

Research

Implementation considerations for factor investing

FTSE
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Implementation considerations for factor investing

Investors of large pension funds or insurance companies should care about factors. They are systematic drivers of portfolio risk and return and at the heart of risk management tools. A more recent offering is the introduction of smart beta or factor-investing techniques to the allocation decision of many institutions [1]. This approach aims to incorporate factors (such as Value, Size and Quality) to enhance portfolio diversification and performance relative to traditional market-cap indexes.

Traditional portfolio and asset allocation techniques typically performed poorly in 2008. The Norwegian Ministry of Finance commissioned an in-depth study of the fund by Ang, Goetzmann and Schaefer (2009) [2]. They found that a major part of the fund's active returns before, during and after the financial crisis could be explained by static exposure to systematic factors and that it may be possible to reproduce such outcomes using passive management approaches. The report recommended that the Norwegian Government Pension Fund should go beyond traditional asset allocation techniques, across asset classes and geographies, and incorporate factor investing.

There are several reasons why an investor may decide to follow a factor route. Traditional passive investments offer advantages of high capacity and liquidity, high transparency and low implementation costs. But there are also risks: price being the driver of index returns,¹ cap-weighted indexes exhibit exposure to risk factors such as momentum, (large) size and (poor) value stocks. They may also exhibit periods of concentration—e.g., Japan in the 1980s and during the Internet Bubble in the 1990s. Factor-based investing can address these issues by targeting exposure to factors a plan believes will be rewarded in the long run. Single factors display differing sensitivities to macroeconomic events and combinations of cyclical and defensive factors can be used to target different outcomes, from reducing downside risk, improving diversification to enhancing risk-adjusted returns.

The purpose of this paper is to help institutional investors pose the right questions and develop a further understanding of the role of factor investing, thereby facilitating the decision-making process.

I. How do factors fit in an institutional portfolio?

There is substantial academic evidence that certain factors have earned a positive return over the long run [3]. The literature distinguishes three main reasons for the existence of factor premia:

- 1. Risk premia:** Factor premia are the reward for assuming additional risk, enduring losses during bad times and the cyclical nature of factor returns.
 - For example, value stocks are perceived to carry default risk and are more economically sensitive. They tend to be sold off when risk aversion in the market rises and liquidity falls.
 - During a market recovery phase, as earnings visibility improves, value stocks tend to outperform the underlying market index.

If stock markets are liquid and highly efficient, differences in risk should be the sole determinant of differences in expected return. However, there are other theories that allow for the existence of factor premia.

- 2. Behavioral biases:** If investors are not fully rational in their actions—allowing their decisions to be influenced by emotions and using rules of thumb to inform their decisions—behavioral biases can result. Extrapolation of past growth rates is one behavioral explanation for the value effect. Behavioral explanations for momentum include initial underreaction and subsequent overreaction to news. The disposition effect refers to a tendency to sell shares whose prices have increased, while holding on to

¹ A company's market cap is defined as the stock's price times the number of shares outstanding. As the share price rises or a company issues more shares (all else being equal), a company's weight in the index will increase.

stocks that have fallen in value, resulting in a herding behavior. Traditional risk-based explanations of the size effect consider smaller stocks to be fundamentally more risky than larger ones. However, a behavioral explanation posits that larger stocks are more familiar to investors due to the greater availability of information and analyst coverage, and therefore they require a lower expected return.

- 3. Structural impediments:** Market friction may result in pricing inefficiencies as investors are subject to different constraints such as, investment horizon and the ability to use leverage. Such a restriction is one rational for the existence of the low volatility premium. An institution seeking to increase performance outcomes when it is restricted to use leverage may choose to overweight riskier stocks as traditional pricing models suggest they will generate higher return outcomes. In the absence of leverage, low volatility stocks are unattractive in such models. Lottery effects are a behavioral explanation for the low volatility premium. Stocks exhibit unlimited upside potential, while downside is limited to the price of the stock. The skewed nature of these outcomes is exaggerated in more volatile stocks. Investors prize (and consequently overpay) for such outcomes.

An important consideration for long-term investors thinking of making an allocation to risk-premia strategies is the extent to which their investment beliefs provide a strong conviction for the existence and persistence of factor premia. Whereas individual factors have been rewarded over the long term, they can also underperform the broad market for prolonged periods. Factors typically display modest correlations with each other and can be combined to reduce the probability of extended periods of underperformance.

Cyclical and Defensive Factors

Factors may be categorized into Cyclical and Defensive types, depending on their sensitivity to the economic cycle. Value, Momentum and Size are considered cyclical as they are more sensitive to economic growth and investor risk appetite. Low Volatility and Quality are typically considered defensive that do well as investors become increasingly risk averse. Yield² factor exposure can enhance portfolio income. Yield is a hybrid factor; it is related to Value but beyond a certain point is an assessment of the probability of the company going bankrupt or staying solvent and continuing to pay a dividend. Multi-factor combinations of Yield and high Quality and/or Low Volatility can limit exposure to high yielding equities with poor fundamentals that have experienced large price declines and focus on gaining exposure to Defensive attributes.

