

Research

Factor valuation considerations

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Introduction

Factor investing is increasingly in vogue with estimates of passive assets tracking such strategies reaching US\$729bn [1], [2]. This popularity has led investors, academics and practitioners to question the extent to which factor premiums may have been arbitrated away and the future performance of such factor strategies [3] - [6]. One approach to answering these questions is to assess the relative valuation of factor strategies. In this paper, we review this ongoing debate and highlight key aspects that investors should consider when assessing factor valuations.

Arnott et al [7] consider that most factors are expensive relative to historic norms with the exception of the Value factor. They argue that since valuations are stretched in historical terms, future factor returns are likely to be lower as factor valuations revert to long-run levels.

In their analysis, they relate the performance of six factors (Value, Momentum (high), Small cap, Illiquidity, Beta (low), and Profitability (high)) to changes in the relative valuation of each factor. Factor performance is divided into a “structural” and a “situational” alpha. The former is viewed as “true” alpha as it is a repeatable factor return that is likely to persist, while the latter is considered a consequence of “enthusiasm” resulting from a non-repeatable increase in valuation levels.

Arnott et al categorize Momentum and Beta differently to the other factors. Portfolios constructed using Momentum and Beta exhibit high turnover. Therefore, changes in valuation tend to be a reflection of the altered composition of the portfolio rather than a change in valuations. However, Illiquidity, Small cap and Profitability are considered to be overvalued and much of the historically observed factor performance is attributed to a non-repeatable increase in valuations. Of the six factors analysed, they conclude that the only factor that is likely to perform well is Value since its valuation remains relatively low compared to historical levels.

Asness [8] highlights that valuation levels have historically been a relatively poor guide to future factor performance. He draws parallels between factor performance and the wider market performance. As an example, he refers to the stock market crash in 2007 when valuation metrics did not predict the correction of 2007. Asness [9] notes that if the factors are true risk factors and not systematic errors (which can be removed from the market when discovered), then they should underperform at some unpredictable point – the risk factor for which investors are rewarded. The emphasis is that this should not, however, discourage investing in factors or in the stock market in general.

Having highlighted recent thinking, in this paper, we examine two limitations stemming from the use of simple valuation comparisons. Firstly, we consider which valuation metrics to use, since different measures do not necessarily yield consistent conclusions. For example, Arnott et al [7] mention the Shiller P/E but use a price-to-book ratio, whereas Asness et al [9] use a price-earnings ratio. Secondly, we consider the subtle influence of portfolio construction on the relative valuation of factors, highlighting the confounding effects on relative valuations of variable levels of on and off-target factor exposures.

There is a concern over valuation but there is no consensus on approach to valuation of factors.

Valuation: Standard Single Factor Indexes

Despite the importance attached to valuation in general and its specific importance to factor investing, there is no consensus on the appropriate valuation metric or approach to follow to assess the valuation of portfolios as inter alia the discussion between Arnott et al and Asness highlights.

We examine the valuation of a set of single factor US indexes (Size, Value, Low volatility, Quality and Momentum) over the period between September 2000 to January 2019.¹

Table 1. Factor definitions

Factor	Definition
Value	Composite measure of sales-to-price, cashflow yield and earnings yield
Momentum	Return over 11-months preceding the last month
Quality	Composite measure of profitability (return-on-assets, asset turnover and accruals) and industry relative leverage ratio (operating cashflow over total debt)
Low volatility	Standard deviation of five years of weekly returns
Size	Logarithm of market capitalization

Source: FTSE Global Factor Index Series Ground Rules.

For each single factor US index, we calculate the active Value factor exposure (as in Table 1) and sales-to-price and book-to-price ratios relative to the underlying US index.² Active factor exposure is calculated as the arithmetic difference between the aggregate Z-score³ of each single factor index and the US market capitalization weighted index. Relative valuation is calculated as the ratio of the single factor index and the US market capitalization weighted index valuation metrics multiplied by 100.

Factors exhibit varying degrees of correlation with each other and consequently single factor indexes display a small (in the case of the non-Value factors), time-varying exposure to Value. This off-target Value exposure can be interpreted as a relative measure of Value for each factor index. The higher the active Value exposure, the “cheaper” the factor index.

