
The move to multi-factor investing: what every investor should know

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There is no need to re-rehearse the arguments for factor investing. Both academia and the market have taken the idea to heart. Ever since 2009, when Ang, Goetzmann and Schaefer produced their study for the Norwegian Government Pension Fund, many in the market have accepted the need to invest intentionally and efficiently in factor premia. A host of institutional mandates have evolved focusing on factors and, importantly, a series of financial products has come to market that has been built from these indices.

Looking at the range of 'smart' or 'strategic beta' products in the market, many of which fall under the category of factor investing, Morningstar estimates the industry is now worth \$400bn (€369bn), four times its value in 2010. Lyxor has suggested that the total is closer to \$1trn if private mandates are included. Clearly this is a large and growing marketplace.

Now, as the market for factor-based products has matured and the volume of assets under management has become difficult to ignore, a new form of factor investing has begun to appear: multi-factor products created by the grouping together of a series of individual factors. Over the course of the past couple of years these products have attracted significant assets.

Of course, the factor investing proposal always included a host of individual factors – value, momentum, size, liquidity, quality, volatility, yield – each with its own story justified by a host of academic papers, plus screeds of marketing material. But products have emerged over the course of the past year that look to combine these individual factors into multi-factor products. Each product combines a series of individual factors to take advantage of their underlying characteristics in one product.

Goldman Sachs, Deutsche Bank, JP Morgan, SSgA and iShares have all either launched, or are in the pro-

cess of launching, products in this space.

But buyers need to understand the complexities of multi-factor products; the market's understanding has lagged as they have taken off. Upon inspection, they lack consistency in their combination of factors as well as the methods used to weight factors in the combined portfolios.

When considering multi-factor products as part of their portfolios, it is essential for institutional investors to understand which factors are being combined, as well as the underlying values used to create the factors. Investors should also ask how the product is being constructed: how are factor weightings determined and what are the assets weights within the factors?

How factors are selected and defined in multi-factor products

More than 350 individual factors have been identified as potential sources of outperformance. Below is a review of several single factor products that are suitable for the construction of multi-factor products.

Figure 1 shows factors that have a long history in the academic literature and have been used in the construction of factor indices.

While some have suggested that factor premia are the result of data mining – that if you look hard enough you can get the data to tell you what you'd like to observe – the factors in figure 1 are supported by a wealth of academic literature. In addition, work undertaken by both practitioners and academics has shown that the economic rationale, or the 'story', behind the factors make good financial sense.

Detractors of the factor investing argument have suggested that these factors might be academically valid, but argue that when they become investment products the 'crowding' or 'herding' effects are likely to lead to an erosion of returns. However, the history of

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1. An overview of factor premia

| | Explanation | Examples |
|------------|--|----------------------------------|
| Value | Undervalued relative to corporate fundamentals | Price-to-book, price-to-earnings |
| Growth | Above-average earnings growth | Price-to-earnings |
| Momentum | Rate of acceleration of price | 3-month, 6-month, 12-month |
| Volatility | The dispersion of returns | Volatility, VIX |
| Size | High or low market capitalisation | Market cap |
| Liquidity | Low trading volume | ADV |
| Yield | Income return on investment | Dividend per share, buybacks |
| Quality | Sustainable profitability | Profitability, margins |

Source: Axioma

minimum variance investing (the low-volatility factor) suggests that these factors are remarkably robust.

The eight factors listed in figure 1 account for the majority of factor indices. However, the specific definition of factors has become an industry in itself. While these eight common factors might generally be agreed on by both academia and the market, there is no universal consensus on their definition. There are many variants of these factors.

Let's take the value factor as an example. Value investing has a long and venerable history with many adherents over the course of the past 100 years. The vast majority would look back to the work of Benjamin Graham – with his seminal books *Security Analysis* and *The Intelligent Investor* – as the father of value investing, alongside his investment courses at Columbia University.

The Graham definition of value would look at a host of inputs – price-earnings ratios, dividend yields, net current asset value, debt, earnings stability. However, when it comes to factor definition, many will reach for simplicity and suggest price-to-book value, with perhaps some price-to-earnings included.

