

Axioma Briefing

Multi-factor Investing Practical Considerations for Portfolio Managers

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Factor-based and smart beta products have become a growing trend as investors look for ways to quantitatively expose their portfolios to certain historically successful investment themes while reducing the volatility that comes from betting on individual securities. The factor investing trend spawned multi-factor investment products as investors recognized that certain factors may underperform in certain market conditions and combining one or more of them can potentially limit the portfolio's downside risk.

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Multi-factor Investing: Practical Considerations for Portfolio Managers

As a leading provider of portfolio construction and management solutions, Axioma offers its unique insights on what portfolio managers should consider when thinking about multi-factor products.

Top Four Things Portfolio Managers Should Know

1. **Factor definitions:** Multi-factor products can be hard to compare as there is a lack of consistency in the way factors are selected and defined. Not all factors are created equal, and investors should always aim to understand the choice of factors and their underlying value: The eight factors that make up the majority of factor indices – value, growth, momentum, volatility, size, liquidity, yield and quality – are commonly accepted but they can be defined in different ways, ranging from the simple and transparent to the sophisticated and complex.
2. **Factor interaction:** Different factors have differing return profiles during an economic cycle, and are therefore subject to their own limitations dependent on market conditions. The cyclical nature of individual factors can be identified by looking at each factor's rolling 12-month returns and needs to be taken into account when combining and weighting them in order to counterbalance any interaction between the factors.
3. **Factor risk and return:** Portfolio managers need to understand that market-oriented factors like volatility or momentum often overshadow fundamental factors like value in a portfolio. While this can lead to higher returns, it also often means there is more volatility and risk. A portfolio optimizer can help to balance the trade-off between factor strength and factor volatility and achieve the desired risk/return profile.
4. **Factor portfolio construction:** To optimize or not to optimize, that is an essential question faced by portfolio managers. Academic research has shown the benefits of an optimized portfolio compared with a simple, rules-based approach to portfolio construction. An optimizer can limit drift in a portfolio from the desired investment strategy and specify how to allocate any turnover budget. Optimization also helps portfolio managers better understand and control the risks and exposures in their portfolio. Axioma's optimizer has limitless objectives and constraints to give portfolio managers the flexibility to construct complex strategies that match their investment approaches.

Read on to get a guided tour of multi-factor investing from Ian Webster, Axioma's Chief Operating Officer.

The Rise of Multi-Factor Products

In recent years, institutional mandates have witnessed the rise of so-called smart beta funds that attempt to bridge the gap between passive and active management by taking major indices and reweighting them according to a specific factor in order to beat the market in the long-term and not simply hug the index.

Morningstar estimated that by the end of 2014 the smart beta market was worth more than \$400bn (€369bn), four times its value in 2010. Lyxor has suggested that the total is closer to \$1trn if private mandates are included.

But the market's understanding of these products has lagged their growing popularity, says Webster. "Potential buyers need to understand the complexities of multi-factor products when considering them as part of their portfolios. Upon inspection, they can often lack consistency in their combination of factors as well as the methods used to weight factors in the combined portfolios.

"Institutional investors need to understand how the product is constructed - which factors are being combined, how the factor weightings are determined and what the assets weights are within the factors."

How to Select the Right Factors

To date, more than 350 individual factors, or factor premia, have been identified as potential sources of outperformance, and it is a list that is likely to grow as fund managers turn to more esoteric characteristics in order to stand out in an increasingly competitive marketplace.

But at the heart of factor investing there are eight factors that form the cornerstone of any strategy:

Table 1	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

These factors are supported by decades of academic literature, market research and practitioners' experience and make up the majority of factor indices. But while there is a common agreement on their identification, there is no such consensus when it comes to their definition. In fact, defining these factors has become an industry in itself, says Webster.

"For 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.