The Quality and Momentum factor indexes displayed a negative active Value exposure in January 2019, meaning that they were relatively more expensive than the underlying US index.

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¹ For detailed definitions please see the FTSE Global Factor Index Series Ground Rules. https://www.ftse.com/products/downloads/FTSE_Global_Factor_Index_Series_Ground_Rules.pdf

² Throughout this note, our calculations are based on the FTSE US Index. The Russell 1000 Index leads to similar results and can be provided upon request.

³ For each factor, stock level Z-scores are calculated as normalized and winsorized raw factor values. Index level Z-scores are calculated as the weighted (by index weight) average Z-score.

Table 2. Active Value Exposure and Relative Valuation: US Single Factor Indexes

Factor Indexes	Active Value Exposure	Relative Valuation Ratios	
		Sales-to-Price	Book-to-Price
Quality	-0.07	94.1	75.5
Momentum	-0.11	88.7	83.5
Value	0.39	146.9	121.3
Size	0.16	136.7	121.9
Low volatility	0.01	97.6	100.9

Source: FTSE Russell. Data is calculated as of January 18, 2019. Single factor indexes based on FTSE US Index created for research purposes only. Please see the end for important legal disclosures.

Relative valuation ratios are another way to assess valuation. The higher the relative valuation ratio, the cheaper the single factor index is relative to the underlying market capitalization index. A reading above 100 means that the factor index is cheaper than the underlying index on the basis of the selected valuation ratio, and a 100 mark means that the valuations are the same.

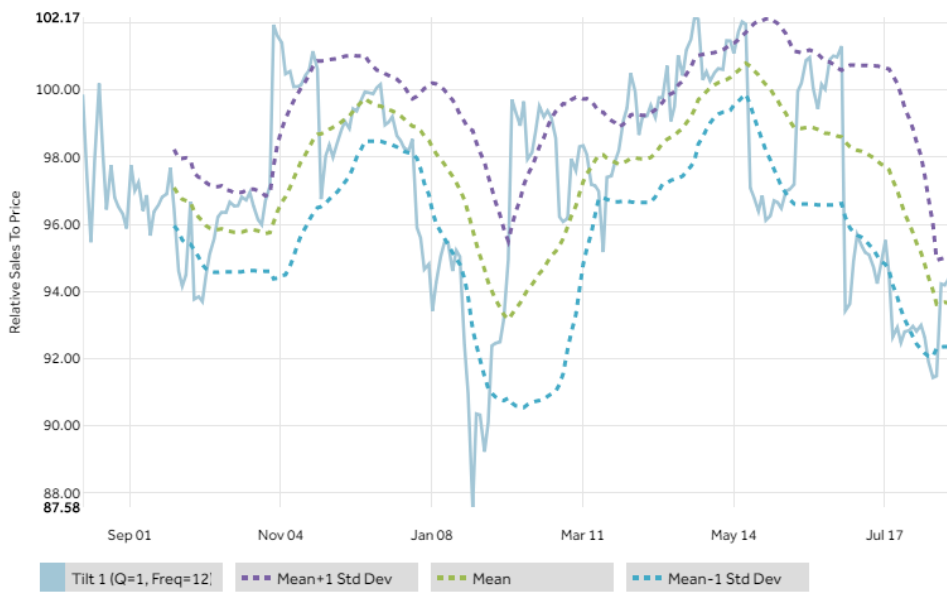
For example, both the Value and Size indexes were cheap relative to the benchmark in January 2019 based on sales-to-price and book-to-price ratios (circled in Table 2). Low volatility was marginally cheap based on book-to-price and marginally more expensive according to the sales-to-price ratio.

The figures in Table 2 are for a single point in time. Chart 1 shows the relative sales-to-price of the Quality US index through time. The relative valuation has been range-bound, fluctuating between 88 and 102, and is currently at average levels.⁴ The dashed lines indicate the 24-month rolling mean relative valuation level and the plus / minus, one standard deviation (24-month) bands around the mean. A reading above (below) the bands is commonly used as a measure of relative cheapness (expensiveness) compared to recent history.