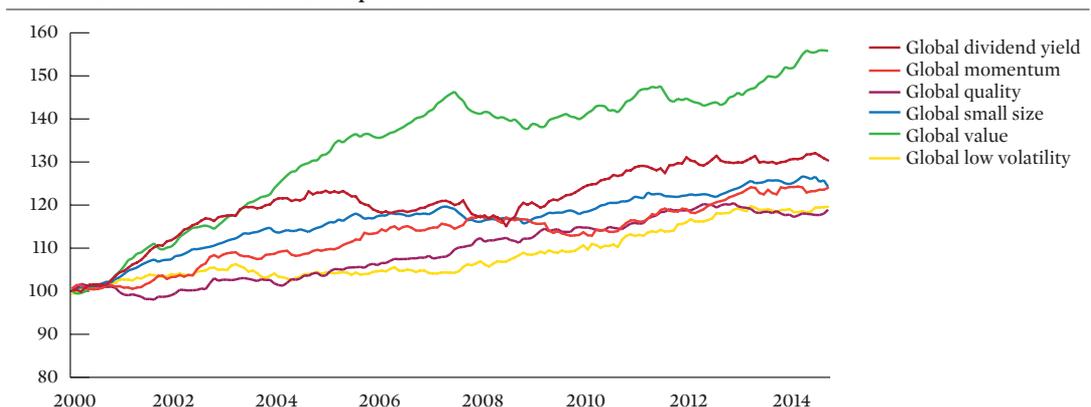
In creating factor products there is a constant tension between choosing a simple, straightforward definition (price-to-book value), which is intuitive and transparent, and the use of multiple descriptors (P/E ratios, dividend yields, net current asset value, debt, earnings stability) to ensure that the definition reflects the sophistication of a professional investor.

How factors are combined to construct multi-factor products

The complexity involved in defining a factor is apparent. But there is an additional issue that needs to be addressed in making a decision to invest in a factor, namely that factors display differing return profiles over the economic cycle. Figure 2 shows cumulative returns, over 14 years, for six separate factors measured on a global portfolio of 1,800 assets.

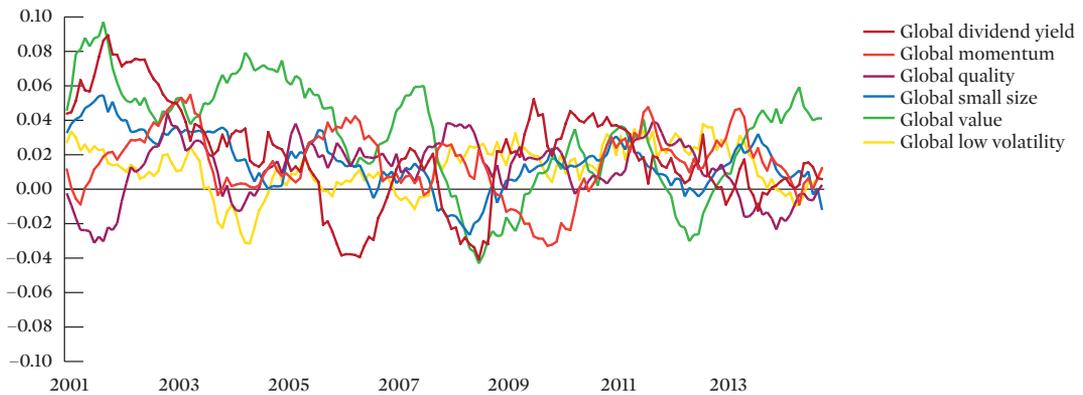
All of the factors have strong cumulative returns. But now look at rolling 12-month returns of the same factors over the same time period with the same 1,800 asset global portfolios (figure 3). The story is clear: while all factors appear strong over the course of the portfolio history, each factor is very much subject to

2. Cumulative returns for six factor premia



Source: Axioma

3. Rolling 12-month returns for six factor premia



Source: Axioma

its own limitations, or outperformance, dependent on market conditions.