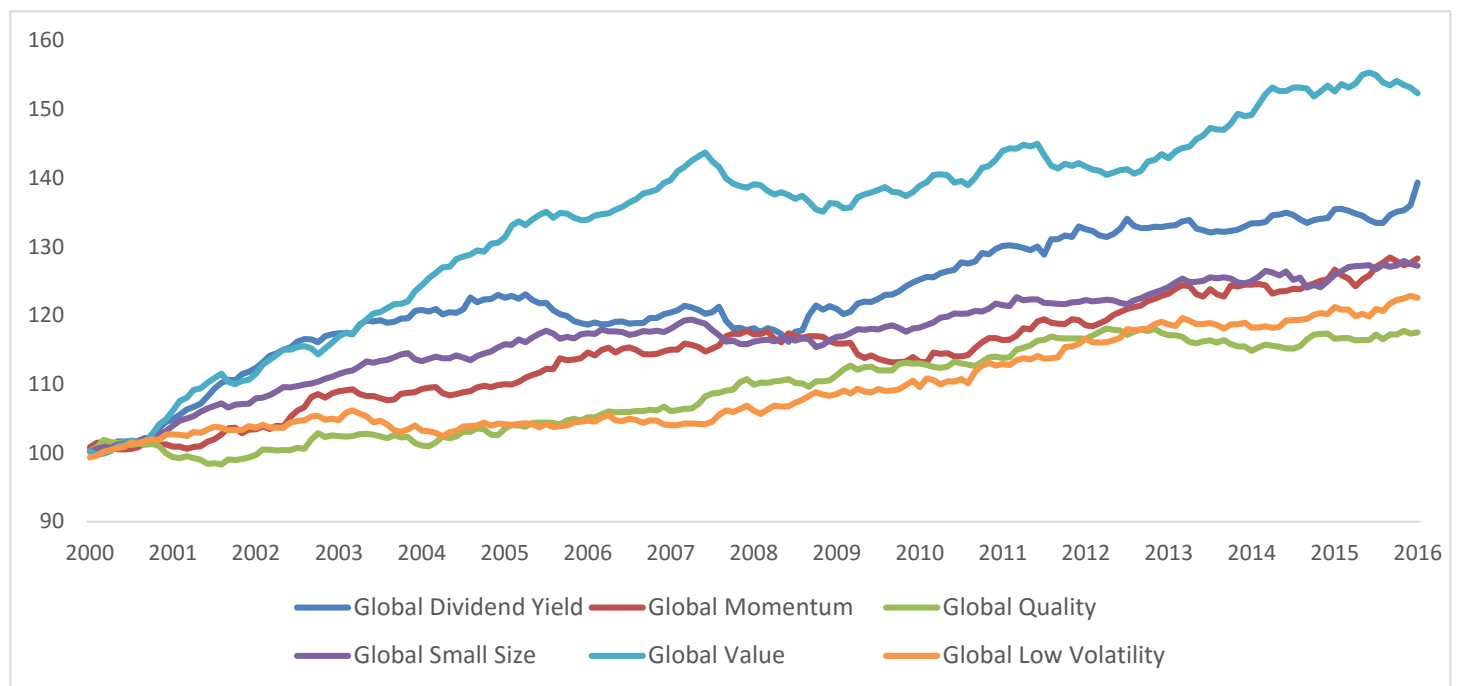
"The Graham definition of value would look at a host of inputs – price-earnings ratios, dividend yields, net current asset value, debt, earnings stability. However, many others will take a far simpler approach with much fewer inputs such as price-to-book value, with perhaps some price-to-earnings included."

The different directions in definition highlight the constant tension between the simple and the complex that comes with the creation of factor products. The creators must choose between a straightforward definition that is both intuitive and transparent or a more complex, multi-descriptor approach that reflects the sophistication of a professional investor.

How to Combine Factors

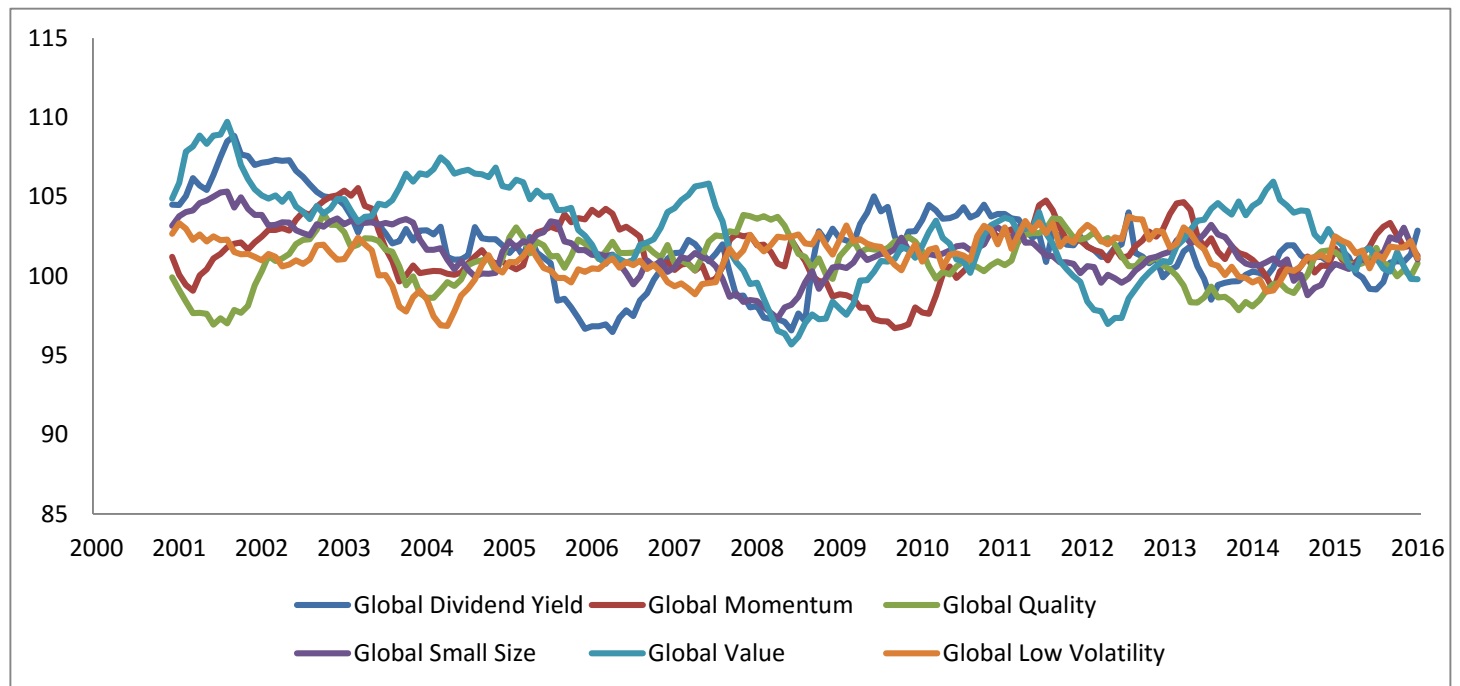
It is not enough to know which factors are involved in a multi-factor product—investors must also know how they are combined. For example, all of the factors in the chart below have strong cumulative returns. But a look at the 12-month returns of the same factors over the same time period with the same 1,800 asset global portfolios (chart 2) shows that each factor acts separately.