Relative valuation ratios are another way to assess valuation. The higher the relative valuation ratio, the cheaper the single factor index is relative to the underlying market capitalization index.

⁴ The FTSE Russell online tool Analytics+ allows one to calculate data within different time frames and alternative valuation ratios. See the Analytics+ user guide at: <http://ftserussell.lseg.stockex.local/sites/ftserussell/marketing/Product%20Document%20Library/FTSE%20Analytics%20Plus%20Overview.pdf>

Chart 1. Relative Sales-to-Price Ratio: US Quality Index

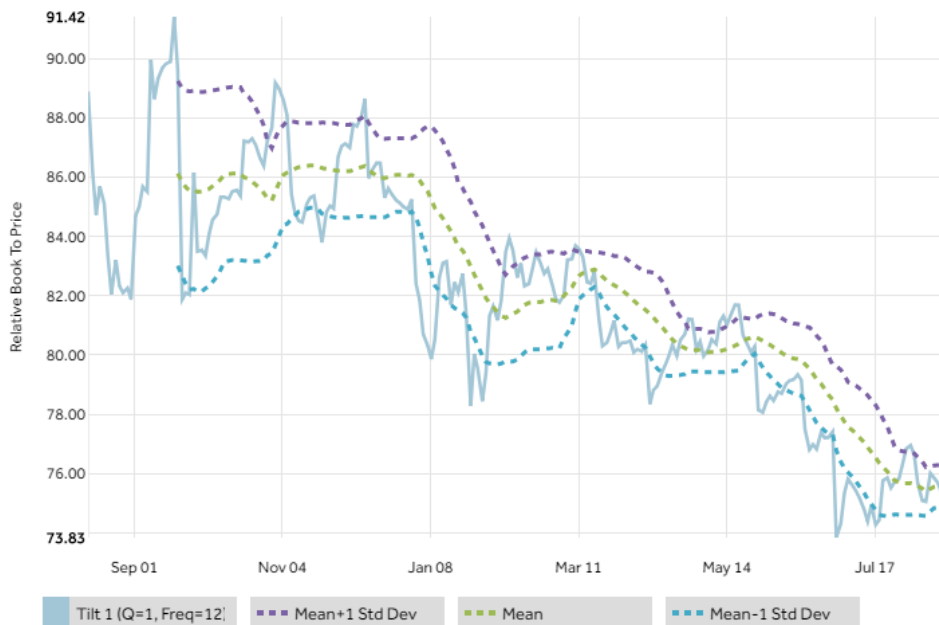


The sales-to-price and book-to-price ratios do not necessarily convey the same message on valuation.

Source: FTSE Russell. Monthly observations on the third Friday of each month, from September 2000 to January 2019. Index based on FTSE US Index created for research purposes only. Please see the end for important legal disclosures.

In contrast, the relative book-to-price ratio in Chart 2 has drifted steadily downwards from 89 to 76, indicating that the Quality index has become more expensive over time from a book-to-price ratio perspective.

Chart 2. Relative Book-to-Price Ratio: US Quality Index



Source: FTSE Russell. Monthly observations on the third Friday of each month, from September 2000 to January 2019. Index based on FTSE US Index created for research purposes only. Please see the end for important legal disclosures.

Comparing the valuation bands in Charts 1 and 2 also shows differences between the sales-to-price and book-to-price ratios relative to recent history. The difference is particularly stark in April 2018, when the relative book-to-price is above the upper band (1.2 standard deviations above the rolling mean), indicating relative cheapness, while the sales-to-price ratio is close to the lower band (0.8 standard deviations below the rolling mean), suggesting Quality was relatively expensive. Table 3 provides the figures for the relative valuation ratios and normalized relative valuations in April 2018.