Looking at each of the individual factors, an assessment of their effectiveness during the business cycle is outlined in figure 4.

The cyclical nature of the individual factors is one of the compelling reasons for the creation of the multi-factor products. The aim is to combine the individual factors and vary the weights of the cyclical nature of the individual factors to counterbalance the interaction between the factors.

While this proposition has a compelling logic, construction of multi-factor products is now even more complex. It is also important to understand the interaction between the factors and the methodology for defining the appropriate factor weights. This challenge is analogous to how individual assets are weighted within a single factor product.

While there is a rich body of literature on weighting

schemes, the limits of space require us to simplify the question: do you optimise or not?

At a high level, the optimisation question can be regarded in the same light as the factor definition question: there is either a simple and transparent way of defining the problem, or a more sophisticated and complex way. To go back to the value discussion earlier, do you use price to book to define value or a more sophisticated set of valuation metrics? Do you use a simple heuristic to weight the factors within the portfolio, or do you use optimisation?

Why does this discussion between a simple weighting scheme and optimisation matter? There are two reasons why this is an important decision. Firstly, the individual factors are not created 'equally', and secondly, rules-based (heuristic) construction has a tough time controlling turnover.

The notion of individual factors not being created 'equally' can be observed by the fact that market-oriented factors like volatility or momentum tend to overshadow bets on fundamental factors such as value. The factor returns and volatilities of market-oriented factors are often of a greater magnitude than the fundamental factors.

But, of course, the higher volatility of these factors creates higher risk, so the trade-off between factor strength and factor volatility needs to be taken into account. This trade-off between strength and volatility can be 'solved' by using a risk parity weighting scheme to ensure that the 'weaker' factors have appropriate 'strength' in the multi-factor portfolios.

4. Factor premia and the business cycle

| | Historic business cycle |
|------------|----------------------------|
| Value | Pro-cyclical |
| Growth | Pro-cyclical |
| Momentum | Pro-cyclical |
| Volatility | Low volatility = defensive |
| Size | Pro-cyclical |
| Liquidity | Pro-cyclical |
| Yield | Defensive |
| Quality | Defensive |

Source: Axioma

5. Review of key multi-factor products

| | FTSE Developed Diversified Factor index | MSCI ACWI Diversified Multi-Factor index | EDHEC Multi-Beta Multi Strategy Equal Weighted index | Goldman Sachs Equity Factor Index World |
|------------------|---|--|---|---|
| Universe | FTSE All-World Developed | MSCI ACWI | Proprietary (developed markets only) | Proprietary (developed markets only) |
| Factors | Low volatility | – | Low volatility | Low beta |
| | Value | Value | Value | Value |
| | Momentum | Momentum | Momentum | Momentum |
| | Small size | Small size | Small size | Small size |
| | – | Quality | – | Quality |
| Factor weighting | Inverse risk weighted | Risk weighted | Equal weighted | Risk weighted |
| Asset weighting | Mostly market cap weights with some rules-based adjustments applied | Optimised | Mix of max deconcentration, max decorrelation, min vol, max Sharpe ratio, risk parity. All these involve optimisation | Optimised |

Source: Axioma

With a rules-based portfolio construction method, there are few ways to control such instability or turnover, except by possibly forcing more names and additional diversification. But with optimisation the optimiser chooses how to best use the available turnover budget.

Review of key products

While the above discussion looks at some of the practical decisions involved in a multi-factor approach, here is a review of some of the products that are available in the market.

Figure 5 looks at four specific offerings from FTSE, MSCI, EDHEC and Goldman Sachs comparing the markets that are covered (the universe); the individual factors that are combined to create the

multi-factor product; the weighting scheme used to combine the factors; and how the assets are weighted within the factors.

The introduction of multi-factor indices has clearly generated a lot of interest in the market, and that interest has resulted in growth in assets under management. But multi-factor products are not all created equally and there is a lack of consistency in their construction. When choosing a multi-factor product there are two key areas that institutional investors need to analyse in detail. First is the choice of factors, including the underlying values used; second is the product construction methodology, including how factor weightings are determined and the asset weights within the factors.

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