



Not all smart beta portfolios are created equal

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Insurance investors drawn to smart beta by the prospect of excess returns, lower volatility and lower fees, have begun to think in terms of combining factors rather than taking exposure to individual ones. In this article we discuss techniques to combine factors that are designed to lead to better risk/return outcomes.

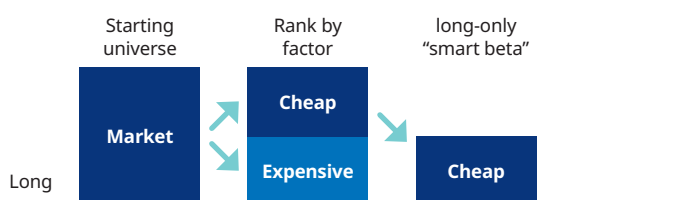
Demand for factor-based “smart beta” investing is growing

Active funds offer the potential for alpha whereas passive products forgo excess returns, instead offering a low-cost and transparent way to produce returns close to those of a typical capitalisation-weighted (cap-weighted) index. Factor investing or “smart beta” combines elements of both these approaches and has been gaining momentum with institutional investors. Insurance companies in particular have been enthusiastic adopters, drawn by strong historical performance, transparency and economy.

Factor/smart beta investing in practice

In factor investing we rank stocks using a quantifiable rule that we believe will provide a guide to the return (or risk-adjusted return) of these stocks.¹ Examples include “Value” (seeking cheap stocks using an accounting measure such as the ratio of book value to market value of the firm) and “Momentum” (seeking stocks which have outperformed over some recent period such as the past 12 months). The confidence in the rule generally reflects a combination of theoretical and empirical evidence relating to outperformance but of course historical evidence of excess returns is no guarantee of future performance and factors do not outperform at all times. The ranking itself may take many forms, for example simple ordering by percentile (assigning a score of 0 to the least attractive stock and 100 to the most attractive stock).² Portfolios may be formed simply by choosing the most attractive stocks according to the ranking, or they may use sophisticated optimisation techniques.

Figure 1: Creating “smart beta”



Source: Schroders. For illustrative purposes only.

Multi-factor investing

Ranking a stock according to a single desirable characteristic is quite straightforward. Ranking a stock on the basis of many characteristics is not much more complicated. For example, if we are interested in two characteristics, such as value and momentum, we can rank value on a scale of 0 to 100, where 0 is most expensive and 100 is cheapest, and rank momentum on a similar scale, from “losers” to “winners”. Having done this, it is easy to add the scores together to form a composite score which could range between 0 and 200. Ranking different characteristics, expressing them in common units, and combining them can be this straightforward.³

While the idea is easily explained, the difference between single-factor and multi-factor portfolio processes is profound. To fully understand why, we examine the investment process.

Combining factors

Despite their many advantages individual factors do not outperform all the time, thus many investors have decided to obtain a more diversified exposure by combining factors.

Most factor-based strategies target individual factors, such as Momentum or Value. To obtain diversified exposure to factors, investors can combine individual factor strategies. We call these “single-factor portfolios”, because investment decisions are made for each factor strategy individually, and the portfolio is a sum of these exposures. This is a common and simple way to achieve a more diversified set of factor exposures, but it may not be the most effective way.

1 Although factor investing can also be successfully implemented in fixed income, this paper focuses on equities. For more information about factor-based fixed income investing, please see “Fact or fiction: bond investors can add returns with factor-based investing”, Investment Horizons, Schroders, on press 2017.

2 A common example of a slightly more sophisticated method is “z-scoring”, which measures how unusual the stock’s value of a characteristic is compared to the average value of the characteristic for all the stocks in the population.

3 In practice, of course, the many choices involved (including selection of which scores, what type of scores, weights to assign to different scores, and so on) can make the process highly sophisticated.