Table 1. Performance of FTSE All-World Single Factor Indexes relative to FTSE All-World Index, US Market Cycles (December 2001 to December 2017)

Contraction			Expansion		
	Relative Returns	Volatility		Relative Returns	Volatility
Value	-0.7%	6.4%	Value	1.4%	2.7%
Size	2.5%	10.2%	Size	2.5%	4.6%
Quality	4.3%	5.0%	Quality	0.5%	2.0%
Low Volatility	2.0%	5.1%	Low Volatility	0.3%	2.7%
Yield	-0.9%	6.9%	Yield	1.2%	3.2%
Momentum	-1.1%	4.0%	Momentum	0.7%	1.8%
<i>Market Index</i>	-23.4%	30.3%	<i>Market Index</i>	11.8%	13.1%

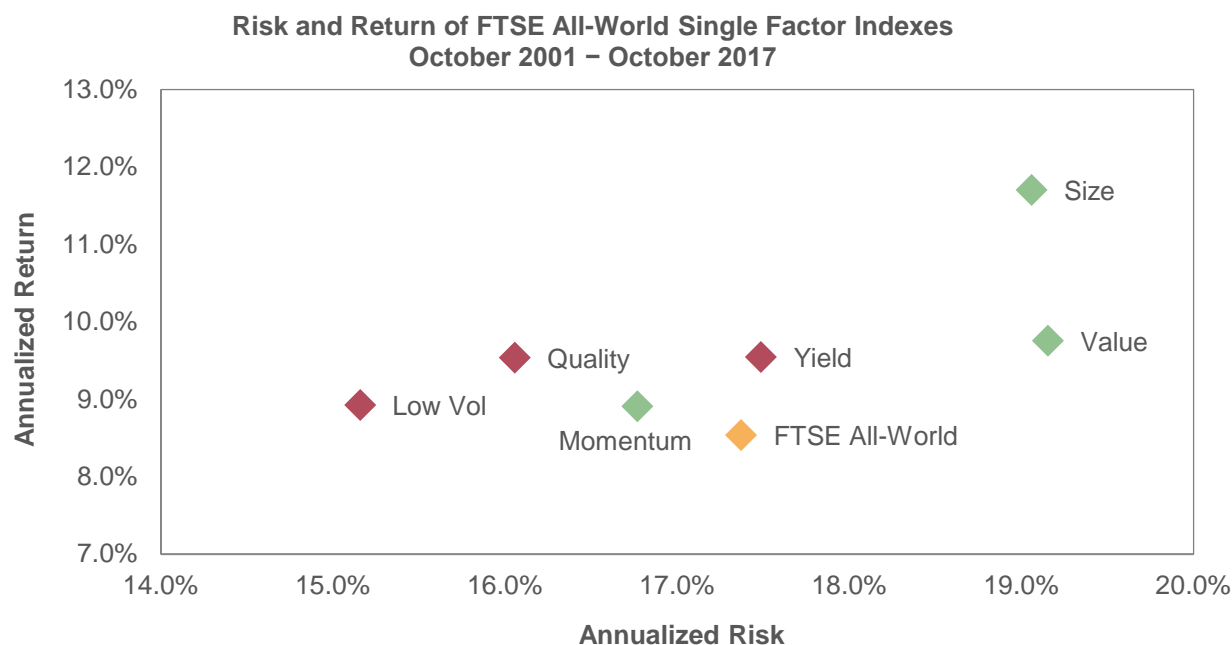
Sources: NBER data on US business cycles is used to define periods of contraction and expansion; FTSE Russell for index data. Data from December 2001 to December 2017. Table 1 shows the annualized total return to the FTSE All-World Index (Market Index). The Factor Index returns are relative to the market index. Past performance is no guarantee of future results. Returns shown prior to index launch reflect hypothetical historical performance. Please see the end for important legal disclosures.

² Yield is different from the other defensive factors and is typically highly correlated with Value. Expected dividend yield can be defined as the firm's cost of equity (risk-free rate plus risk premia) minus its growth rate in earnings and dividends. It is a proxy for the value of the firm and depends on estimates of growth in earnings and dividends and the risk to that growth. It is best seen as a proxy for equity carry.

To gain more insight in the sensitivity of individual factors to the economic cycle, we studied the average return of single factor indexes relative to the FTSE All-World® Index during periods of US business cycle contractions and expansions, as defined by the National Bureau of Economic Research (NBER). These contractions (recessions) are specified to start at the peak of a business cycle and end at the trough.³ The period covers December 2001 to December 2017 and includes the contraction during the global financial crisis (GFC). Table 1 shows the results. During periods of market contraction, the FTSE All-World Index averaged a -23.4% return; Defensive Quality and Low Volatility factor indexes outperformed the broad market index, while Momentum, Value and Yield factor indexes underperformed. In the market expansions following the Internet Bubble and the GFC, investors regained interest in more cyclical Value and Momentum factor attributes. Despite the positive correlation between Value and small-cap stocks, the pay-off to the FTSE All-World Size Factor Index remained constant across the business cycles. This may have been because of its greater weight in mid-cap stocks. The volatility of all factor index returns is substantially higher during periods of contraction.

In Graph 1, we show the risk/return properties of the FTSE All-World Single Factor Indexes between October 2001 and October 2017. The analysis confirms that Defensive (Cyclical) factor indexes have lower (higher) levels of annualized risk. The annualized return of Defensive factor indexes relative to Cyclical factor indexes is also typically lower.

