

The Frontier Line

Thought Leadership and insights from Frontier Advisors

Equity factor investing

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The Frontier Line explores a range of investment issues and ideas to explain and illuminate areas for investors to be aware of and be thinking about. Our specialist and sector research teams constantly review and discover topics to provide new perspectives and enrich understanding of critical risks and opportunities.

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Equity factor investing

Factor investing is a topic that has garnered significant interest from institutional investors in the last few years. Despite the concept effectively having been around for many years, the recent spike in interest in factor investing has been driven by an increased focus by institutional investors on driving fees down, believing this can be achieved without compromising excess return potential.

In 2011, Frontier's research paper, *Alternative Equity Beta: Non Cap-Weighted Strategies*, examined alternative sources of equity beta exposure. This paper builds on the findings from that research and considers factor investing as another form of non-market capitalisation weighted investing. Within this paper, we address the following questions:

What is factor investing?

- Why should investors consider factor investing?
- What are the risks of factor investing and how are these mitigated?
- What is the best approach to implementing a factor investing strategy

What is factor investing?

A large body of academic research supports the assertion that long term equity performance can be explained by a number of "factors". A "factor" is a characteristic which links a group of securities and helps explain its risk and return profile¹. "Factor investing" is an approach whereby factors which have historically earned a higher return than the market (or higher risk-adjusted return in the case of the Low Volatility factor) are targeted by investors in a systematic manner. These factors can be targeted in isolation or as part of a multi-factor strategy and via a "passive" or "active" approach. For institutional investors in Australia where there is spotlight on reducing fees, factor investing is understandably receiving attention as it targets returns above the benchmark, for fees closer to a traditional passive approach.

MSCI identifies six factors that are supported by academic research and logical explanations as to why they have historically

offered a premium to the broader market: Value, Low Size, Low Volatility, High Yield, Quality and Momentum. We acknowledge that various market participants challenge the existence of some of these premia, particularly when considering their practical implementation (i.e. some have considerable and costly turnover).

There is also some disagreement regarding the explanation for the existence of these factors (some argue that the Value factor exists for behavioural reasons while others argue the excess returns are compensation for additional risk). Despite these questions, we accept that some of these factors at least partly explain the performance of many outperforming active managers over time. Given their wide acceptance in academia and the frequency of use by equity managers, we have used these factors as the basis for our analysis.

We briefly explain each of the factors on the following page.

¹ Bender, J., et al. (2013). "Foundations of Factor Investing". *MSCI Research Insight*, p.2

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Table 1: Explanation of common factors

Factor	Description	Common measures
Value	Stocks with low prices relative to their fundamental value are expected to outperform the capitalisation-weighted index.	<ul style="list-style-type: none">• Low price / book Value• Low price / cash Flow• Low price / earnings• High dividend yield
Low size / small cap	Small cap stocks are expected to outperform the broader market, even after adjusting for betas and other factors.	<ul style="list-style-type: none">• Low market cap
Low volatility	Lower volatility (and lower beta) stocks are expected to offer better risk adjusted returns than “higher risk” stocks.	<ul style="list-style-type: none">• Lower beta• Lower realised volatility
Quality	Higher quality stocks (defined in various ways) are expected to outperform the capitalisation-weighted index.	<ul style="list-style-type: none">• High (and stable) ROE• Low accruals• Low leverage
Momentum	Stocks that have performed well are expected to continue to perform well (and stocks that have been performing poorly continue to perform poorly).	<ul style="list-style-type: none">• Strong six or 12 month return
High yield	Stocks with a higher dividend are expected to outperform the capitalisation-weighted index.	<ul style="list-style-type: none">• High dividend yield

Table 1 notes some of the common measures used by managers to identify stocks which are likely to be driven by a certain factor.

Importantly, however, considerable research goes into the way different managers define the factors and nuances in the way managers classify stocks can lead to significant performance differences.

