PENSIONS AND
LIFETIME SAVINGS
ASSOCIATION

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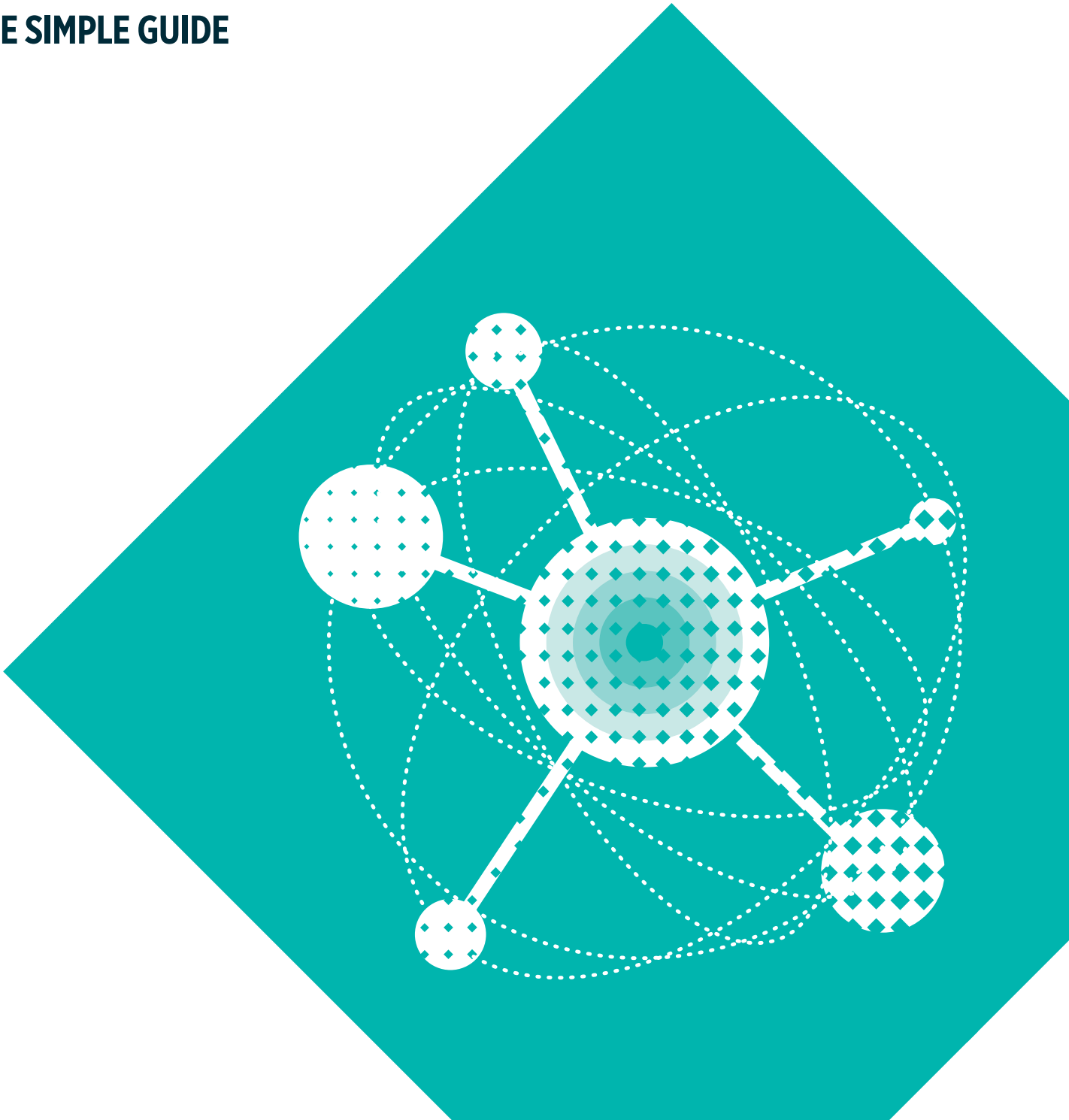
FACTOR INVESTING

MADE SIMPLE GUIDE



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FOREWORD

ACADEMIC RESEARCH AND MANY YEARS OF PRACTICE HAVE SHOWN THAT FACTOR-BASED INVESTMENT APPROACHES CAN HELP TO SIGNIFICANTLY IMPROVE THE PROFILE OF A PORTFOLIO, FOR EXAMPLE BY REDUCING DOWNSIDE RISK OR ENHANCING LONG-TERM RETURNS AT POTENTIALLY LOWER COSTS.