Graph 1. FTSE All-World Single Factor Indexes

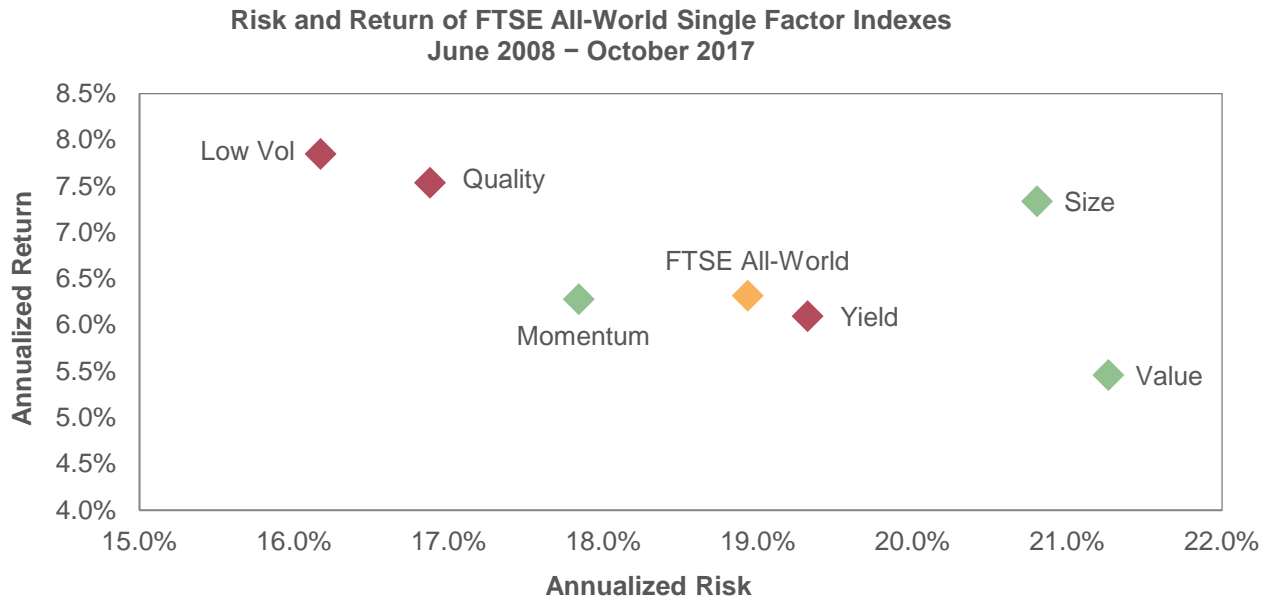


Source: FTSE Russell. Data from October 2001 to October 2017. Past performance is no guarantee of future results. Returns shown prior to index launch reflect hypothetical historical performance. Please see the end for important legal disclosures.

The GFC increased investor interest in downside protection: Low Volatility and Quality outperformed Value and Momentum between June 2008 and October 2017 (Graph 2). Size performed in line with the defensive factors, but with significantly higher levels of volatility. Value was the real laggard, with a negative active return and a 12.3% increase in risk relative to the FTSE All-World Index (Graph 3).

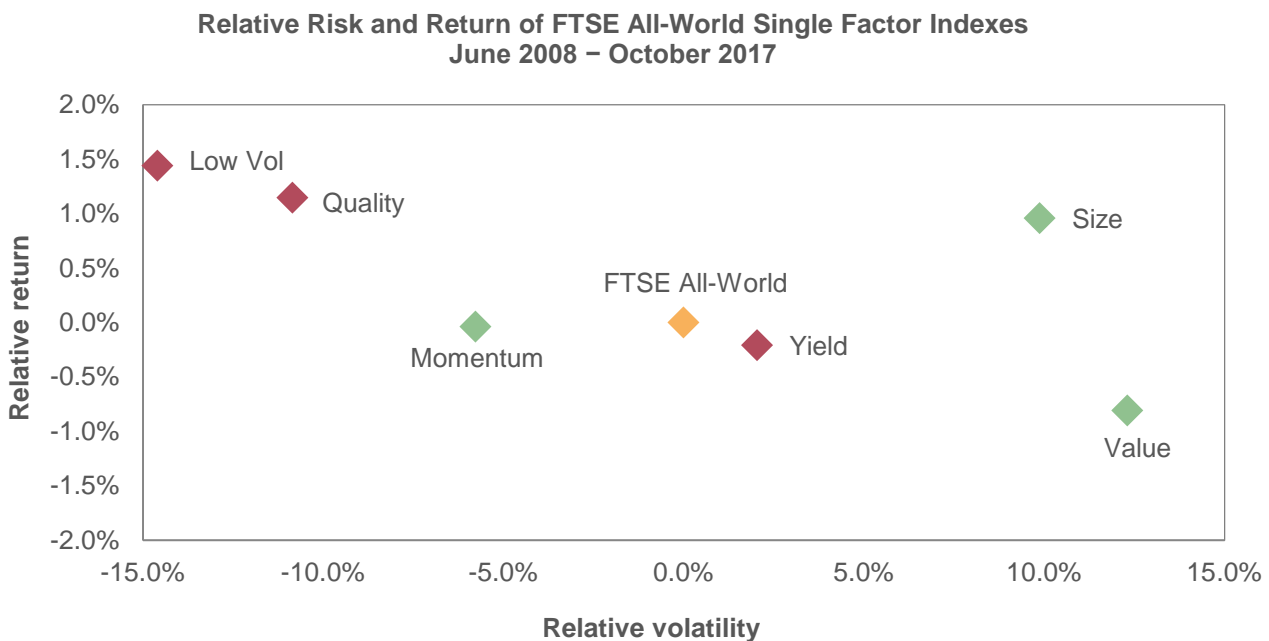
³ The US business cycle is used as a proxy for the global business cycle.

Graph 2. FTSE All-World Single Factor Indexes (since the Global Financial Crisis)



Source: FTSE Russell. Data from June 2008 to October 2017. Past performance is no guarantee of future results. Returns shown prior to index launch reflect hypothetical historical performance. Please see the end for important legal disclosures.

Graph 3. FTSE All-World Single Factor Indexes relative to FTSE All-World Index (since the Global Financial Crisis)



Source: FTSE Russell. Data from June 2008 to October 2017. Past performance is no guarantee of future results. Returns shown prior to index launch reflect hypothetical historical performance. Please see the end for important legal disclosures.

Investors can combine individual factors to target different outcomes with the appropriate expected risk/return profiles. Depending on the targeted outcome, factors may be combined to create diversified portfolios designed to perform in a range of market conditions.