Combining factors more effectively

Instead of combining individual factor strategies without consideration as to how they overlap, we introduce a “multi-factor portfolio” that looks at all of the relevant factor information for each stock and manages exposures for the portfolio as a whole. We prefer this approach because it is more efficient in capturing diversified exposure to factors. For example, it avoids buying stocks in one factor portfolio that we wish to avoid in another portfolio.

This combination process can have a significant impact on investment outcomes, indeed in a simple case study we show that a four-factor integrated approach can provide twice as much effective factor exposure as its single-factor counterpart. Critically, in the historical cases we study (see figure 6), this leads the multi-factor approach to outperform by twice as much as the single-factor approach.

Selecting stocks for multi-factor portfolios

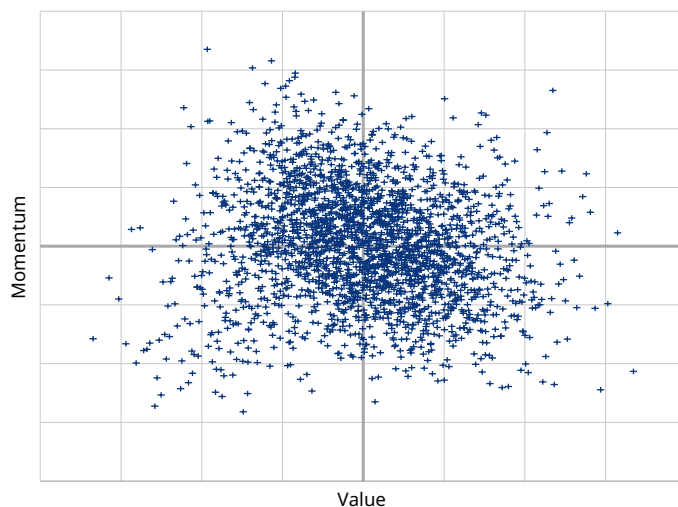
Every stock possesses some exposure — desirable or not — to all of the factors an investor may wish to target. There is no such thing as a “value stock” — stocks are relatively cheap or expensive. Buying a cheap stock increases our exposure to Value, while buying an expensive stock reduces our exposure to Value. But even a very cheap stock is also either a recent “winner” or recent “loser” and, therefore, possesses some (positive or negative) momentum. A single-factor approach only considers one of those exposures, and the single-factor portfolio does not take into account relationships among the factors.

Figure 2 is a simple illustration of why this produces inefficient investment outcomes. It shows a scatterplot as of a single point in time of the value and momentum scores of all the stocks in the MSCI ACWI global equity index.⁴ A positive score on value indicates the stock is cheap, while a negative score indicates the stock is expensive. Similarly, a positive momentum score shows a stock is a recent winner, while a negative momentum score shows it is a recent loser.

Stocks in the top right are desirable in terms of both momentum and value; they are “cheap winners”. Conversely, stocks in the bottom left are “expensive losers”. Both a momentum and a value portfolio would likely hold most of the stocks in the top right, and few of the stocks in the bottom left. But what about stocks that occupy the top left or bottom right quadrants — the “expensive winners” or “cheap losers”? A value portfolio will buy cheap stocks even if they are losers. And a momentum portfolio will buy winners even if they are expensive. But every cheap loser we buy reduces the total amount of momentum in our portfolio; and every expensive winner reduces the total amount of value in our portfolio. If we buy too many of these sorts of stocks, we might end up without much of either value or momentum.

Figure 2: Every stock displays both value and momentum characteristics

Value vs Momentum: Stock Selection Dilemma

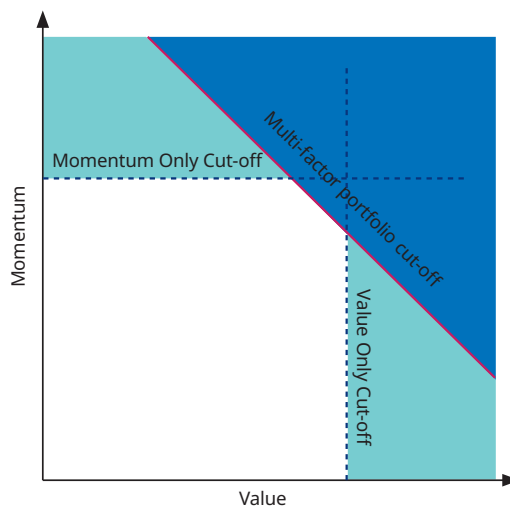


Source: MSCI, FactSet and Schroders. For illustrative purposes only. Data as of January 2016