This guide is intended to help you become more familiar with factor investing. It provides an insight into the extensive academic research supporting the existence of factor premiums and explains how these premiums can be harvested in practice. It also outlines a number of concrete steps to successfully incorporate factor strategies in your portfolio. We trust it will be a useful tool on which to base discussions with your trustee boards, consultant and asset managers.

Peter Walsh, Head of Robeco UK.

THIS GUIDE IS INTENDED TO HELP YOU BECOME MORE FAMILIAR WITH FACTOR INVESTING

1 INTRODUCTION

THE CONCEPT OF FACTOR INVESTING IS BASED ON THE EXISTENCE OF VARIOUS ACADEMICALLY-DOCUMENTED FACTOR PREMIUMS, WHICH CAN BE SYSTEMATICALLY HARVESTED IN ORDER TO ACHIEVE HIGHER RISK-ADJUSTED RETURNS AND BETTER DIVERSIFICATION THAN TRADITIONAL MARKET CAP-WEIGHTED INDEXES AT POTENTIALLY LOWER COSTS.

Although the empirical foundations of factor investing were laid over 40 years ago, the real breakthrough came in 2009, after the publication of a research report *Evaluation of Active Management of the Norwegian Government Pension Fund – Global* by professors Andrew Ang, William Goetzmann and Stephen Schaefer. Their paper analysed the performance of one of the world's largest sovereign wealth funds, which invests Norwegian oil revenues, after it suffered heavy losses during the global financial crisis of 2008.

The authors showed that the added value of the fund's active management did not reflect true skill, but could in fact be explained by implicit exposure to a number of systematic factors. They recommended the adoption of a factor investing approach as a solution.

Factor investing is a subject which is receiving increased attention from pension funds and their trustee boards given the focus on transparency of costs and value for money.

This guide is intended to explain what factor investing is and how factor-based solutions can help pension funds improve the risk-return profile of their portfolios. It highlights some of the practical issues relating to the selection, implementation and ongoing governance considerations.

The guide examines the sources of factor premiums, focusing specifically on five key market anomalies: value, momentum, quality, low-volatility and size[1]. It also discusses a series of practical steps pension funds can take to successfully implement factors in their portfolios.

1 Despite the number of studies documenting a size effect, it still remains controversial among academics and asset managers if this can be considered a factor or not within equities.

2 WHAT IS FACTOR INVESTING?

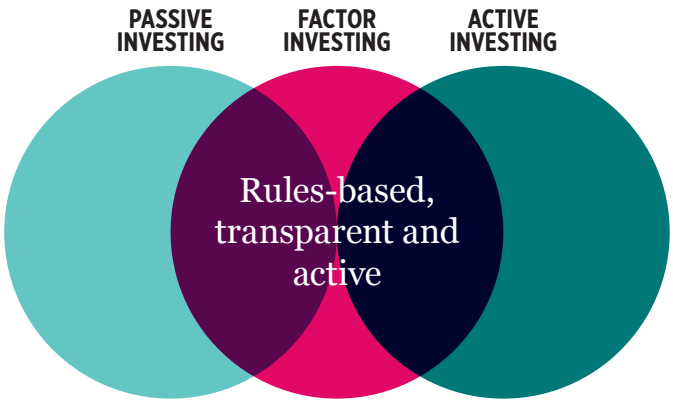
Factor investing – applying a top-down approach to capture a factor or style premium in a systematic way.

FACTOR INVESTING IS BASED ON THE EXISTENCE OF A NUMBER OF FACTOR PREMIUMS THAT CAN BE SYSTEMATICALLY EXPLOITED. AS A RESULT, FACTOR INVESTING IS OFTEN DESCRIBED AS A THIRD ALTERNATIVE TO PURELY PASSIVE, MARKET INDEX-FOLLOWING STRATEGIES AND TRADITIONAL ACTIVE MANAGEMENT.