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Table 2: Factor performance in USD to 31 December 2014

Period	MSCI world	MSCI value	MSCI high dividend	MSCI quality	MSCI Equal weighted (small cap)	MSCI momentum	MSCI min. vol.
One year (%)	5.5	2.9	3.3	9.0	3.4	7.0	12.1
Three years (% p.a.)	16.1	15.7	12.9	16.5	15.2	17.0	13.4
Five years (% p.a.)	10.8	9.7	10.1	13.0	10.3	14.3	12.2
10 years (% p.a.)	6.6	6.1	6.5	9.0	7.3	9.5	7.4
15 years (% p.a.)	3.6	5.2	6.2	5.2	7.3	5.0	6.5
20 years (% p.a.)	7.6	8.5	n.a.	11.0	8.1	11.1	8.8

Source: MSCI

Table 3: Factor volatility in USD to 31 December 2014

Period	MSCI world	MSCI value	MSCI high dividend	MSCI quality	MSCI Equal weighted (small cap)	MSCI momentum	MSCI min. vol.
One year (%)	8.6	8.3	9.6	9.1	8.7	10.1	7.4
Three years (% p.a.)	10.4	11.6	10.6	9.6	11.3	9.3	8.4
Five years (% p.a.)	14.3	15.3	13.6	12.4	14.8	13.1	9.1
10 years (% p.a.)	16.0	17.5	16.8	13.7	17.7	16.1	11.5
15 years (% p.a.)	15.9	16.9	15.9	14.0	17.2	15.7	11.2
20 years (% p.a.)	15.3	15.9	n.a.	13.9	16.4	16.1	11.0

Source: MSCI

Table 2 and Table 3 show the performance and volatility of the six factors for a number of periods up to December 2014². Over the long term (15 and 20 years) all of the factors have outperformed the MSCI World Index³. This supports the case for investing in factors, but also reiterates the need to take a

long term time horizon when considering such an approach (performance over shorter periods can be variable). We discuss in a later section methods of reducing volatility by, for example, combining multiple factors and/or taking a more active approach to factor investing.

2. This data is a composite of actual and simulated returns provided by MSCI.

3. Note that these indices do not incur transaction costs like a typical portfolio.

Equity factor investing

Why consider factor investing

In this section, we discuss why clients might consider an allocation to single factor strategies within an equities configuration. We separate the motivations for investing in factor strategies into; (1) investment considerations; and (2) fee considerations.

Investment Considerations

The main reasons an investor might consider a single factor strategy are: (1) to help maintain a long term targeted tilt in the configuration (e.g. as an additional source of value exposure in a multi-manager configuration); (2) to opportunistically target a factor over the short- to medium-term (e.g. moving overweight momentum on the expectation it will outperform over the following year); and (3) as a source of diversification in a multi-manager portfolio (e.g. exposure to the low volatility factor).

Investing in a single factor can be helpful for investors trying to maintain target exposures to factors within a multi-manager portfolio. Frontier's preferred equities configuration has a bias to value, but in order to achieve this bias, clients should not compromise on the quality of their active manager line-up. In situations where clients are restricted in their access to high quality value managers (e.g. limited capacity with incumbent managers or fee constraints) we envisage single factor strategies playing a "completion" role to help clients achieve a desired tilt, ideally at a

reduced cost. Our preference for high-quality, active management is supported by the results in Table 4 which shows that the median active value manager⁴ has performed better than the MSCI Value Factor (converted to Australian dollars) over all periods.

Alternatively, single factors might be targeted on an opportunistic basis to enhance returns. Where an investor has a view that the momentum factor will outperform over the next year, for example, this view can be reflected in the portfolio by investing in a single factor momentum-based strategy. While the successful implementation of an opportunistic factor tilt has the potential to enhance returns, we would caution that the timing of factors is fraught with difficulty. Indeed one of the key tenets of factor investing is that it should be implemented with a long term view in mind given the possibility of material and sustained periods of underperformance. We suggest that this type of approach is only employed when extreme conditions (i.e. extreme over—or undervaluation) exist.

A third justification for investing in a single factor strategy is that it adds something different to the portfolio. For example, by increasing exposure to the Low Volatility factor in an equities portfolio (via a low or managed volatility equity manager), clients may be able to reduce the downside risk of the portfolio.

Table 4: Active global equity manager excess return comparison⁵ in \$A to 31 December 2014

Period	Median active value manager	MSCI value factor
One year (%)	-1.5	-2.4
Three years (% p.a.)	0.3	-0.2
Five years (% p.a.)	0.5	-0.6
Seven years (% p.a.)	1.4	-0.2
10 years (% p.a.)	1.1	-0.1

Source: eVestment, MSCI and Frontier

4. Manager results are from eVestment and include managers which identify themselves as being active, value-style managers with a minimum of A\$500 million invested as at 31 December 2014.

