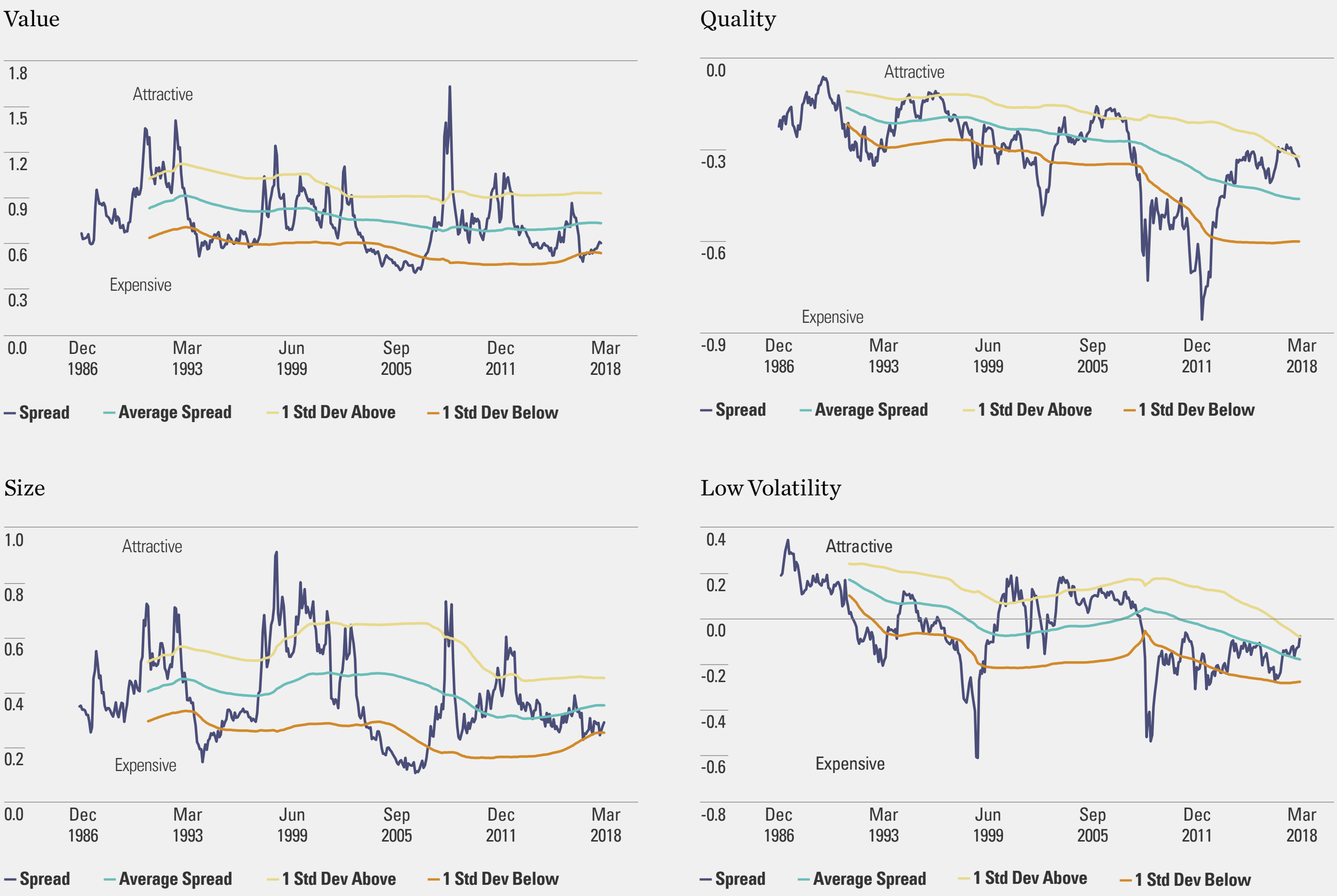
Our long-term forecasts are forward-looking estimates of excess return generated through an assessment of current factor valuations and historical return premiums. These excess return expectations can then be added to our total return forecasts of the underlying equity market to formulate total return Smart Beta forecasts. We find that factor valuations are useful in predicting asset class returns over an intermediate horizon, and over the long-term we expect that return premiums will converge to a historical norm.

We focus on the following four factors: Value, Quality, Small Size, and Low Volatility, and in each case our universe is the MSCI World Index.

