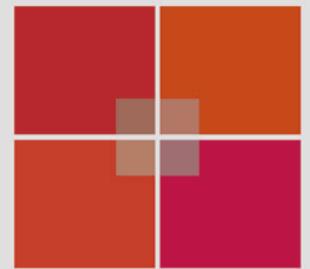




# Equity factor-based investing: A practitioner's guide



## Key points

- Equity factor-based investing is a form of active management that aims to achieve specific risk or return objectives through systematic, rules-based strategies.
- Factor-based investment performance is highly cyclical and typically inconsistent across different economic and market conditions. Investors must be willing and able to endure numerous and potentially extended periods of underperformance relative to the broad market index.
- Key due-diligence considerations relevant for structuring factor-based investments include factor selection, weighting methods and all-in costs.

Factor-based investing isn't new. Investors have looked beyond asset-class categorisations for many years. But some vehicles available to tilt portfolios to specific factors are new, and it can be difficult to keep up with the range of strategies available to those interested in factor-based investing.

This brief, based on research by The Vanguard Group, Inc.,<sup>1</sup> explores the historical performance of a few commonly discussed long-only, factor-based equity investment strategies, or factor tilts, and discusses key considerations relevant to choosing equity factor tilts.

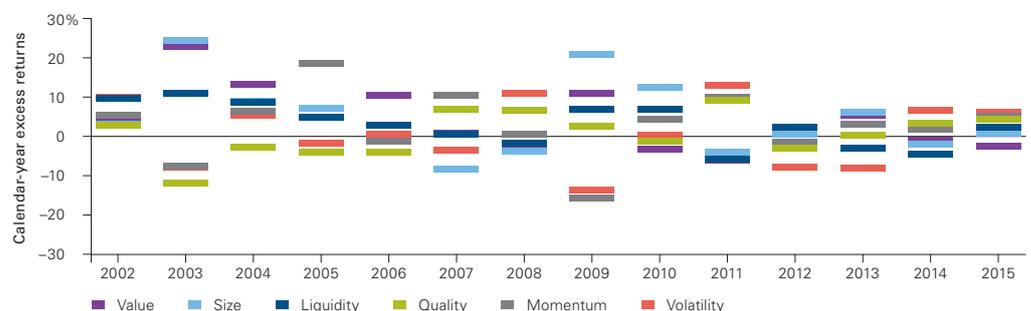
Our research details the primary ways investors may choose these investments to potentially achieve certain objectives.

## Factor performance varies considerably

Why the interest in factors? Although stocks can be sorted in many different ways, attention is typically paid to those factors with an extensive academic literature and empirical evidence of historical positive risk-adjusted excess returns — in other words, certain factors that have “worked” in the past (e.g. value, momentum, quality, size, volatility and liquidity).

Like other forms of active management, the performance of equity factor tilts relative to the broad market is difficult to predict. Regardless of the type of active management employed, long-term success demands strong patience to endure the inevitable periods of underperformance. **Figure 1** showcases the year-to-year relative performance of each equity factor tilt.

Figure 1. Equity factor tilts relative performance has been inconsistent



## Past performance is not a reliable indicator of future results.

Notes: Data cover 1 January 2002 through 31 December 2015. Excess returns are calculated relative to the MSCI World Total Return Index (USD). For each factor, the following indices were used: **Momentum** — MSCI World Momentum Index (USD) history begins May 31 May 1973; **Value** — MSCI World Value Index (USD) is from 31 December 1974 to 30 November 1997, and MSCI World Enhanced Value Index thereafter; **Quality** — MSCI World Quality Index (USD) begins November 30, 1975; **Volatility** — MSCI World Minimum Volatility Index (USD) begins 31 May 1988; **Size** — MSCI World Small Cap Index (USD) begins 31 December 2000; and **Liquidity** — FTSE Developed Illiquidity Factor Index (USD) begins 30 September 2001.

Source: Vanguard calculations, using data from Thomson Reuters Datastream, MSCI, Bloomberg and FTSE.