Passive market-cap weighted portfolios do not discriminate between attractive and unattractive assets. There is extensive evidence in the literature demonstrating that the expected performance of securities with certain characteristics is lower, while other characteristics are rewarded with higher returns. Meanwhile, active management also has its drawbacks, such as a lack of transparency and higher fees. Moreover, as concluded in the aforementioned report for the Norwegian Government Pension Fund, most of the value that active management adds does not reflect true skill, but can be explained by implicit exposures to factors.

Factor investing aims to offer higher risk-adjusted returns and better diversification than passive investing, while at the same time it provides a better degree of transparency at lower costs than traditional active management.

Figure 1: Investment styles



SOURCES OF FACTOR-BASED OPPORTUNITIES

The origins of factor investing date back to the 1970s, when academic researchers began to challenge the prevailing assumptions of the Capital Asset Pricing Model (CAPM) and the Efficient Market Hypothesis (EMH). These financial theories presume that markets are efficient and that investors are rational.

According to the EMH, it is impossible to consistently 'beat' the market index because all participants are rational and always have access to relevant information, to which they react instantaneously. The theory also assumes that portfolio changes incur no costs and that participants are not subject to any limitations on what they can trade and hold in their portfolios.

The theory further claims that, as a result of this, securities always trade at their fair value, making it impossible for investors to either purchase undervalued stocks or sell stocks at inflated prices. As a result, markets always ensure the most efficient allocation of capital.

In practice, however, market participants do not all receive or react to information simultaneously, and they do not always act rationally. Persistent and significant inefficiencies do exist and these form the basis of factor premiums that can be exploited systematically.

WHAT MAKES A FACTOR PREMIUM?

There are many competing strategies in the market claiming to be factor-based, however, not all prove efficient in capturing premiums. One fundamental issue for investors is targeting the most relevant factors. Premiums that represent a real and persistent opportunity to improve risk-adjusted returns should fulfil the following requirements:

- **Performing** Show strong premium with superior risk-adjusted returns
- **Proven** Withstood attempts for falsification within academia
- **Persistent** Observable in different markets, stable over time, robust to different definitions
- **Explainable** Have an economic rationale with strong academic underpinnings
- **Executable** Implementable in practice; e.g. survive after trading costs and other market frictions

These criteria can be used to determine which premiums are actually factors and which are not. Over time, hundreds of different premiums have been documented in the academic literature, but only a handful are worth exploiting once all of the above elements have been taken into consideration.

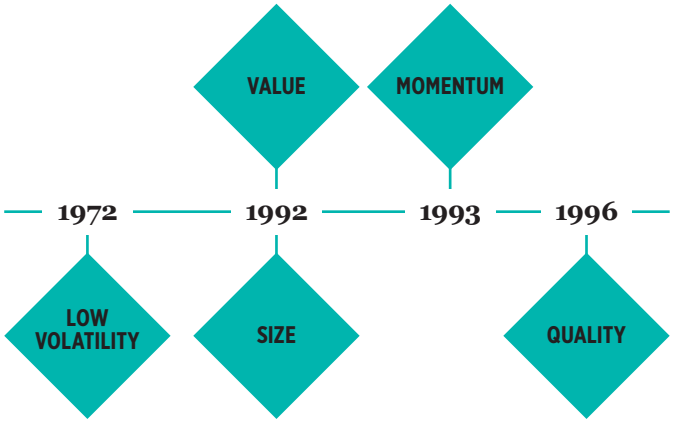
3 COMMONLY-TARGETED FACTORS

ALTHOUGH THE CONCEPT OF FACTOR-BASED ALLOCATION HAS ONLY RECENTLY BEEN GAINING TRACTION, OVER THE PAST FOUR DECADES ACADEMICS HAVE IDENTIFIED AND DOCUMENTED NUMEROUS FACTORS. THIS GUIDE FOCUSES ON FIVE OF THE MOST WELL-ESTABLISHED FACTORS.