Valuation

The starting point for our Smart Beta forecasts is an estimate of the current valuation of each underlying factor. We use the Book/Price ratio to estimate how attractive or expensive each factor is, comparing it to its own history. Figure 1 shows these spreads over time for each factor. To illustrate this point, consider the bottom right chart which focuses on Low Volatilty.

Figure 1: Median Book/Price Spreads of MSCI World Index Factors



Source: State Street Global Advisors (SSGA), MSCI. Data is from January 1, 1987 through March 31, 2018.

The data displayed is based on empirical research for illustrative purposes only and is not indicative of the past or future performance of any SSGA product. Standard deviation is a historical measure of the degree to which returns vary over a certain period of time. The higher the standard deviation, the greater the likelihood (and risk) that performance will fluctuate and have greater potential for volatility; a lower standard deviation indicates past returns have been less volatile.

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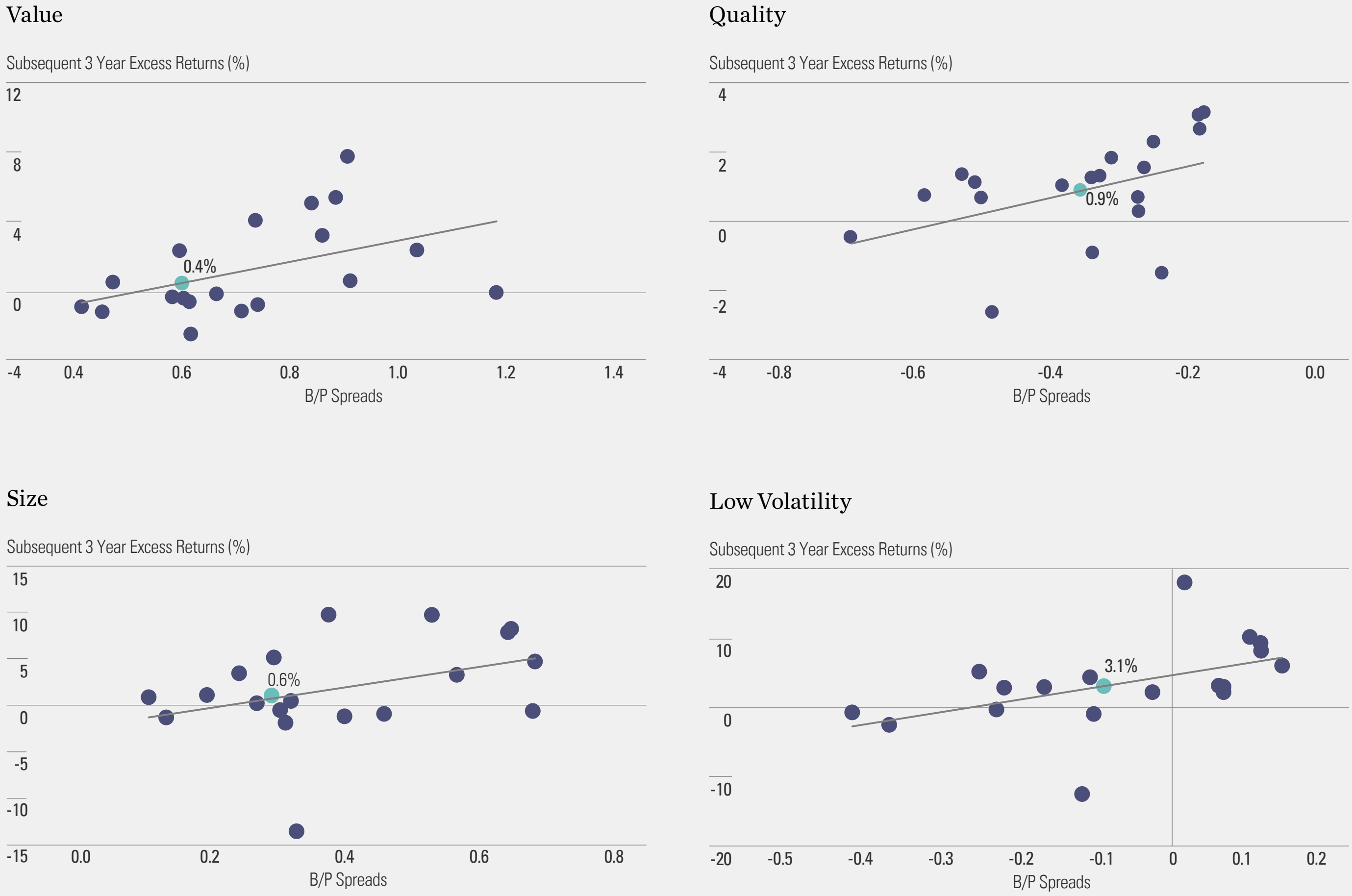
Here we ranked all the stocks in the MSCI World (approximately 1,600 stocks) each month, by their historical volatility. We then calculated the median Book/Price ratio of the lowest volatility quintile of stocks, and subtracted from it the median Book/Price ratio of the highest volatility quintile of stocks. This result provided a valuation spread of the Low Volatility factor, which we show over time. We do this for each of the four factors. Importantly, since Price is in the denominator, a high spread indicates that the factor is attractive and a low spread indicates that the factor is expensive relative to its own history.