<sup>1</sup> *Equity factor-based investing: A practitioner's guide.* Douglas M. Grim, CFA; Scott N. Pappas, CFA; Ravi G. Tolani; and Savas Kesidis; March 2017.

Although the relative performance of equity factor tilts varies over time, it's difficult to profit from these swings through market timing. A high degree of uncertainty is associated with the relative performance of equity factor tilts in different environments. The challenge of forecasting what the environments will be and when they will occur, and how factors will act as a result, is notoriously difficult. Investors should tread carefully if considering tactically timing using different equity factor tilts.

### Challenges in considering future performance

A debate persists whether equity factors will earn excess returns in the future, particularly after there is broad awareness of their potential effectiveness. In addition, data mining and other statistical biases may affect the validity of conclusions drawn from the analysis of historical data.

Many academic and practitioner papers (including the one on which this brief is based) that explore the characteristics of equity factor-based investing don't incorporate various implementation costs into their results; these costs can materially affect performance in real-world portfolios. When evaluating the appropriateness of an equity factor-based investment vehicle, it's important to take these potential performance drags into account. Four key implementation challenges can affect potential returns:

**Short-selling constraints.** Academic studies are often conducted by analysing long-short, single equity factor portfolios. Such portfolios often require significant short selling, which can be expensive and may not be achievable in practice.

**Management and oversight expenses.** The cost of both paying for day-to-day management and conducting ongoing oversight of these vehicles is rarely taken into consideration by academic and practitioner research. In some cases, such costs can be a significant portion of the theoretical factor returns.

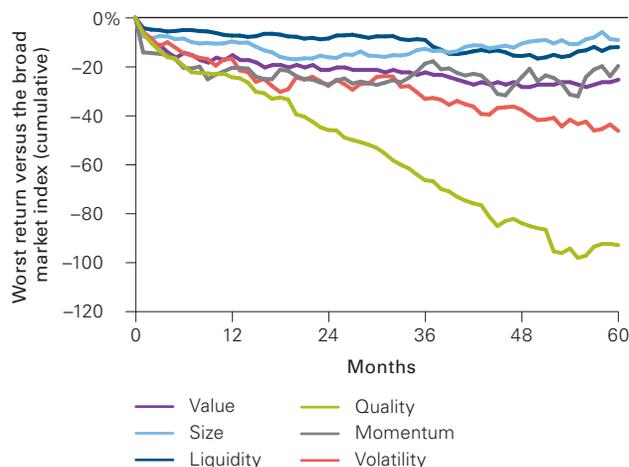
**Transaction costs.** Equity factor tilts require varying degrees of turnover to maintain the desired exposure. This can generate costs because of bid-ask spreads, commissions and market impact.

**Taxes.** Taxes can reduce the potential returns of equity factor tilts. The size of the impact will depend on the tax jurisdiction, the type of account and the investor's tax status as well as the investment strategy chosen.

### Periodic underperformance can be severe and lengthy

Equity factor tilts have experienced extended stretches of both relatively strong and relatively weak performance compared with the broad equity market. **Figure 2** charts the worst periods of underperformance that each equity factor tilt has had during different periods. All have experienced periods of 60-plus months of such underperformance, potentially challenging the conviction of even the most patient investors to stay the course. The magnitude of underperformance has also been significant: Each factor tilt has underperformed the broad market index by at least 7 percentage points over a 12-month period.

**Figure 2. Investors must be able to withstand difficult stretches of underperformance**



### Past performance is not a reliable indicator of future results.

**Notes:** Excess returns are calculated relative to the MSCI World Total Return Index (USD). All results are as of at 30 September 2016. Returns are calculated using the following indices: **Momentum** — MSCI World Momentum Index (USD) history begins 31 May 1973; **Value** — MSCI World Value Index (USD) from 31 December 1974 to 30 November 1997, and MSCI World Enhanced Value Index thereafter; **Quality** — MSCI World Quality Index (USD) begins 30 November 1975; **Volatility** — MSCI World Minimum Volatility Index (USD) begins 31 May 1988; **Size** — MSCI World Small Cap Index (USD) begins 31 December 2000; and **Liquidity** — FTSE Developed Illiquidity Factor Index (USD) begins 30 September 2001.