Table 2. Targeted Multi-Factor Solutions

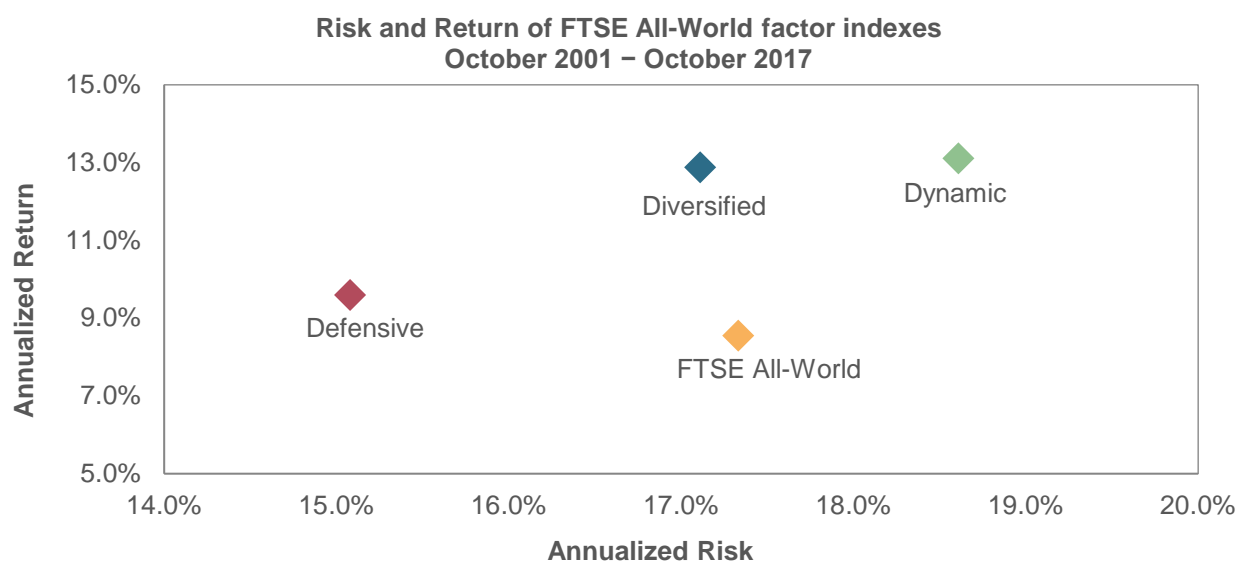
Defensive	Low Volatility	Quality			
Diversified	Low Volatility	Quality	Value	Size	
Dynamic			Value	Size	Momentum

Graph 4 shows the risk versus return trade-off for the FTSE All-World Index multi-factor combinations. Typically, an investor seeking to improve risk-adjusted returns with downside protection would favor the Defensive solution. The up (down) capture ratio shows the fraction of positive (negative) returns captured by the strategy. The Defensive factor combination typically offers relative capital protection during market downturns, but also tends to capture less of the market upside. It has the lowest absolute risk of the three multi-factor combinations. Maximum drawdown (MDD) is the maximum loss from peak to trough, before a new peak is attained. The Defensive solution has a relatively small drawdown. In short, its focus is on wealth preservation.

The Diversified solution seeks modest outperformance at market levels of absolute risk. On average, it has outperformed in both up and down markets as a result of its diversified properties. The beta of the Diversified strategy is 0.96 relative to 0.85 for the Defensive solution; in other words, it is more sensitive to market direction. The MDD is higher relative to the Defensive solution, but slightly lower than the benchmark index.

The Dynamic solution is more aggressive, with a higher return (and risk) objective. Its higher level of volatility result in larger drawdowns. A long-term investment horizon and strong governance are essential to realize the potential of more risky factor combinations.

Graph 4. FTSE All-World multi-factor indexes



Index	Annualized Return	Standard Deviation	Sharpe Ratio	Maximum Drawdown	Beta	Up-Capture Ratio	Down-Capture Ratio
Defensive	9.6%	15.1%	0.55	-42.0%	0.85	91.6%	83.1%
Diversified	12.9%	17.1%	0.67	-50.0%	0.96	102.7%	82.8%
Dynamic	13.1%	18.6%	0.63	-54.3%	1.04	112.1%	94.9%
FTSE All-World	8.5%	17.4%	0.41	-51.6%			

Source: FTSE Russell. Data from October 2001 to October 2017. Past performance is no guarantee of future results. Factor indexes are hypothetical and for illustrative purposes only. Please see the end for important legal disclosures.

II. Main Applications of Factor Investing for Institutional Investors

An active manager's excess returns may be generated via stock selection, factor rotation, sector rotation and top-down country allocation. True manager skill can be defined as the active return achieved in excess of the static factor premia.⁴ Factor investing can provide access to static factor exposure with improved levels of transparency, liquidity and at a lower cost.

A more relevant benchmark can help identify good managers. For example, a small-cap value manager's true active manager skill is the active return in excess of a benchmark with exposure to small-cap value stocks instead of the standard market-cap weighted index.

Factor investment strategies can help to achieve several investment objectives: enhance risk-adjusted returns, reduce portfolio volatility and enhance diversification.

Strategic investing tends to focus on improving relative risk-adjusted returns and to mitigate the performance volatility of any one single factor. Single factors may underperform the broad market for prolonged periods, but typically do not do so at the same time. Therefore, diversifying across factors has tended to deliver more stable outcomes.

Tactical investing exploits the cyclical nature of factors and dynamically allocates across them to reflect investment views.

Risk management aims to manage active aggregate factor exposure at the total portfolio (multi-manager) level and adjust it by dialing up or down the factor exposures (using a completion portfolio) to achieve the intended strategic levels of factor risk. The analysis of portfolios across factor dimensions allows investors to understand and control these risks.

III. Deploying Factor Allocations

A common problem for institutional investors is determining an appropriate factor combination. Investors need to recognize the role factor allocation may play in determining investment plan outcomes. An organization's investment objectives and constraints will typically drive the factor allocation decision.

A. Objectives and Constraints

The investment objective associated with a given allocation to factors needs to be clearly defined. Different investors will address different concerns via a factor approach. A pension fund may wish to use factors to target improvements in risk-adjusted performance relative to their current passive allocation. Other plans may be more concerned with market risk during volatile periods and seek a degree of downside protection. An additional objective may be to replicate the pay-offs of a style manager, like a small-cap value manager, via a factor allocation.