So, what does this analysis show us today? Value and Size appear to be expensive while Quality (low debt/equity, low earnings per share (EPS) variability, high return on assets (ROA)) appears to be attractive over the last 10 years but is neutral over the entire period. Stocks sorted on low volatility are showing attractive spreads over the last 10 years but appear expensive versus the entire period. Armed with this information, how can we convert this into specific index return forecasts? We borrow a method originally set forth by Campbell and Schiller (1998),[1] which simply relates current valuation to forward returns. Figure 2 shows the relationship between the year-end valuation spread of each factor, versus the forward three-year excess return of the Smart Beta factor over the MSCI World Index. To illustrate our point, focus again on the Low Volatility figure in the bottom right. Moving from left to right, the Volatility becomes cheaper. Clearly, there has been an upward relationship between the cheapness of the factor and the subsequent excess returns. In other words, the valuation of the factor appears to have had information regarding the subsequent returns. We find this quite exciting and useful in developing our forecasts.

Figure 2: Median Book/Price Spreads



Source: SSGA, MSCI. Data is from January 1, 1997 through March 31.

The data displayed is based on empirical research for illustrative purposes only and is not indicative of the past or future performance of any SSGA product. Factor returns represent the returns of components of the MSCI World Index universe (at their cap-weight) which have been grouped based on their factor exposure. The performance assumes no transaction and rebalancing costs, so actual results will differ. Past performance is not a guarantee of future results. Index returns reflect all items of income, gain and loss and the reinvestment of dividends. Performance is calculated in USD.

In developing forecasts, the model with an inception date of 1997 assumes mean reversion of Book/Price spreads within these factors. The data produced by the model is represented by the straight line going through the charts. The results do not reflect actual trading and do not reflect the impact that material economic and market factors may have had on SSGA's decision-making. The results shown were achieved by means of a mathematical formula, and are not indicative of actual performance which could differ substantially. The performance does not reflect management fees and other fees expenses a client would have to pay. Transaction costs are reflected. The mean reversion relationship has not been supported based on empirical analysis. Coefficient of B/P spread for Low Vol factor is statistically significant at 5% significance level; coefficients for Quality and Value factors are not statistically significant at 5% level, but are statistically significant at 10% level; coefficient for Size factor is not statistically significant at 10% level with a p-value of 12.7%.

The straight line going through each chart is the least squares regression line, and we use that as the basis for a point forecast. As of the end of March 31, 2018, the B/P spread for Value is 0.60. This spread translates into a forecasted three-year annualised excess return of 0.40% for the factor over the MSCI World Index.

To be sure, there is uncertainty associated with this forecast, and that is best seen by the dispersion of the bullet points around the line. In fact, the R-Squared of each regression relationship is below 0.25. Hence, while this information is helpful, investors should not be overly reactive in using only this information to alter their strategic allocations.

The spreads for each of the factors give the three-year forward excess returns which are shown below. Based on historical relationships and current valuation spreads, we are now showing a high return forecast for low volatility stocks. Due to recent inflows in the strategy, we reduce this expectation by multiplying the value by 0.5.

Factor	Three-Year (Annualised) Factor Excess Return Expectations (%)
Value	0.40
Quality	0.90
Size	0.60
Low Volatility	1.50

Source: SSGA, 03/31/2018.

The above forecasts are estimates based on certain assumptions and analysis made by SSGA. There is no guarantee that the estimates will be achieved.