Table 3. Active Value Exposure, Relative Valuation and Normalized Relative Valuation: US Single Factor Indexes

Factor Indexes	Active Value Exposure	Relative Valuation Ratios		Normalised Relative Valuations	
		Sales-to-Price	Book-to-Price	Sales-to-Price	Book-to-Price
Quality	-0.04	93.0	76.9	-0.8	1.2
Momentum	-0.12	87.9	84.6	-0.1	-1.3
Value	0.38	143.9	118.4	1.1	-0.7
Size	0.17	131.2	112.9	1.0	0.8
Low volatility	0.05	101.2	102.4	1.1	1.7

Source: FTSE Russell. US single factor indexes. Data is calculated as of April 20, 2018. Single factor indexes based on FTSE US Index created for research purposes only. Please see the end for important legal disclosures.

Valuation: Pure Factor Indexes

Assessing the valuation of a factor index is complicated by two further considerations: firstly, the level of active exposure to the target factor is itself time varying, blurring the relevance of time-series valuation comparisons; and secondly unintended, or off-target, factor exposures, may obscure true valuations. Tables 2 and 4 show only active Value exposures (for simplicity), however there are exposures to the other factors as well. We can assess these effects by targeting a constant level of active exposure to the factor of interest (e.g. 0.5 units of factor exposure) and additionally removing any off-target exposure to create “pure” factor indexes.⁵ In Table 4 and Chart 3, we assess the relative valuation characteristics of these pure factor indexes.

Pure factor indexes are designed to have a fixed specific on-target exposure and zero off-target exposures.

Table 4. Active Factor Exposure and Relative Valuation Ratios: Pure Factor Indexes

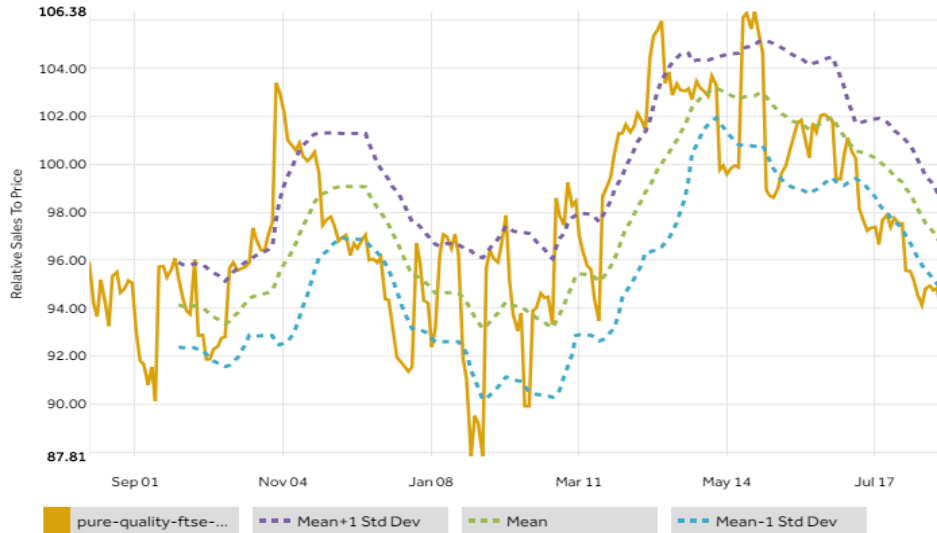
Pure Factor Indexes	Active Value Exposure	Relative Valuation Ratios	
		Sales-to-Price	Book-to-Price
Quality	-0.05	93.6	74.2
Momentum	0.04	100.0	87.1
Value	0.41	146.8	109.7
Size	0.01	100.0	96.8
Low volatility	-0.05	89.4	90.3

Source: FTSE Russell. Data is calculated as of January 18, 2019. Pure factor indexes based on FTSE US Index created for research purposes only. Please see the end for important legal disclosures.

⁵See “Factor Indexes and Factor Exposure Matching: Like-for-Like Comparisons”. October 2018 https://www.ftserussell.com/sites/default/files/factor-indexes-and-factor-exposure-matching-like-for-like-comparisons_0.pdf and

“Alternative Approaches to Multi-Factor Construction: Like-for-Like Comparisons”. November 2018 https://www.ftserussell.com/sites/default/files/alternative-approaches-to-multi-factor-index--construction-like-for-like-comparisons_0.pdf

Chart 3. Relative Sales-to-Price Ratio: Pure US Quality Index



Source: FTSE Russell. Monthly observations on the third Friday of each month, from September 2000 to January 2019. Index based on FTSE US Index created for research purposes only. Please see the end for important legal disclosures.