- Low-risk, or low-volatility, was first documented in the academic literature in 1972. At the time, a study by Robert Haugen and James Heins showed that low-beta stocks in the United States outperformed in the period 1929-1971.
- Value is one of the oldest investment approaches in the world, for which Benjamin Graham and David Dodd laid the intellectual foundations in the 1930s. In 1992 Eugene Fama and his fellow researcher Kenneth French published the first academic study documenting the existence of the value premium.
- Size was also described by future Nobel Prize-winner Eugene Fama and Kenneth French in 1992 in their influential three-factor model. Despite the number of studies documenting a size effect, this premium still remains controversial among academics and asset managers.
- Momentum was first proposed and documented by Narasimhan Jegadeesh and Sheridan Titman in 1993.
- Quality, as measured by the profitability of a firm (Sloan, 1996), its accruals (Novy-Marx, 2013) or its investments (Fama & French, 2015) is strongly advocated by many academics.

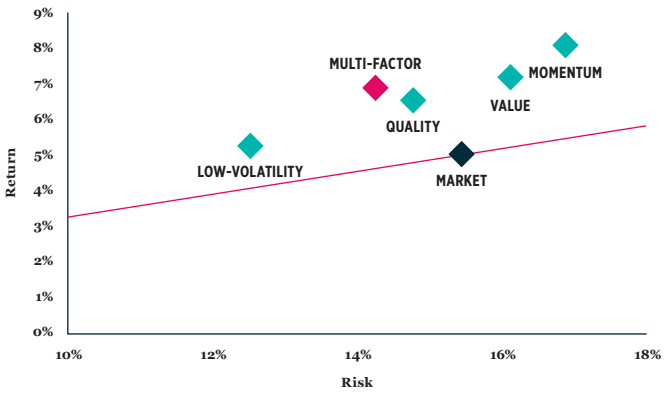
The next section will go into further details on each of these factors.

Figure 2: A brief history of factor premiums in equity markets



All these factors have been shown to generate significant and persistent premiums over long time periods. The chart below illustrates how these equity factors have delivered better risk-adjusted returns than a market portfolio, sometimes with lower risk (quality and low-volatility) and in other cases higher risk (value and momentum). Size has not been mentioned here because of questionable persistency.

Figure 3: The historical performance of equity factors



Source: Performance figures for generic US value-weighted factor portfolios from 1963:07 to 2014:12 from Blitz (2015), "Factor Investing Revisited", Journal of Index Investing. Quality is defined as the equal weighted combination of the Profitability and Investment factor portfolios.

PROVEN FACTORS

Value

The value effect is the tendency for securities that are inexpensive compared to their intrinsic value to generate above-market returns.

Value investing focuses on buying securities that are cheap relative to their intrinsic value. This can be measured by comparing the market value of a security with its fundamentals, for example the book value of a company or its discounted expected cash flows.

FACTOR INVESTING CAN HAVE LIMITATIONS, ALL OF WHICH CAN BE OVERCOME WITH THE RIGHT APPROACH TO IMPLEMENTATION

Fama & French published the first academic study documenting the existence of the value premium in 1992. This phenomenon has since then been confirmed in numerous studies. The value effect is persistent and has been found in many markets across the globe.

Momentum

> ***The momentum premium is the tendency for securities that have performed well in the recent past to continue to perform well; and for those that have performed poorly to continue to perform poorly.***

A momentum investment approach looks for securities with the highest recent return, for example over the past 6 to 12 months, while avoiding those that have performed poorly over the same period.

The momentum effect was first documented in the early 1990s, and has also been confirmed in numerous subsequent studies. It is persistent and has been found to exist even for the most liquid securities. There are different opinions as to why the momentum effect exists. Some interpretations attribute this factor to the mispricing that occurs when investors over- or under-react to financial news.

Low-volatility

> ***The low-volatility effect is the finding that securities that generate relatively stable returns tend to suffer less in down markets and achieve higher risk-adjusted returns over the longer term.***

Low-volatility investing is selecting securities that generate more stable returns than the broader market, in order to achieve higher returns over a longer investment horizon.

The low-volatility effect was first noticed in the 1970s, when it was discovered that low-beta stocks in the United States had outperformed in the period 1929-1971. Further research showed this was not only the case for low-beta securities but also for those with low-volatility (the standard deviation of returns) in many different geographic regions.

This anomaly can be explained by the rational behaviour of many professional investors (caused by incentives, market structure and regulation), and by behavioural finance (irrational behaviour of market participants). For example, fund managers may be ready to overpay for high-beta stocks as they chase their short-term incentives. Meanwhile, many market participants only act on a fraction of the information available to them and tend to focus too much on news relating to high-risk stocks.