5. Before fees.

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Fee Considerations

One of the obvious attractions of factor investing is the prospect of achieving superior returns on the broader market, for a cost lower than the average active equity manager. The magnitude of fee savings depends on: (1) the level of sophistication of the factor strategy (e.g. passive investment in a factor index versus deeply researched proprietary factors); and (2) where the factor strategy fits within the configuration. The cost of investing in factor strategies varies broadly from less than 0.10% p.a. for a passive approach to up to 0.40% for more sophisticated, active approaches. Table 5, while simplistic, provides an indication of the magnitude of fee changes when replacing different aspects of a portfolio with factor strategies. The ultimate funding source for an investment in a factor strategy will depend on investment objectives and fee sensitivity.

The key conclusion to draw from this table is that fee savings are largely generated from switching active manager exposure to a factor strategy. We note that while terminating a skilled active manager for a factor strategy could ultimately save fees, it can result in lower after-fees returns (see Table 4). This decision, therefore, needs to include an assessment of the active manager's capabilities.

We also note that there are lower cost means of gaining factor exposure (i.e. passively), however these come with certain risks (see page 11). More sophisticated approaches are more costly, and may not reduce overall fees significantly.

Table 5: Impact on fees⁶

	Fees (% p.a.)	Base	60/30/10	50/30/20	40/30/30
Active	0.50	70%	60%	50%	40%
Passive	0.10	30%	30%	30%	30%
Factor	0.25	0%	10%	20%	30%
Total fees	n.a.	0.38%	0.36%	0.33%	0.31%

	Fees (% p.a.)	Base	70/20/10	70/10/20	70/0/30
Active	0.50	70%	70%	70%	70%
Passive	0.10	30%	20%	10%	0%
Factor	0.25	0%	10%	20%	30%
Total fees	n.a.	0.38%	0.40%	0.41%	0.43%

6. We have assumed fees for active management of 0.50% p.a., passive management 0.10% p.a. and factor strategies of 0.25%. Actual fees can vary significantly for factor strategies with fees similar to passive strategies at the lower end and fees similar to active management at the higher end.

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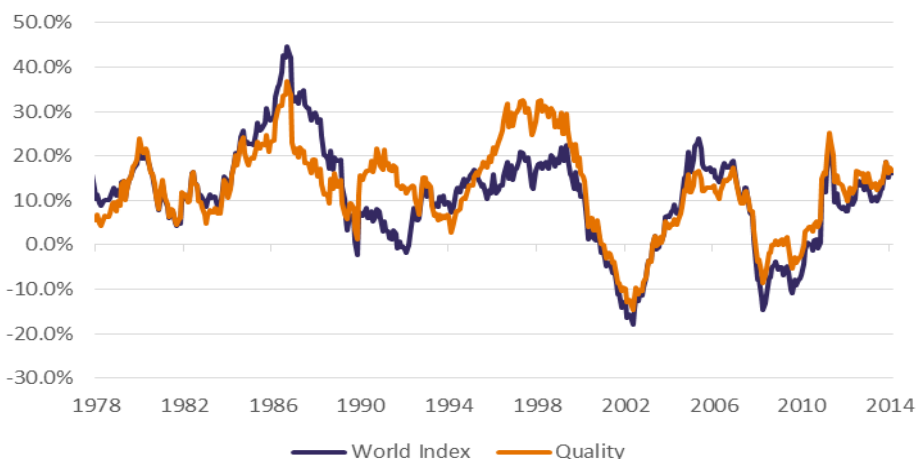
Considerations of single factor investing

There are a number of important considerations for investors looking at single factor investing. We discuss some of the key risks below.

Firstly, while single factors have been shown to outperform over long periods, they can still experience extended periods of underperformance relative to a cap-weighted benchmark. This is illustrated in Chart 1 and Chart 2 which show the performance of the MSCI Quality Index versus the MSCI World Index over rolling