Chart 1: Cumulative returns for six factor premia



Source: Axioma

Chart 2: Rolling 12-month returns for six factor premia



Source: Axioma

The aim is to combine the individual factors and vary the weighting to counterbalance the interaction between them – the idea being that there will always be a dominant factor that can compensate for the negative cycles of others.

While this proposition has a compelling logic, the construction of multi-factor products is even more complex, says Webster. “It is important to not only understand the interaction between the factors but also the methodology for defining the appropriate factor weights. This challenge is analogous to how individual assets are weighted within a single factor product.”

This issue can be distilled into one simple question, says Webster: do you optimize or not? “The optimization 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. Do you use a simple rules-based (heuristic) approach to weight the factors within the portfolio, or do you use optimization?”

There are two reasons why this is an important decision. Firstly, the individual factors are not created equally. 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 the higher volatility creates higher risk.

Secondly, it can be problematic to apply rules-based weighting schemes to funds with multiple factors. “With a rules-based portfolio construction method, there are few ways to control such instability or turnover, but with optimization the optimizer chooses how to best use the available turnover budget,” says Webster.

Review of Key Products

Once investors have acquainted themselves with the principles involved creating multi-factor products, they must then apply these findings to the products available in the market. Table 2 shows four specific offerings - from FTSE, MSCI, EDHEC and Goldman Sachs – and compares the markets covered, the individual factors that are combined, the weighting of factors used to combine them and the methodology employed to weight the assets within the factors.

Table 2				
	FTSE Developed Diversified Factor index	MSCI ACWI	EDHEC Multi-Beta	Goldman Sachs Equity Factor Index World
Universe	FTSE All-World Developed	MSCI ACWI	Proprietary (developed markets only)	Proprietary (developed markets only)
Factors	Low volatility Value Momentum Small size ---	--- Value Momentum Small size Quality	Low volatility Value Momentum Small size ---	Low beta Value Momentum Small size Quality
Factor Weighting	Inverse risk weighted	Risk weighted	Equal weighted	Risk weighted
Asset Weighting	Mostly market cap weights with some rules-based adjustments applied	Optimized	Mix of max deconcentration, max decorrelation, min vol, max Sharpe ratio, risk parity. All these involve optimization	Optimized

Any similar review of multi-factor products will show the variation that exists in their relative complexity, the use of optimization and the number of inputs involved, thereby proving that no two products are created equally. Nor will they perform equally.

Investors have to judge how effective these different approaches will be in relation to their own risk appetite, their investment philosophy and, importantly, the resources available to them to examine the products in detail, says Webster.

“The introduction of multi-factor indices has clearly generated a lot of interest in the market, and that interest has resulted in the growth of assets under management. But it is crucial that investors’ appetite for these products is matched by their understanding.”

Multi-factor Investing: Axioma Solutions for Portfolio Managers

Axioma Optimizer: empowers portfolio managers to build and optimize multi-factor portfolios using the industry's most extensive library of modelling options and a full suite of Axioma-supplied or third-party data and risk models

Axioma Portfolio Analytics: offers a full-suite of analytics, including factor-based performance attribution, that helps portfolio managers identify sources of risk, such as exposure to investment styles, industries, countries and currencies

The most effective use of an optimizer in multi-factor investing requires a risk model that includes factors identical to those in the investment strategy. Axioma's Risk Model Machine, or custom risk models as a service, allows clients the ability to create models tuned specifically to their strategies for a balanced integration of the factors into the portfolio.

Axioma Risk Model Machine: clients can use our breakthrough solution to create custom risk models with factor definitions uniquely tailored to align to those in their multi-factor portfolios

Custom Risk Models as a Service: Axioma can also engage in a consultative partnership to develop custom risk models based on its clients' requirements

Find out more: visit www.axioma.com or contact our advisor team at Support@axioma.com.