**Source:** Vanguard calculations, using data from Thomson Reuters Datastream, MSCI, Bloomberg and FTSE.

Individual and institutional investors have tended to sell active investments when those are underperforming over shorter periods.<sup>2</sup> Therefore, it is critical for investors, and other stakeholders, to determine in advance whether they have the willingness, ability and time horizon necessary to handle periods of poor relative performance.

### How securities are weighted can affect results

No widely accepted method exists for weighting securities in an equity factor tilt strategy. The numerous approaches used in the industry can be broadly classified into three main types: market capitalisation, alternatively weighted and long-short.

The alternatively weighted category is a catchall for any long-only techniques that are not market-cap-weighted, including the index-based strategies commonly referred to as “smart beta” or “strategic beta”. Alternatively weighted vehicles generally set stock weightings based on a stock’s sensitivity to the desired factor or factors. In some cases, these weightings are constrained by the active manager or index provider to meet certain liquidity and diversification guidelines.

A long-short weighting method fundamentally differs from a long-only approach. Long-only techniques provide exposure to a combination of the chosen factor plus the equity market factor (equity risk premium). In contrast, the long-short approach provides exposure to the selected factor.

Although the long-short weighting technique offers the highest degree of factor sensitivity and is the purest form of obtaining factor exposure, investors need to consider the unique practical implications and risks inherent in using it.

### Case study: Portfolio completion

Equity factor-based investing can be used in a range of different applications by investors. Because each investor has a unique combination of objectives, constraints, due-diligence capabilities and belief sets and can use equity factor tilts in multiple ways, it is inadvisable to suggest a universal equity factor tilt approach.

Our research paper presents four case studies on how equity factor tilts can be applied; this brief presents one that shows how to mitigate unintended risk exposures.

A university endowment in the United States has a public equity lineup that includes broad market-cap-weighted index vehicles and three traditional active equity managers. The managers have been selected through extensive research, but during a recent risk budget assessment, the endowment realised that its aggregate public equity portfolio has negative exposure to the momentum factor, as displayed in **Figure 3a**.

Although the endowment investment committee understands that its traditional active managers must accept active risks in order to potentially generate excess returns, the degree of the unintentional aggregate negative momentum factor exposure is outside its documented tolerance range. To address this, the committee sells a certain portion of the assets allotted to each traditional active manager and puts the proceeds in a momentum-tilted factor fund.

As **Figure 3b** demonstrates, by adding the factor fund, the inadvertent momentum underweight has been reduced to fit within the endowment’s active-risk budget. This illustrates how single-factor equity vehicles can potentially help investors control for unwanted risk exposures that may occur as a byproduct of other active decisions made in the portfolio.<sup>3</sup>

### A final thought

Successful equity factor-based investing requires a thorough approach to due diligence and portfolio construction. Investors should determine which factors, if any, they believe will help them meet their goals; what portfolio configuration best suits their objectives, philosophy and investment process; and how implementation costs may affect performance.

<sup>2</sup> Sources: *Putting a value on your value: Quantifying Vanguard Advisor’s Alpha*. Francis M. Kinniry Jr.; Colleen M. Jaconetti; Michael A. DiJoseph; Yan Zilbering; and Donald G. Bennyhoff; 2016, and *Bad Habits and Good Practices*. Amit Goyal; Antti Ilmanen; and David Kabiller; 2015.

<sup>3</sup> It is important to point out that even single factor-tilted equity vehicles have some unintended positive and negative exposures to other factors. Every stock is influenced by numerous forces. This makes it challenging to design a single-factor product that can completely neutralise sensitivity to other factors. As a result, the equity factor tilt used in this case study changed some of the other factor exposures in the equity portfolio, albeit in a minor way.

Figure 3. Equity factor tilts can help investors calibrate risk exposures

a. Current equity portfolio significantly underweights the momentum factor

b. Proposed equity portfolio would have no factor exposures that violate risk budget thresholds



Notes: The portfolios shown are hypothetical and are used for purposes of illustration only.  
Source: Vanguard.

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