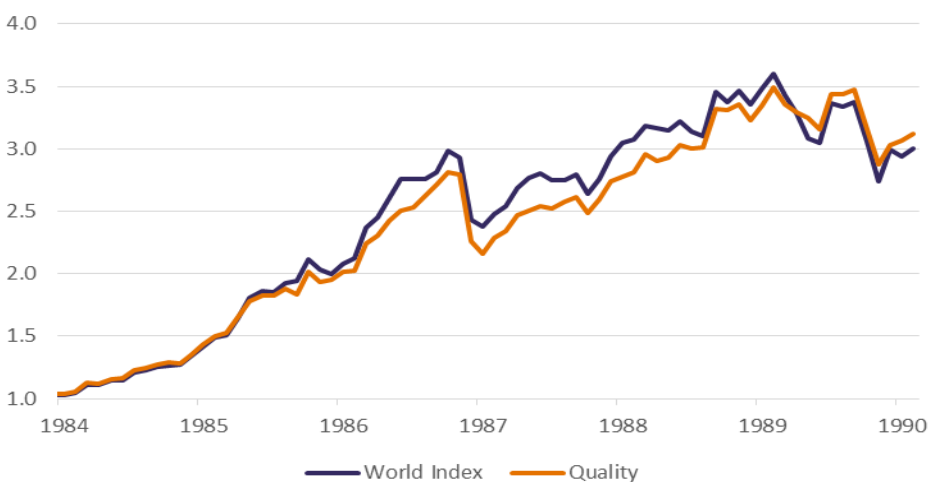
three year periods between 1978 and 2014 and cumulatively from 1984 until 1990. Specifically, Chart 2 shows that investing passively in a strategy tracking the MSCI Quality strategy would have yielded poorer returns than the broader MSCI World strategy until 1990. While remaining invested in the strategy would ultimately be rewarding over the long term, there is a risk that an investor can lose patience and terminate the strategy prior to the performance recovery.

Chart 1: Three year rolling returns to December 2014



Source: MSCI and Frontier

Chart 2: Cumulative performance from 1984 to 1990



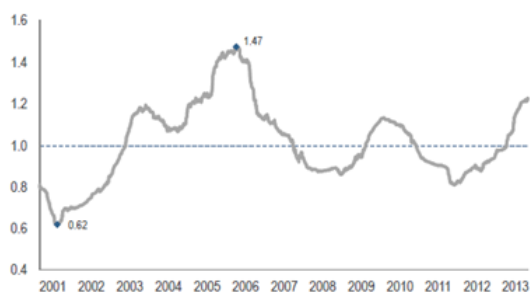
Source: MSCI and Frontier

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In addition, single factor investing can lead to significant “unintentional” risk exposures. This risk is particularly acute in passive approaches which track factor indices, but can also occur in some active approaches to factor investing, as shown in Chart 3 and Chart 4. For example, a Momentum strategy can lead to large (unintentional) beta tilts and a naïve Quality strategy can result in extreme sector exposures.

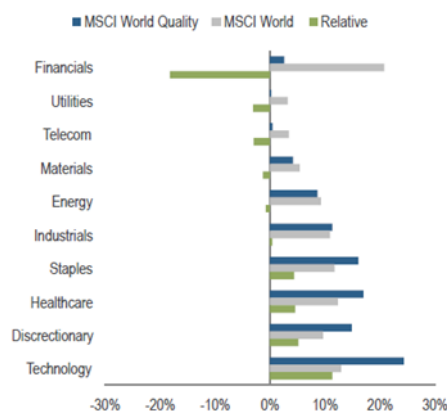
These exposures warrant consideration, but do not detract from the case for factor investing, in our view. Our clients tend to have equities portfolios which are well-diversified across sectors, regions and factors and, therefore, an appropriately sized investment in a factor strategy will not lead to significant risks at the portfolio-level. In addition, these risks can be managed by taking a considered approach to factor construction (for example, limiting sector or regional exposure) and/or by combining multiple factors, discussed in the next section.

Chart 3:
MSCI US momentum index
rolling one-year daily beta



Source: Acadian and MSCI.

Chart 4:
MSCI world quality index
relative sector exposure



Source: Acadian and MSCI.

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Multi-factor investing

Taking a multi-factor approach to factor investing can help mitigate the risks outlined above which may arise when targeting a single factor and can enhance returns if an investor is able to successfully rotate between factors. This is due to the relatively low (or negative) correlations among a number of factors. Table 6 shows the correlations among the six MSCI factors.

The reasons for the low correlations are largely intuitive. For example:

- Value and Quality – low quality companies tend to be less expensive;
- Value and Momentum – out-of-favour companies (those with negative momentum) are less expensive;
- Small Caps and Quality - larger companies tend to be financially stronger and have more stable earnings than smaller companies; and
- Small Caps and Momentum – as stocks underperform they decrease in size, so small caps may include these underperforming companies.