Quality

> ***The quality effect illustrates the tendency of high-quality securities – as measured by the profitability of a company, its accruals or its investment policy, for example – to outperform low-quality ones.***

Quality companies are typically those that are highly profitable, have high earnings quality and are conservatively managed. But other characteristics, such as safety and growth, can also be associated with the quality factor. In fact, the quality factor is much broader in scope than the other factors discussed above.

Quality is one of the newest factors to be researched, defined by Sloane (1996), Novy-Marx (2013), and Fama & French (2015).

Size

> ***The size effect recognises that the securities of smaller companies tend to outperform larger companies over the long term.***

In equity markets the size effect, despite various studies documenting it, still remains controversial among academics, as it has been found to be positive at certain times but not at others.

The reason for the size effect is that the coverage of smaller companies is lower – only the largest research firms and investors analyse them to determine their value, and even if a firm does research them they will usually dedicate fewer analysts to them as the perceived opportunity is lower, given the company's relatively small size.

While the size effect, as mentioned earlier, has not been shown to be persistent over time in equities, each of the other equity factor premiums is actually stronger among smaller companies. This means that a portfolio which explicitly seeks factor exposures may well have a bias towards smaller companies, even if it is not explicitly seeking the size factor premium.

DO FACTORS MEAN ADDITIONAL RISK?

Risk premiums (equity risk, interest rate risk, credit risk, etc.) are the basic building blocks of investment markets. Risk premiums reward investors for taking risk. Factor premiums, in contrast, result from the way markets operate, rather than the underlying economy. As factors stem from behavioural biases in markets, they can be very deeply embedded.

Factor investing does not require investors to take more risk to get better returns. But it does result in a diverse portfolio with the factor approach altering weights between securities, rather than excluding them altogether. Indeed, some factors, such as low-volatility, look to explicitly weight the portfolio towards lower-risk securities on the basis that these tend to be undervalued by the market. This approach has lower absolute risk than a passive index and yet achieves similar returns.

Factor investing can have limitations, all of which can be overcome with the right approach to implementation. Capturing these factors and putting theory into practice requires a well-thought-through approach to harvest them in an optimal way. The table below outlines some of the considerations to take into account and the subsequent solutions to them.

Implemented correctly, factor-based solutions can help to significantly improve the profile of a portfolio, for example by reducing downside risk or enhancing long-term returns at lower costs.

	CONSIDERATIONS	SOLUTIONS
VALUE	Some stocks are cheap for a reason (value trap)	Avoid value companies with high distress risk, e.g. companies facing serious financial difficulties, and select value companies with low distress risk
MOMENTUM	Momentum offers above-average returns in the long run, but when approached too generically, can be sensitive to short-term trend reversals and higher turnover	Select stocks that have performed well due to their individual stock specific characteristics rather than those that have risen because they are highly geared towards a strongly performing market. Avoid unnecessary transactions
LOW-VOLATILITY	A generic low-volatility approach typically selects stocks based on just one single backward-looking risk measure, such as volatility or beta, making it more vulnerable to sharp market turns	Take forward-looking risk measures into account when selecting low-volatility stocks, and integrate the valuation and momentum factor to help select the most attractive ones
QUALITY	Generic approaches tend to be suboptimal due to their use of poor definitions of quality, which can lead to overpaying for high quality companies	Rely on thoroughly researched and proven quality definitions, also taking valuation of companies into account to help select the most attractive ones
SIZE	In equity markets the size effect has been found to be positive at certain times, but not at others. Timing factors introduces a new layer of risk without the evidence that it adds value over time	Equity factor premiums are actually stronger among smaller companies. A portfolio which explicitly seeks factor exposures will tend to have a bias towards smaller companies, even if it is not explicitly seeking the size factor premium

4 IMPLEMENTATION WITHIN A PENSION SCHEME FRAMEWORK

HAVING DISCUSSED THE BENEFITS OF FACTOR INVESTING AND THE FACTORS THEMSELVES, WE NOW TURN TO HOW TO IMPLEMENT A FACTOR-BASED PORTFOLIO IN PRACTICE.