An important constraint is a plan's governance structure. Governance is a critical consideration, determining how much risk a plan can tolerate and its investment horizon. A plan with strong governance can often tolerate more downside risk and weather periods of underperformance in the belief that factor risks will ultimately be rewarded. The funding ratio of a pension fund will also impact its risk tolerance. A fund in deficit will require a more conservative factor allocation than a well-funded pension scheme.

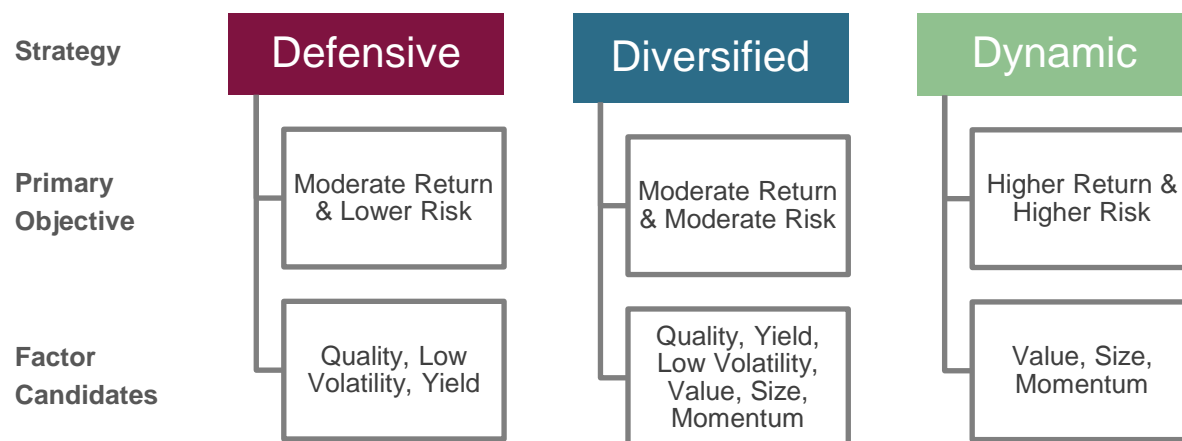
B. Factor Selection

The specific set of objectives and constraints will determine the appropriate factor allocation. It is important that an investor believes in the long-run persistence of factor risk premia. An investor looking to enhance risk-

⁴ Active Return = Static Factor Premia + Manager Skill (Factor Rotation + Stock Selection).

adjusted returns may seek a certain risk profile, and factor-investing can build relevant, outcome-oriented solutions. For example, the aim may be to have a strategy that offers a higher relative risk and return (Dynamic), or moderate risk and return (Diversified) or relatively low risk with moderate returns (Defensive). Figure 1 provides an overview of these options, including some FTSE Russell Index products designed to capture these outcomes. The FTSE Russell factor index framework permits an extensive degree of customization, spanning factor combinations, tracking error and turnover considerations.

Figure 1. Multi-Factor Solutions



FTSE Russell Multi-Factor Indexes: Targeted Factor Exposures

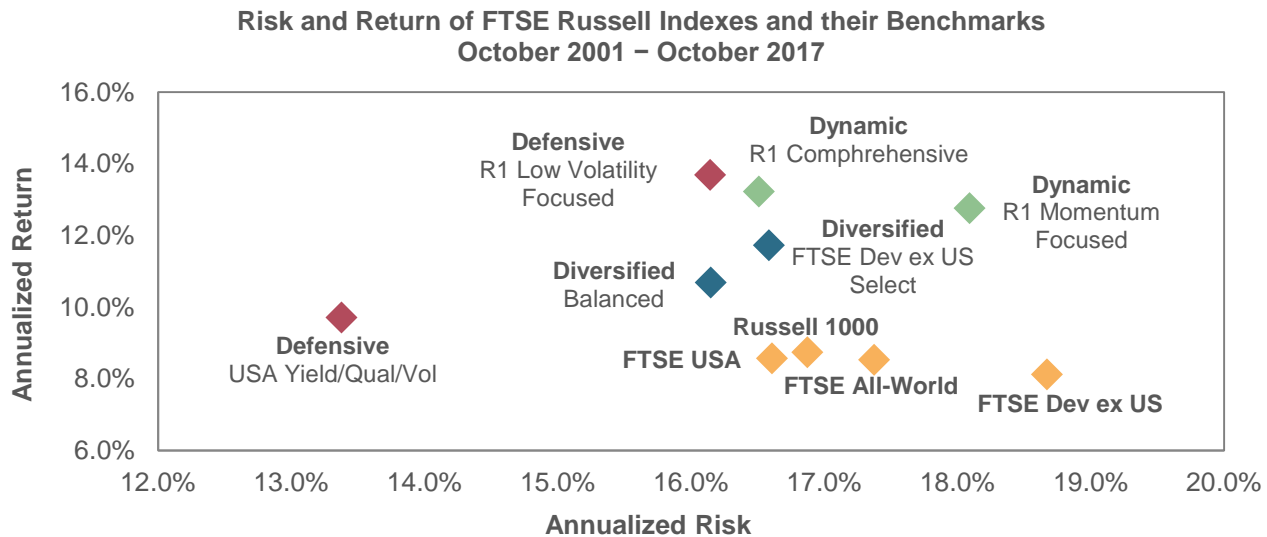
Index	Low Volatility	Quality	Yield	Size	Value	Momentum
FTSE USA Qual/Vol/Yield Factor	1	1	1	-	-	-
Russell 1000 Low Volatility Focused Factor	2	1	-	1	1	-
FTSE All-World Balanced Factor	1	1	-	1/4	1	-
FTSE Developed ex US Select Factor	1	1	-	1/2	1	1
Russell 1000 Comprehensive Factor	1	1	-	1	1	1
Russell 1000 Momentum Focused Factor	-	1	-	1	1	1

Source: FTSE Russell multi-factor index solutions target exposure to a subset of six factors: Low Volatility, Quality, Yield, Size, Value and Momentum. The number in the table reflects the strength of the factor exposure: numbers above (below) 1 provides a stronger (weaker) factor exposure relative to the other factors.