Table 6: Correlation between factors (excess returns versus MSCI world)

	Value weighted	High div. yield	Quality	Equal weighted (small caps)	Momentum	Minimum volatility
Value	1.00					
High dividend yield	0.61	1.00				
Quality	-0.01	-0.01	1.00			
Equal weighted (small caps)	0.63	0.19	-0.26	1.00		
Momentum	-0.27	-0.16	0.37	-0.19	1.00	
Minimum volatility	0.13	0.56	0.25	0.12	0.16	1.00

Source: MSCI and Frontier, for the period between July 1988 and December 2014 (except for high div. yield which has a track record from July 1995).

Equity factor investing

The impact of combining factors with a low correlation can be seen in Table 7. The table shows the risk and return characteristics of the MSCI World Index, three single factor indices (Value, Quality and Momentum) and an equally-weighted combination of those three indices (“Combination Portfolio”).

The Combination Portfolio achieves better risk-adjusted returns than the MSCI World Index, as well as the single factor indices. This emphasises the benefits of combining factors with correlations lower than one. In addition, the Combination Portfolio’s maximum drawdown over the period is not as severe as the MSCI World, Value or Momentum Indices. The Quality Index has a more modest maximum drawdown than the Combination Portfolio, but has weaker performance and a similar level of volatility to the Combination Portfolio.

In addition to deciding which factors to combine, investors looking at multi-factor

combinations must decide whether to maintain the weights over the long-term (static weighting) or change factor exposures over time (dynamic weighting).

Under a static weighting system, the weighting to each factor remains constant through time (or is at least rebalanced to a pre-determined level at regular intervals). The benefits of such a system are obvious: it is simple and transparent. It is also argued that timing factors is extremely difficult and a number of managers point to a lack of evidence that this can be successfully done over the long term⁷.

Table 8 shows the ranking of the best (and worst) performing factors from year to year, highlighting the significant variability in factors’ relative performance. For investors that are able to successfully vary their exposure to factors at different times, this provides opportunities to improve returns.

Table 7: Risk return comparison from December 1975 to December 2014

	MSCI World Index	Combination Portfolio ⁸	Value	Quality	Momentum
Annual Return (% p.a.)	10.6	12.6	11.8	11.9	13.7
Standard Deviation (% p.a.)	14.7	14.2	14.8	14.2	15.9
Sharpe Ratio	0.72	0.89	0.80	0.83	0.86
Max Drawdown (%)	-53.7	-51.6	-57.5	-44.5	-52.5

Source: MSCI and Frontier

7. Dimensional discusses the absence of mean reverting tendencies of factors and Robeco advocates a static approach due to lack of evidence of timing ability.

8. Combination is an equally-weighted mix of the Value, Quality and Momentum Indices.

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Table 8: Factor rankings for year-on-year returns⁹

Year	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
2014	MV	Q	M	RW	W	EW	HD	V
2013	M	V	Q	W	EW	RW	HD	MV
2012	V	EW	W	M	RW	Q	HD	MV
2011	MV	HD	M	Q	RW	W	V	EW
2010	EW	M	RW	MV	W	V	Q	HD
2009	EW	V	HD	Q	RW	W	MV	M
2008	MV	Q	RW	M	W	EW	HD	V
2007	M	Q	W	HD	V	EW	RW	MV
2006	HD	RW	V	EW	MV	W	M	Q
2005	M	EW	RW	V	W	HD	MV	Q
2004	RW	EW	M	MV	HD	V	W	Q
2003	EW	RW	V	W	HD	MV	M	Q
2002	RW	MV	HD	EW	M	Q	V	W
2001	HD	RW	MV	V	EW	Q	W	M
2000	RW	HD	MV	EW	V	Q	W	M
1999	M	W	Q	V	EW	RW	MV	HD
1998	Q	M	W	MV	V	HD	EW	RW
1997	M	Q	HD	W	V	MV	RW	EW
1996	Q	HD	M	V	RW	W	EW	MV

Source: MSCI, AB and Frontier

9. EQ = Equal weighted (i.e. small caps); HD = High dividend yield; M = Momentum; MV = Minimum volatility; Q = Quality; RW = Risk weighted; V = Value weighted; W = World index.

The methods of dynamically weighting factors vary widely from relatively simplistic to extremely sophisticated. Towards the simpler end of this spectrum can be strategies which reduce exposure to factors that have outperformed over a period and increase exposure to factors which have underperformed over that period (mean reversion). More sophisticated strategies incorporate considerations of the macroeconomic environment, how “crowded” a factor is, and changing correlations among factors, amongst other things.