Figure 3 shows how a multi-factor approach can solve this problem. Suppose that stocks are ranked and each factor portfolio buys the top 25% of stocks. The momentum portfolio buys all of the stocks above the dotted horizontal line (including many recent losers). The value portfolio buys all the stocks to the right of the dotted vertical line (including many expensive stocks). A multi-factor portfolio, by contrast, buys all of the stocks above and to the right of the diagonal line. This portfolio avoids buying stocks that are very negative on value or momentum, and thereby preserves exposure to value and momentum. It also buys some stocks that neither the value nor the momentum portfolios hold, because they have quite good momentum and value characteristics without being outstanding in either. Again, buying these stocks maintains exposure to both the selected factors, rather than reducing one or the other.

Figure 3: Multi-factor approach improves factor exposure

Value vs Momentum: Methods for Portfolio Construction



Source: Schroders. For illustrative purposes only.

⁴ The MSCI All Country World Index is a widely used global share index.

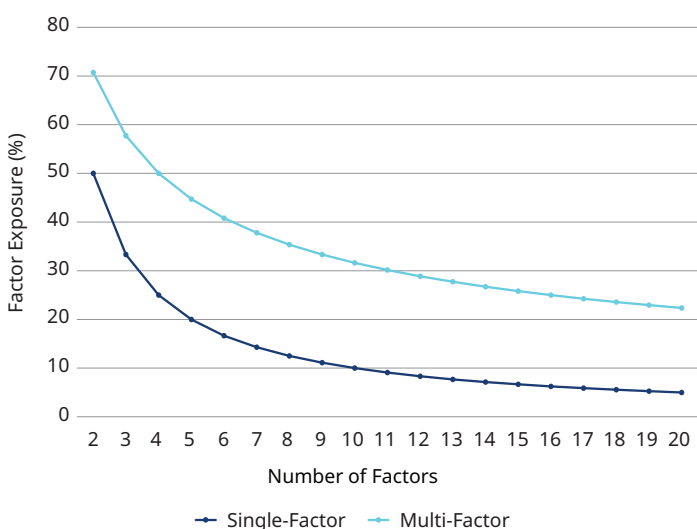
In most cases, investors seek exposure to many factors — not just one or two. The insights from the analysis above also apply to portfolios of many factors. In fact, the advantage of the multi-factor approach becomes even larger when more factors are used.

Figure 4 shows how much exposure we get to each factor comparing a multi-factor portfolio and single-factor portfolio approach. The analysis uses the reasonable assumption that the factors are uncorrelated with each other. Although this is not exactly the case across all factors at all times it is a good assumption for the most common factors over time. Inevitably, the more factors we invest in, the less exposure we have to any given factor.

A description of the mathematics underpinning the results in figure 4 is beyond the scope of this paper. What is clear is that by combining information about factors, a multi-factor portfolio can retain more of the original factor exposure. Many factor investors choose four factors; in this case, a single-factor approach gives us 25% of the original exposure to each factor. With a multi-factor approach, we retain 50% exposure to each factor.