Five key steps have been identified to help implement a factor-based approach as part of a pension scheme's investment strategy.

1. Understand the concept of factor investing

To determine if factor investing is the appropriate way forward, it is important to understand the major empirical findings on which it is based and form investment beliefs and goals. These should focus on the risks you are comfortable with and the role of factor investing in meeting your objectives. This will help to formulate your approach to factor investing, and set out your objectives and governance processes.

2. Assess current factor exposures in your portfolio

The next step is to assess the factor exposures that exist in your current portfolio and take advantage of the opportunity to address any issues. Use factor-based strategies to address any imbalances, and consider removing active managers whose performance is largely dependent on factor premiums, replacing them at lower cost.

3. Determine the right factors for your portfolio

When considering an allocation to factors, it is important not only to look at the individual factors but also to assess how they work in combination. There are several reasons for this. An important one is that key factor premiums can go against each other. For example, cheap stocks (value) can be unattractive from a momentum perspective.

As research shows that timing factors doesn't add value longer-term, and factors can be out of favour for longer periods – such as the value premium over the past couple of years – it is important to create a robust portfolio diversified across different factor premiums.

4. Implementation

A factor equity approach can be implemented in two ways.

Factor tilting – adding one or several factors to your current portfolio.

Depending on preferences and goals, one or several factors can be added to your existing portfolio to deliver a specific outcome. For example, if a pension scheme primarily targets funding-ratio stability, a higher allocation to low-volatility could be the way forward, in order to reduce downside risk and increase the Sharpe ratio. Momentum could prove to be the desired factor when looking to improve investment returns.

Factor optimisation – replacing a part of your portfolio with a multi-factor approach.

While some pension schemes may only be looking to reduce downside risk in their overall portfolio, others may be ready to fully embrace factor investing to capture the many benefits it can deliver. Implementing a multi-factor approach will achieve higher risk-adjusted returns and better diversification than traditional market cap-weighted approaches. This offers the most optimal solution to capture factor premiums in a consistent way.

5. Ongoing monitoring and review

Your factor exposure will shift over time. Regular assessment is required in conjunction with corrective action to return to the desired level of factor exposure. This may be an annual process, forming part of the Statement of Investment Principles review. Regular monitoring of your current factor exposures will ensure the portfolio is always in a position to capture the maximum outperformance potential that factors offer.

Over time, different factors will underperform. You need to establish whether this is because the persistence of the factor has eroded, or because the market has been through a period during which it was under-rewarded. Conversely, have new factors been identified that could be relevant for your portfolio?

FACTOR-BASED INVESTING IS OFTEN CONSIDERED AS AN ALTERNATIVE TO PASSIVE STRATEGIES AND ACTIVE MANAGEMENT

PRACTICAL CONSIDERATIONS

As previously stated, factor-based investing is often considered as an alternative to passive strategies and active management. Targeting academically-documented market inefficiencies in a systematic way enables investors to achieve better risk-adjusted returns than classic cap-weighted market indices, often at a significantly lower cost than traditional active strategies.

A broad range of factor-related products is available in the market, but not all of them may prove to be efficient in harvesting the factor premiums. As standard factor-based strategies are typically exposed to unrewarded risks, managing and eliminating these risks proves essential for an efficient implementation of a factor-based portfolio. Therefore, finding the right asset manager to implement factors into your portfolio is critical.

Some other considerations which are important to take into account when implementing a factor-based approach include:

Public factor indices can be suboptimal

One very popular way of gaining exposure to factor premiums is to use exchange-traded funds (ETFs) based on so-called public factor indices. Unfortunately, using these products often entails serious drawbacks and can prove inefficient.

Even though these solutions can effectively capture the targeted factor premiums at relatively low cost, they also frequently create exposure to unrewarded risks and bring undesired exposures to the other factors. These unintended exposures to other factors may lead to uncontrolled factor exposures in factor-based portfolios that combine two or more of these public factor indices. As a result, many of these strategies do not offer the most efficient exposure to the targeted factor premiums.

Moreover, the use of smart beta indices often entails inefficient portfolio construction processes that may lead to unnecessary turnover, high concentration in some countries or business sectors, or to an excessive exposure to large capitalisation stocks.