Graph 5 illustrates the characteristics of a sample of the FTSE Russell indexes. The FTSE USA Qual/Vol/Yield Factor 5% Capped Index is a genuinely defensive strategy. The up and downside capture ratios are both low, highlighting its defensive properties. The maximum drawdown is -34% versus -47% for the comparable benchmark. The Russell 1000[®] Low Volatility Focused Factor Index is also defensive in nature, with relatively low downside risk. However, it captures substantially more of the market upside, resulting in a beta of 0.92 versus 0.74 for the FTSE USA Qual/Vol/Yield Factor 5% Capped Index. Consequently, the improvement in MDD falls to -42% compared to -48% for its benchmark, the Russell 1000[®] Index.

The FTSE All-World Balanced Factor Index displayed a 2.2% p.a. outperformance compared to its benchmark, the FTSE All-World, with slightly lower levels of risk. The FTSE Developed ex US Select Factor Index achieved a higher Sharpe ratio resulting from improvements in return and reductions in risk compared to its benchmark the FTSE Developed ex US Index.

Graph 5. FTSE Russell Indexes Performance Characteristics



Index	Annualized Return	Standard Deviation	Sharpe Ratio	Maximum Drawdown	Beta	Up-Capture Ratio	Down-Capture Ratio
FTSE USA Qual/Vol/Yield Factor 5% Capped	9.7%	13.4%	0.62	-34.3%	0.74	83%	69%
Russell 1000 Low Volatility Focused Factor	13.7%	16.1%	0.76	-42.4%	0.92	101%	76%
FTSE All-World Balanced Factor	10.7%	16.1%	0.58	-45.9%	0.92	97%	86%
FTSE Developed ex US Select Factor	11.7%	16.6%	0.63	-48.8%	0.87	96%	80%
Russell 1000 Comprehensive Factor	13.2%	16.5%	0.72	-44.1%	0.95	103%	82%
Russell 1000 Momentum Focused Factor	12.8%	18.1%	0.63	-49.0%	1.04	110%	93%
FTSE USA	8.6%	16.6%	0.43	-47.3%			
Russell 1000	8.7%	16.9%	0.44	-48.1%			
FTSE All-World	8.5%	17.4%	0.41	-51.6%			
FTSE Developed ex US	8.1%	18.7%	0.36	-54.2%			

Source: FTSE Russell. Data from October 2001 to October 2017. Past performance is no guarantee of future results. Returns shown prior to index launch reflect hypothetical historical performance. Please see the end for important legal disclosures.

The Russell 1000 Comprehensive Factor Index captured more market upside over the period, with modest downside protection. Its market beta is 0.95 and MDD -44.1% versus -48.1% for the Russell 1000[®] Index. The Russell 1000 Momentum Focused Factor Index has exposure to Quality, Value, Size and Momentum factors. The negative correlation between the factors helps to diversify risk, though overall volatility is higher than the overall market. As an index representing a Dynamic strategy, it tends to outperform in up markets but provides little or no downside protection. This emphasizes the importance of understanding the desired risk-return profile and tolerance for absolute losses in market downturns.

C. Implementation

Once the set of desired factors has been determined, the final question for investors is how should the factors be implemented into an investment strategy? How can one ensure consistent exposure to the chosen factors is achieved? There are important trade-offs to be made during the implementation phase in order to achieve a diversified exposure to the target set of factors and to diversify away idiosyncratic risk.

IV. Key Implementation Decisions

A. Tracking Error, Diversification and Factor Exposure

There is a direct relationship between the level of factor exposure, expected tracking error and expected performance. Increasing levels of factor exposure will lead to more active risk in a portfolio. The analogy is similar to an active equity manager making selections that are further away from the benchmark, resulting in increased tracking error.

For a well-diversified portfolio, the relationship between active factor exposure, expected return and tracking error is approximately linear. Therefore the contribution to information ratio (the active return over tracking error) of a particular factor remains relatively unchanged as exposure varies. Once the relative magnitudes of factor exposures are determined, this will define the information ratio leaving investors to choose an appropriate level of tracking error (or expected outperformance) by varying their magnitude. It is crucial to achieve the desired factor exposure, while maintaining appropriate levels of stock-weight diversification to ensure factor pay-offs are not subsumed by idiosyncratic risk. Therefore, portfolio construction techniques that efficiently incorporate the factor exposure versus diversification trade-off are critical. Finally, an investor may want to impose country and sector constraints that will impact the outcomes. Transparency regarding the interaction of constraints is critically important.