Figure 4: Multi-factor approach maintains more exposure as factors increase

Aggregate factor exposure



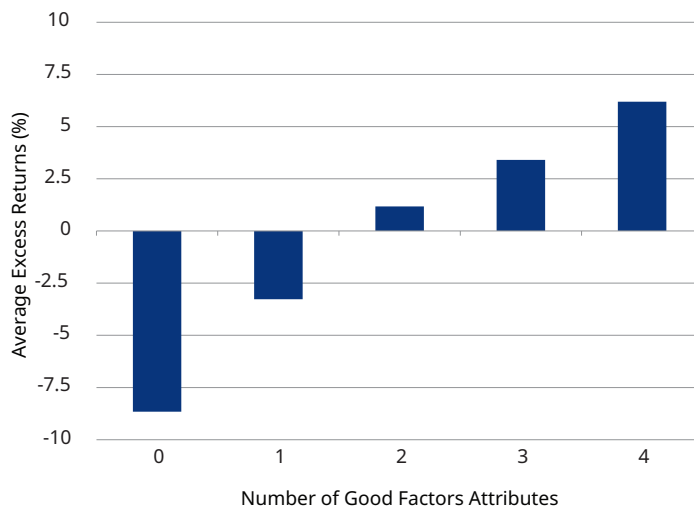
Source: Schroders. For illustrative purposes only.

Greater efficiency for better performance

Does the extra factor exposure pay off in practice? Perhaps all of the factors say the same thing. Or the factors could interact in strange ways that mean combining the information is not actually useful. Figure 5 examines four factors (Value, Momentum, Quality and Low Volatility) and assigns each stock in the MSCI ACWI either a “good” or “bad” rating, according to the monthly performance of each factor over a period of nearly 22 years. Stocks that rated bad on all four characteristics (i.e., represented by the “0” bar in the graph) experienced an average return relative to the market of -8.7%. Stocks that rated well on just one characteristic also generated negative returns compared to the market. The more characteristics on which a stock rated well, the better its historical average performance compared to the market. A multi-factor approach can focus exposure on stocks which do well across many characteristics.

Figure 5: Excess returns improved when the number of “good” factors increased

Factor interactions and excess returns



Source: MSCI, FactSet and Schroders. Data period: February 1995 – March 2017

To test this claim, we needed to compare single-factor portfolios against their multi-factor equivalents on level terms. We therefore ran a simple exercise comparing portfolios of four individual factors with a single multi-factor portfolio formed using the same four factors. In all cases, a portfolio comprised the best 20% of stocks according to the relevant measure – either a single factor, or the sum of all four factors. To make the exercise as general as possible, we ran many of these experiments, in each case choosing a particular version of each of four factors. Since each factor can be created various different ways, there are many possible combinations: we compared over 1,200 random portfolios. This was not a backtest in the usual sense that it tested a particular strategy. Instead, it harnessed the power of having many possible definitions of factors and many possible factors to investigate the properties of single-factor and multi-factor portfolios, in a simplified setting.

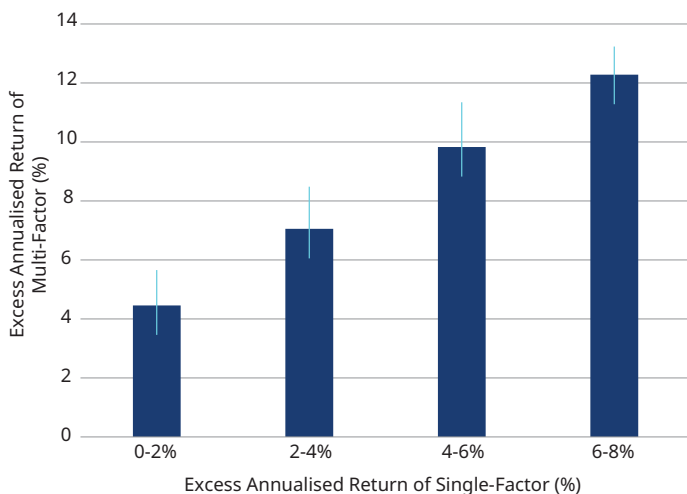
Figure 6 shows the results. The excess annual returns from the single-factor portfolios ranged between 0 and 8 percent, and have been grouped in four two-percentage-point bands. The bar shows the average outperformance of the corresponding multi-factor portfolios. For example, for single factor portfolios with excess returns in the range 0-2%, the corresponding multi-factor portfolios had average excess returns of a little over 4%. The small vertical lines represent one standard deviation, or the dispersion of portfolio results.