Most of the factor indices are fully transparent to the entire market and, consequently, sophisticated investors can effectively predict stock deletions or additions to these indices well in advance. This transparency is the key reason why public factor indices and some smart beta indices are prone to arbitrage as a result of front-running and may lead to overcrowding at the cost of investors.

Finally, the fact that most generic smart beta products do not take sustainability into account can be an issue for some institutional investors.

These different drawbacks can be avoided, but this typically requires a more sophisticated approach than simply using index-based solutions.

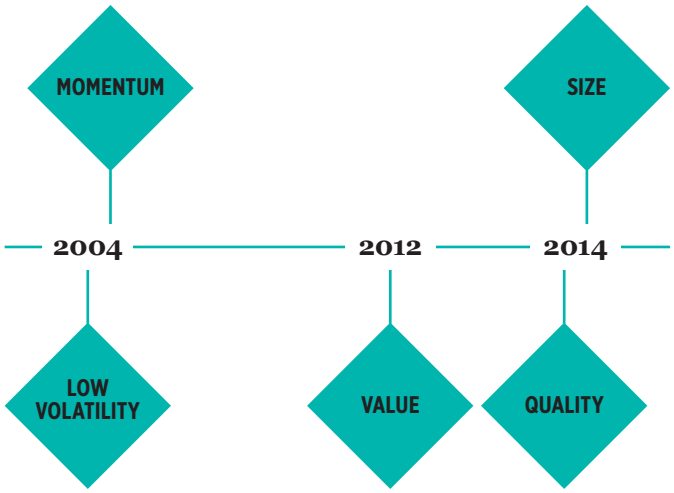
Transaction cost considerations

Transaction costs may be materially higher in a factor approach than in a passive approach, but this will depend on the factor. Momentum, for instance, requires higher levels of portfolio turnover. Well-thought-out construction approaches can reduce this by looking at momentum over different time periods, but turnover is still likely to be higher than a passive approach. However, not all factors imply higher turnover and many will be similar to a passive approach. For defined contribution investors, where transaction costs are increasingly in focus, some factors (for example value and low-volatility) may be more suitable than others.

5
FACTOR INVESTING WORKS FOR CREDITS TOO

THE CONCEPT OF FACTOR INVESTING IN CREDITS IS SIMILAR TO EQUITIES. ACADEMICS INITIALLY FOCUSED THEIR RESEARCH ON EQUITY MARKETS, AND IT WAS NOT UNTIL THE 2000s THAT SIMILAR ANOMALIES WERE DOCUMENTED FOR CREDITS AS WELL. THIS IS MOSTLY DUE TO THE FACT THAT QUALITY MARKET DATA BECAME AVAILABLE MUCH LATER FOR CORPORATE BONDS THAN FOR EQUITIES.

Figure 4: A brief history of factor premiums in credit markets



The empirical evidence shows that low-volatility, value, momentum, quality and size factors have economically meaningful and statistically significant premiums in the corporate bond market. Therefore a factor-based approach can also generate attractive risk-adjusted returns within fixed income portfolios.

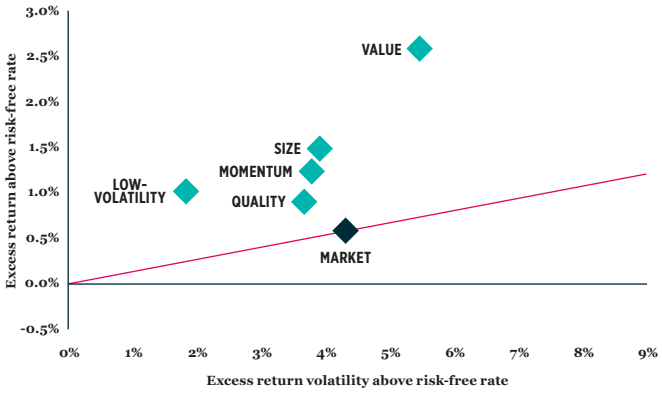
Low-volatility selects low-risk bonds issued by low-risk companies, value selects bonds that are cheap relative to their associated level of risk, momentum selects recent winners and quality selects bonds issued by well-run, profitable companies. The main difference in the underlying factors identified for credits compared to equities is that the size effect has only been found to be persistent within the credits market.