B. Turnover

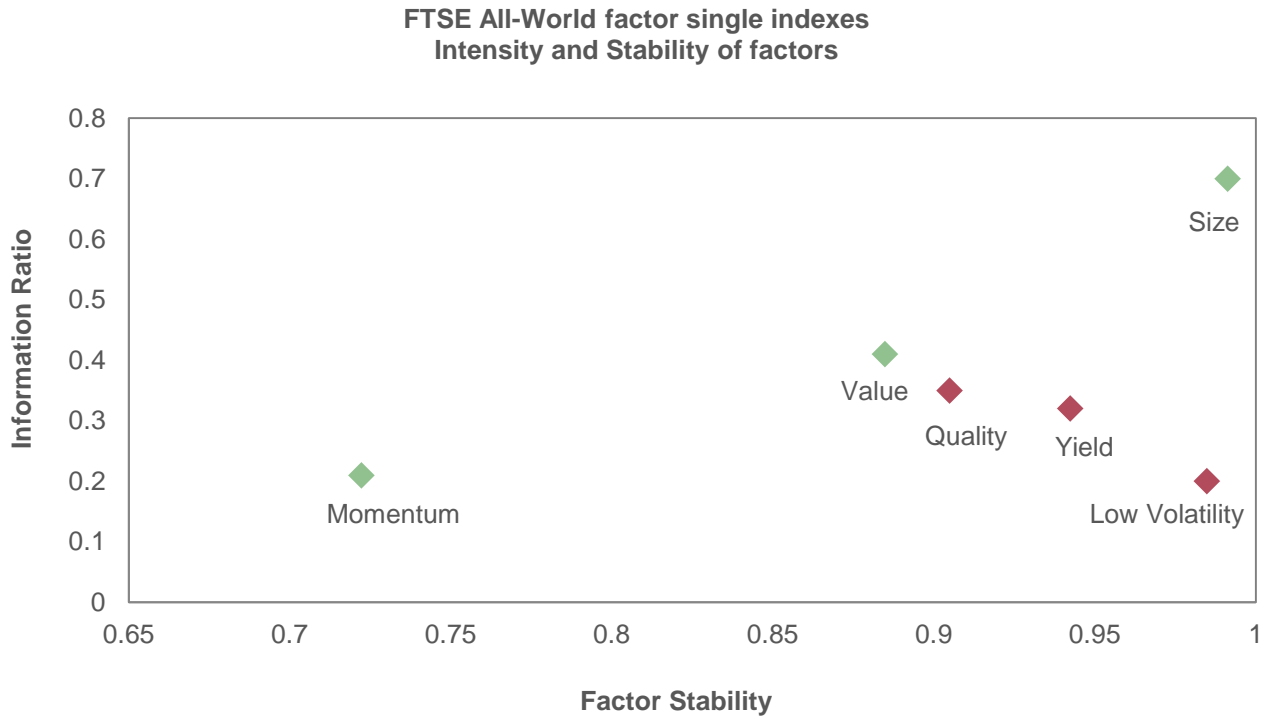
A large fund may want to limit turnover. This will impact the choice of factors. Momentum, driven by a stock's price, typically has less stable exposure and needs to be rebalanced more often, increasing the turnover. Factors calculated using balance-sheet data in combination with stock price will show an intermediate speed of decay, while a pure financial statement-based factor, like Quality, will need less rebalancing to preserve factor exposure and capture any associated risk premium. The stability of factor exposures is further analyzed in the next section.

C. Factor Intensity versus Factor Stability

Individual factors have different characteristics in terms of their reward and the longevity or persistence of the signal. In this section, we measure reward or intensity as the information ratio. Factor stability is defined as the average cross-sectional correlation between the factor scores at month-end and three months later. High factor stability indicates that factor scores persist.

Graph 6 shows the intensity and stability characteristics of the hypothetical FTSE All-World single factor indexes, measured between December 2001 and November 2017. As expected, Momentum displays low levels of factor stability: the signal dissipates relatively fast. The consequence is that in order to maintain Momentum exposure, higher turnover relative to a factor with greater longevity is required. Over the specified period, the information ratio was also low. Size is a highly stable factor, with a high information ratio. The defensive factors Quality, Yield and Low Volatility have a long life span, but their intensity is low relative to the dynamic factors such as Value and, in particular, Size.

Graph 6. Factor Intensity versus Factor Stability (December 2001 to November 2017)



Source: FTSE Russell. Data from December 2001 to November 2017. Past performance is no guarantee of future results. Factor indexes are hypothetical and for illustrative purposes only. Please see the end for important legal disclosures.

D. Investability

Investability is a constraint: a large investor will require greater capacity than a small asset owner, with implications for factor choice and desired levels of factor exposure. The funding ratio of a pension fund will also be a deciding factor in the desire to limit risk.

Portfolio concentration can become a problem for institutional investors allocating a considerable amount to factor strategies. It is important the construction approach leaves investors with the choice and the flexibility to determine the desired trade-off between exposure and diversification. Intentional exposure to the Size factor can be incorporated to enhance diversification. It is important to be aware of the difference between unintentional Size exposure, often observed in top-down models due to the weighting scheme employed in the underlying single factor indexes, and integrating a Size component directly and intentionally in a bottom-up approach.

V. Product Evaluation Criteria: Understanding the Construction Methodology

Graph 7. Product Evaluation Criteria



Graph 7. Once the factor mix is decided, the multi-factor construction methodology needs to be evaluated. The product evaluation criteria highlight the trade-offs an investor needs to take into consideration.

A. Target and Off-target Exposures

Once the appropriate factor mix is determined, exposure to the target factors must be realized.⁵ This sounds simple, but is actually quite complicated given factors are both positively and negatively correlated to each another. For example, Value and Momentum are negatively correlated: an undervalued stock typically has low Momentum and vice versa. The successful integration of multiple factors into a portfolio relies on the robustness of the investment process.

Two types of portfolio construction or investment process can be distinguished: top-down and bottom-up. A top-down approach creates single-factor portfolios and combines them to obtain a multi-factor portfolio. Conversely, a bottom-up approach applies an integrated approach to delivering portfolio factor exposure in a single step. In general, the additional transparency of a top-down approach results in relatively weak factor exposures and provides a less efficient trade-off between factor exposure, tracking error, investment capacity and diversification.

Having navigated the process of selecting a set of factors that complements the asset allocation decision and investment objectives, it is particularly important to limit or avoid exposure to off-target factors. Top-down approaches, especially those employing diversified weighting schemes, typically introduce a substantial and unspecified size bias. Proponents of a top-down approach often claim the resulting portfolio is more

⁵ Ex-ante factor exposure analysis may be conducted using holdings-based portfolio analysis. Ex-post, holdings-based or returns-based analysis of realized index returns on realized factor returns can also be applied to measure realized factor exposures.

diversified compared to a portfolio constructed using a bottom-up approach. It is important to note this diversification is a result of unintentional Size exposure, which reduces portfolio concentration.

A bottom-up approach can incorporate a Size component directly and intentionally, leaving the investor with the choice and the flexibility to determine the desired trade-offs between exposure and diversification.

A common misconception with a bottom-up portfolio is that it is concentrated relative to a top-down portfolio. However, if we compare on a like-for-like basis after matching factor exposures, bottom-up approaches show greater levels of diversification compared to top-down approaches [4].