Our view is that a static weighting system provides an appropriate starting point for the implementation of a multi-factor strategy, particularly in the context of a very long time horizon. We believe caution is warranted as the level of sophistication increases in regard to dynamically weighting factor strategies, but we acknowledge the potential for enhanced returns and risk management from this approach. Overall, we believe that dynamic, multi-factor investing is currently the domain of the active quantitative manager although this will be an ongoing research topic for Frontier.

Equity factor investing

Implementation options available to institutional investors

For most investors considering factor investing, implementation requires a choice between a passive and active approach. A passive factor investing approach usually involves a manager (or the investor) tracking an agreed-upon factor benchmark (provided by MSCI, RAFI, or another index provider) that is constructed according to established, simple and transparent rules. By contrast, an active approach usually involves the appointment of a manager which will have its own (proprietary) process for targeting a factor (or factors) and this approach can change over time depending on its research.

The advantages of a passive approach to factor investing are its low cost, simplicity and transparency. These characteristics can be contrasted with those of more active approaches which tend to be more expensive (but typically cheaper than fundamental active managers), can be very complex and not particularly transparent (proprietary approaches to factor investing are usually very valuable intellectual property for active managers).

The advantages of a passive approach to factor investing, however, come with some less-obvious drawbacks. As mentioned in Section 4, simple factor constructions can lead to large unintentional risks, such as a high beta at the top of a market (from a Momentum strategy) or large sector tilts (from a Quality strategy). These risks may be managed by incorporating constraints into the strategy, however, our experience indicates that good active quantitative managers are best-placed to assess and manage the incidental risks that can arise in a factor strategy.

A passive approach will also be limited to

investment in stocks that make up the index. This will exclude a range of smaller, less liquid stocks (with typically lower analyst coverage) where it has been demonstrated that factor investing approaches can achieve higher excess returns¹⁰.

Additionally, the best means for measuring certain factors can change over time with, for example, changes in accounting standards or convention. Good active quantitative managers are alert to such changes and through extensive research programmes are able to continually refine their approach. It is for these reasons that we have a preference for the implementation of factor strategies through active management, despite the higher fee.

If the decision is made to implement an active factor investing strategy via an external manager, there are some key attributes we look for in these managers. These include a(n):

- deep and proactive research programme;
- commitment to improving the efficacy of factor measures;
- consideration of practical implications of implementing strategy, such as transaction costs; and
- experienced team with track record of managing large levels of funds under management.

Frontier has a number of highly-rated active quantitative managers. These managers offer their most sophisticated thinking in their actively managed strategies, but can also usually offer lower cost implementations of various single or multi-factor strategies.

10. Zhang, FX, 2006, "Information Uncertainty and Stock Returns," The Journal of Finance 61: 105-137.

Equity factor investing

Conclusions

Despite having been around for decades, the recent interest in factor investing has been relatively sudden and intense. There are several catalysts for this surge in interest, but overarching is a push to reduce investment costs without unduly compromising investment returns.

While we do not consider factor strategies to be a panacea, we expect to see factor strategies playing a role in more investors' portfolios in the future. We see factor strategies as being useful for clients in the following way.

1. To help clients manage a long-term factor-tilt in their portfolio. For example, allocating to a strategy targeting the Value-factor can help maintain a Value tilt at the portfolio-level.
2. To manage risk in a portfolio. For example, by allocating to a Low Volatility strategy to minimise downside risk.
3. As a means of reducing fees by replacing more expensive active managers with factor strategies. We do not, however, see factor strategies as a replacement for managers that can add value via superior stock selection or other means (above the factor premium).

There are a range of considerations for investors looking to include a factor strategy (or strategies) in a portfolio. In this regard, Frontier advocates a number of broad principles.

1. The lowest cost options (passive implementation) will provide exposure to a number of factors, but are typically not the most effective means of targeting factors.
2. Active quantitative managers can provide factor strategies which offer more effective ways of capturing a particular premium and help address the risks that can arise from a passive factor implementation. That said, active quantitative managers must still be able to justify a higher fee.
3. Combining multiple factors can help produce better risk-adjusted returns due to low or negative correlations among factors. Which factors to target and combine will depend on investors' risk appetite and return objectives.
4. Statically weighting factors is a reasonable starting point when combining factors, however, there is the potential to increase returns and reduce risk if investors are able to successfully time factors.

Finally, we also recommend that clients engage with both prospective managers and Frontier to help ensure the desired level of factor (and other risk) exposures are achieved in the overall equities portfolio.

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