The size effect looks at the total amount of debt issued by companies. A size factor portfolio of corporate bonds selects bonds of companies with low levels of debt. The size effect takes advantage of the liquidity premium, which plays a more significant role in less liquid markets than it does for equities.

Even though there are many similarities between equities and credits with regards to factor investing, there are also important differences – in particular, the liquidity of corporate bonds. The structure of the corporate bond market requires the explicit consideration of liquidity differences between individual bonds, and this is the most important consideration for implementing factor investing in credits.

Factor-based strategies offer attractive premiums beyond the credit market premium, as can been seen in the chart below.

Figure 5: The historical performance of credit factors



Source: Robeco, Barclays, FactSet. Performance figurues for USD Investment Grade from January 1994-December 2015. Credit returns measured over duration-matched government bonds. For further reading on this topic: Houweling & van Zundert (2014), "Factor Investing in the Corporate Bond Market", Financial Analyst Journal.

6 SUMMARY

THIS GUIDE WILL HELP YOU GAIN A BETTER UNDERSTANDING OF THE BENEFITS THAT FACTOR-BASED INVESTING CAN BRING TO YOUR PORTFOLIO, BOTH FOR EQUITIES AND FIXED INCOME.

Although hundreds of factors have been documented by researchers, only a small number actually meet the required rigorous academic criteria, have a persistent source and can be used in an implementable strategy. Five factors (value, momentum, quality, low-volatility and size) have been identified that make the mark. These five factors can independently improve the risk-adjusted returns of passive investing, and when combined into multi-factor solutions can create portfolios which routinely outstrip other styles in terms of the value-for-money they offer.

There are pitfalls associated with factor investing, not least the risk of investing in a factor index and exposing yourself to pre-trading by other market participants. Fortunately, these drawbacks can be avoided using more sophisticated approaches, for example selecting asset managers who understand both the factor premiums and how to create an investment strategy without relying on published indices.

An important step is to assess the exposure your portfolio has to these factors, and subsequently determine next steps. Even simple adjustments can unlock value for your scheme. Ask your consultant or asset managers to assess the factor exposure of your current portfolio and challenge them to identify solutions to tackle any imbalances. Finding experts in this field is highly recommended. They can advise you and help create a well-balanced portfolio incorporating the necessary governance processes to ensure your scheme can deliver value in the longer term.

This guide should prove useful in gaining a better understanding of factors and how to implement them, but there is much more to explore in factor investing.

THERE IS MUCH MORE TO EXPLORE IN FACTOR INVESTING

GLOSSARY

Active

an investment approach which gives a manager discretion to construct a portfolio of investments.

Capital Asset Pricing Model (CAPM)

this financial theory model is used to forecast returns that can be obtained with risk-bearing asset classes. The linear relationship means that taking extra risk will on average lead to higher returns.

Efficient Markets Hypothesis (EMH)

the theory that the market portfolio presents the most efficient portfolio investors can invest in; that it achieves the greatest return for the level of risk dictated by the market.

Factor investing

a systematic approach to capture a persistent source of returns backed up by evidence that they will outperform the market portfolio.

Low-volatility (low-risk)

a factor approach that implies investing more in lower-risk securities and less in higher-risk securities.

Market capitalisation (equities)

the total value of a company's equity (share price multiplied by the number of shares issued).

Market portfolio

a portfolio holding all of the securities in a particular market, in weights determined by the market capitalisation of the security relative to the market as a whole.

Momentum

a factor strategy investing more in securities whose value is rising and less in securities whose value is falling.

Passive

an investment approach where the manager must invest in the market portfolio and has limited discretion.

Premium

an additional return awarded for taking on a specific kind of risk (a risk premium) or investing by following a factor (a factor premium).

Quality

a factor strategy investing more in companies with higher profits and less in companies with lower profits.

Sharpe ratio

describes the extent to which an investment compensates for extra risk. This ratio is also called the risk-return ratio. The higher the ratio, the higher the risk compensation an investment offers.

Size

a factor strategy investing more in smaller companies and less in larger companies.

Total amount of debt (credit)

the total value of a company's market debt (the bond price multiplied by the number of bonds outstanding).

Value

a factor strategy investing more in undervalued securities and less in overvalued securities.

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