We know from our earlier discussion that the multi-factor portfolio has twice as much factor exposure as the single-factor portfolios. The question is: does that extra exposure translate into better results? The striking feature of the graph is that, on average, outperformance was almost exactly predicted by factor exposure. Whatever the outperformance of the underlying single-factor portfolios, the multi-factor portfolio, which had twice as much factor exposure, also generated approximately twice as much outperformance. Put differently, for each basis point of outperformance of the single-factor approach, the multi-factor approach generated an additional basis point of outperformance.

Past performance is not a guide to future performance and may not be repeated.

Figure 6: Historically multi-factor portfolios have added to outperformance

Multi-Factor vs Single-Factor



Source: MSCI, Factset and Schroders, January 1999-December 2016.
 Note: 1,215 portfolio simulations using four factors from quality, momentum, profitability, Value and Size. Bars represent the average of Multi-Factor performance; vertical lines represent one standard deviation (dispersion of performance).

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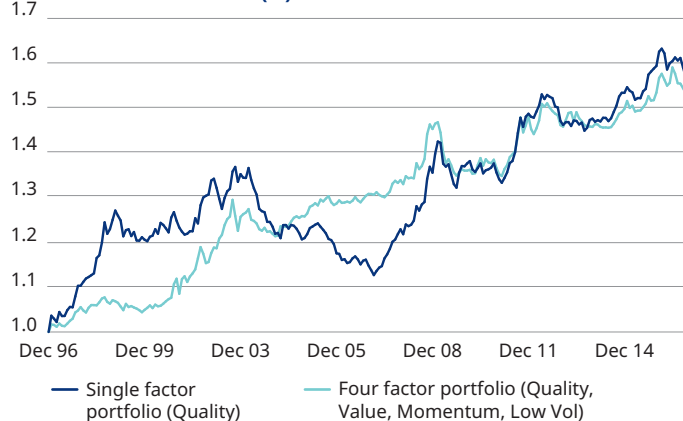
Because multi-factor portfolio returns are linked so tightly to single-factor portfolio returns, an integrated approach to factor investing should therefore be seen as a technical step forward in factor investing, rather than a new source of returns in itself.

Lower balance sheet volatility for insurance companies

Combining factor exposures may reduce volatility. In the chart below we compare historic active returns from exposure to a single factor (Quality) to those of a portfolio with equal weighting to Quality, Value, Momentum and Low Volatility.

Multi-factor exposure has smoothed the path of returns

Cumulative active return (%)



Source: Source: MSCI, Schroders. Chart captures excess performance of MSCI ACWI Quality and an equally-weighted allocation to Quality, Value, Momentum and Low Vol. Data period: December 1996 to December 2016.

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Clearly less volatility and better risk adjusted returns are desirable from an investment perspective. For life insurers in particular, smoother returns may directly benefit the stability of their income statement when IFRS 9 pushes them to recognise changes in the fair value of their equity holdings (held on balance sheet) in P&L. Given the importance that many insurers place on maintaining stable dividend payments, this could be a significant benefit.

Our conclusion

We believe that our multi-factor portfolio approach has the potential to retain more of an investor’s intended factor exposure by considering all of the relevant factor information for each stock in the portfolio.

For insurers specifically, the smoother excess returns that this aims to achieve could reduce balance sheet volatility or increase the attractiveness of the products they offer to their clients.

When combining four-factors our analysis shows that a multi-factor portfolio can provide twice as much effective factor exposure as its single-factor counterpart, which in the historical cases we study leads the multi-factor portfolio to outperform by twice as much as the single-factor counterpart, leading to improve risk-adjusted returns.

When engaging in any form of factor investing care needs to be exercised when selecting, implementing and maintaining factor exposure and of course the performance of the underlying market is a key driver of the strategy’s overall performance. Clearly factor exposures that are poorly chosen will not necessarily outperform even if those factors are efficiently combined.

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