More generally the whole premise of combining “single factor” portfolios in a top-down approach is somewhat undermined if the said portfolios do not in fact represent strictly single factor allocations. Under these conditions, the perceived advantage of transparency of factor allocation and performance attribution of a top-down approach falls apart. The bottom-up approach is more consistent in this respect.

FTSE Russell Factor Tilting

For these reasons, FTSE Russell employs a bottom-up (or “tilting”) approach to create factor indexes [5]. The method begins with a set of weights that are modified by multiplying them by stock and factor specific scores which range from 0 to 1: high factor scores are given for stocks with large factor values and close-to-zero scores for stocks with the smallest factor values. This approach means that stocks are weighted in consideration of all their factor characteristics simultaneously.

B. Stability of Target Exposure

The exposure to target factors should be stable over time and not display significant decay or deterioration between index rebalances. Since the objective is to harvest the factor risk premia, a necessary condition for success is to hold a consistent exposure to the factors the investor believes will be rewarded.

C. Flexible Approach

A firm’s investment objectives, constraints in terms of risk tolerance, investment horizon and investment board governance are unique. This will lead to different preferences over factors, levels of exposure and sensitivity to investment capacity, concentration and turnover. Investors need to be observant of models and approaches that are regularly adjusted to meet with varying and changing needs. A good approach should be flexible, and be able to incorporate the desired trade-offs and investor preferences in a transparent, consistent and robust manner.

D. Sustainable Investor Preferences

Whether the objective is to mitigate long-term risk from exposure to climate change or engage in societal good, the demand to incorporate environmental, social and corporate governance (ESG) considerations, such as reducing carbon footprints, within a factor framework is growing steadily. When integrating ESG, carbon and factor considerations, each objective may pull the portfolio in a different direction. For example, while oil stocks may look cheap at a given point in time, the same stocks will frequently score poorly in terms of carbon emissions and reserves. Investors should ensure they understand the interactions and trade-offs between factors, ESG and carbon considerations, and the implications for the investment process.

E. Live Track Records

No one has ever seen a bad back-test. It is important to examine the live track record of a factor index and review its sources of performance. It is critical to ensure that performance sources are consistent with an index’s espoused objectives and not the fortuitous result of reward from accidental off-target factor exposures. A holdings- or returns-based analysis in addition to formal performance attribution techniques can be applied to assess different products and form conclusions concerning the robustness of the investment process.

F. The European Union's Benchmark Regulation (EU BMR)

From January 1, 2018, the European Union's Benchmark Regulation introduces a common regulatory framework [6]. This framework is designed to ensure the accuracy and integrity of indexes used as benchmarks in the EU and contributes to the proper functioning of the internal market while achieving a high level of consumer and investor protection. Under the EU BMR, only benchmarks that are provided by EU-based administrators, or non-EU administrators satisfying certain requirements, who have been granted authorization or registration under the EU BMR and therefore appear on ESMA's register, may be used by supervised entities within the EU.⁶ In addition, sanctions can be applied to benchmark administrators for non-compliance with the regulation.

Market participants using indexes to create financial instruments or contracts or measure the performance of or determine asset allocation, their investment funds should consider whether the index provider has applied to be an administrator under EU BMR.

Conclusion

Investors of large pension funds or insurance companies and other clients of asset owners should care about factors. Market-cap indexes, while having desirable properties, provide exposure to unrewarded factor risks, and assign increased weights to relatively large, high-momentum and overvalued stocks.

Factors are well documented by academics as being systematic drivers of portfolio risk and return. A more recent offering is the introduction of smart beta or factor investing techniques into the asset allocation framework of many institutional investors. This approach aims to identify combinations of rewarded investment risk factors which may be capable of improving levels of portfolio diversification, generate incremental performance relative to traditional market-cap indexes and /or reduce risk. Factor allocation should be part of an overall asset allocation decision.

Asset owners can target specific portfolio outcomes with different combinations of factors. Depending on the investment objective, Cyclical and Defensive factors may be combined to create more diversified portfolios that can perform relatively well during a range of market conditions. A Defensive portfolio will focus on providing a degree of downside protection, a Diversified portfolio will aim to achieve a modest risk-adjusted relative performance, and a Dynamic portfolio will target a higher active return with potentially higher drawdowns.

Asset-allocation governance plays an important role in deciding the correct strategy. Strong asset-allocation governance often implies a greater robustness to and tolerance for downside risk and consequently the ability to manage periods of underperformance, in expectation of the rewards for long-run exposure to factor risk.

Asset owners' investment objectives, constraints, investment horizon and governance are unique. This leads to different preferences for factor exposure versus capacity, concentration and turnover. A coherent approach should be able to incorporate the desired trade-offs in a transparent, consistent and robust manner without compromising the investment process. It should also be sufficiently flexible to incorporate investor preferences regarding sustainability without diluting factor exposures.

Once the process of identifying the desired factor combination that complements an investor's overall investment strategy is complete, it is important that it delivers its objectives. Investors need to examine the sources of performance and whether they are the result of intended and agreed upon factor exposure or

⁶ Under the EU BMR, only the following types of benchmarks may be used by supervised entities within the European Union:
(1) Benchmarks that are provided by EU-based administrators who have been granted authorization or registration under the EU BMR and who are identified on the register to be maintained by the European Securities and Markets Association (ESMA).
(2) Benchmarks that have been entered onto the ESMA register which are provided by third country administrators who have either satisfied the requirements for equivalence; or acquired recognition under the EU BMR; or successfully sought endorsement from an EU-authorized or registered administrator or other supervised entity for specific benchmarks.

unintended side effects. Realized factor exposure can be measured through holdings-based or returns-based analysis or formal performance attribution techniques and used to confirm if the investment process is robust and can deliver upon an agreed set of investment objectives.

Finally, index users should consider whether their index provider is addressing EU BMR compliance and their provider and/or benchmark appears on ESMA's register.

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