Long-term Factor Forecasts

We look at the historical excess returns in each of the Smart Beta indices created by MSCI in developing expectations 10-years out and beyond. These excess returns are reduced by at least 0.5 as it is our expectation that higher inflows due to popularity will truncate these premiums over time. The 0.5 multiplier represents our intuition that using 1 as the multiplier is overly optimistic and, as mentioned, 0 is not an option (based on our conviction that these factor premia exist); therefore, the two outcomes were averaged to arrive at the 0.5 multiplier. We use straight-line interpolation to estimate returns for horizons between 3 and 10 years forward.

Each of the Smart Beta indices has a positive long-term premium. This reflects our belief that the source of these long-run return premiums will continue into the future.

Factor	Long-Term (10+ Years) Annualised Factor Excess Return Expectations (%)
Value	0.50
Quality	0.50
Size	0.60
Low Volatility	0.50

Source: SSGA, 03/31/2018.

The above forecasts are estimates based on certain assumptions and analysis made by SSGA. There is no guarantee that the estimates will be achieved.

Summary

Investors need to formulate return expectations when committing capital to asset classes. Smart Beta is simply a form of refined asset allocation. The question to investors is no longer a simple tradeoff between equities and fixed income. Rather, it is a tradeoff between Value, Quality, Size, Low Volatility, Credit, Duration, among many other factors and sub asset classes. For many years we have provided institutional investors with a quarterly update of our long-term asset class forecasts. Our Smart Beta forecasts are an extension of this service, which we hope investors will find insightful.

[1] Campbell, John Y., and Robert J. Shiller (1998). "Valuation Ratios and the Long-Run Stock Market Outlook." *Journal of Portfolio Management,* Vol. 24, No. 2 (Winter): 11–26.

Glossary

Book-to-Price Ratio A valuation metric that compares a company's book value (or the value of all its assets minus intangible assets and liabilities) to its current share price. It is a ratio of investor sentiment on the value of a stock to its actual value according to the Generally Accepted Accounting Principles (GAAP).

Debt-to-Equity Ratio A financial ratio indicating the relative proportion of shareholders' equity and debt used to finance a company's assets. A high debt/equity ratio generally means that a company has been aggressive in financing its growth with debt. This can result in volatile earnings as a result of the additional interest expense.

Earnings per Share (EPS) A profitability measure that is calculated by dividing a company's net income by the number of shares outstanding.

MSCI World Index The MSCI World Index is a free-float weighted equity index. It includes about 1,600 stocks from developed world markets, and does not include emerging markets.

Return on Equity (ROE) The amount of net income returned as a percentage of common shareholders' equity. ROE shows how well a company uses investment funds to generate earnings growth.

Smart Beta A set of investment strategies that use alternative index construction rules to traditional market-capitalisation-based indices. Smart beta strategies seek to capture investment factors or market inefficiencies in a rules-based and transparent way.

Spread The difference between the top quintile and bottom quintile of a factor. For example, the median Book/Price spread of the value factor is calculated as the median Book/Price ratio of the highest value quintile of stocks minus that of the lowest value quintile of stocks.

Volatility The tendency of a market index or security to jump around in price. Volatility is typically expressed as the annualised standard deviation of returns. In modern portfolio theory, securities with higher volatility are generally seen as riskier due to higher potential losses.

Forecast Model Limitations and Assumptions

As with any model, the forecasts shown are subject to error. For example, a strong and persistent equity rally could negatively impact the low volatility premium.

SSGA uses models in an effort to enhance returns and manage risk. While SSGA expects these models to perform as expected, deviation between the forecasts and the actual events can result in either no advantage or in results opposite to those desired by SSGA. In particular, these models may draw from unique historical data that may not predict future trades or market performance adequately. There can be no assurance that the models will behave as expected in all market conditions. In addition, computer programming used to create quantitative models, or the data on which such models operate, might contain one or more errors. Such errors might never be detected, or might be detected only after the Portfolio has sustained a loss (or reduced performance) related to such errors.

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Past performance is not a guarantee of future results.

Investing involves risk including the risk of loss of principal.

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Smart Beta strategy does not seek to replicate the performance of a specified cap-weighted index and as such may underperform such an index. The factors to which a Smart Beta strategy seeks to deliver exposure may themselves undergo cyclical performance. As such, a Smart Beta strategy may underperform the market or other Smart Beta strategies exposed to similar or other targeted factors. In fact, we believe that factor premia accrue over the long term (5-10 years), and investors must keep that long time horizon in mind when investing.

While diversification does not ensure a profit or guarantee against loss, investors in Smart Beta may diversify across a mix of factors to address cyclical changes in factor performance. However, factors may have high or increasing correlation to each other

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