The tilt mechanism used to construct the initial set of factor indexes⁶ leads to relatively small off-target factor exposures. Consequently, the results in Table 4 are largely comparable to those in Tables 2 and 3, and Chart 3 is similar to Chart 1. However, different conclusions may sometimes be drawn. For example, in January 2019 the relative sales-to-price ratio of the pure Quality index was relatively expensive in Chart 3, while the standard Quality index appears fairly priced in Chart 1.

Despite similarities between Single and Pure factor indexes, different conclusions may sometimes be drawn. For example, in January 2019 the relative sales-to-price ratio of the pure Quality index was relatively expensive in Chart 3, while the standard Quality index appears fairly priced in Chart 1.

⁶ For further information on our factor tilting methodology, see "Factor Exposure Indexes", August 2014. https://www.ftserussell.com/sites/default/files/research/factor_exposure_indexes-index_construction_methodology_final.pdf

Alternative Single Factor Index Construction Approaches

Valuation differences are more striking when alternative index construction approaches to the creation of single factor indexes are used. One common alternative approach is Selection and Weighting (S&W), where a proportion of some initial universe of constituents is selected having been sorted by the desired factor characteristic. A simple diversified weighting scheme is then applied to form the index, like those suggested by Amenc et al [14]. As an example, we create a S&W index by selecting the top 50% of stocks ranked by the Quality score and then equally weight the constituents. The relative valuation ratios and active Value exposures are presented in Table 5 and compared to the standard and pure Quality indexes discussed earlier.

Valuation differences are more striking when alternative index construction approaches to the creation of single factor indexes are used. One common alternative approach is Selection and Weighting.

Table 5. Active Value Exposure and Relative Valuation Ratios

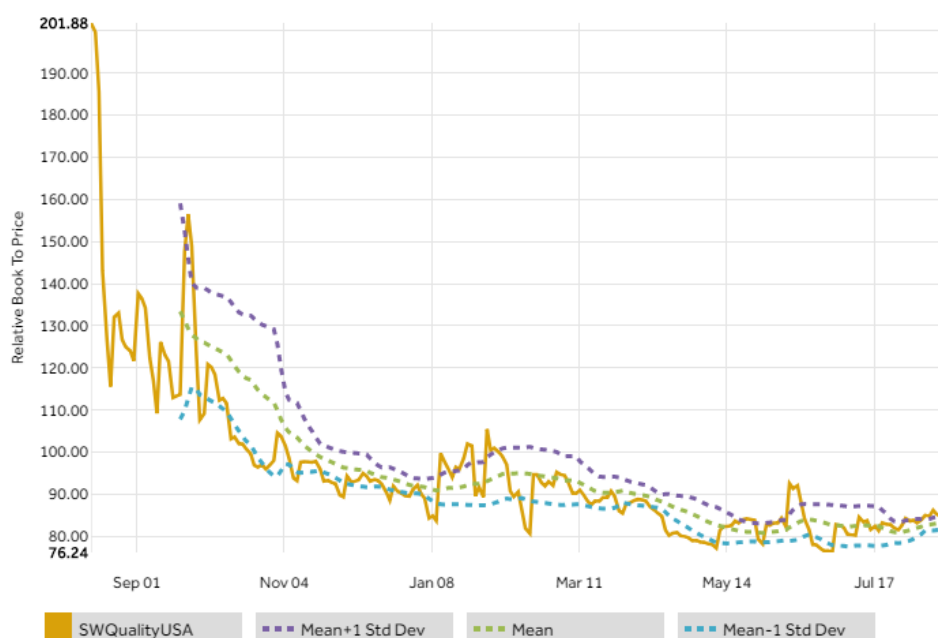
Index	Active Value Exposure	Relative Valuation Ratios	
		Book-to-Price	Sales-to-Price
Quality S&W Index	0.10	83.9	121.3
Pure Quality Index	-0.05	74.2	93.6
Standard Quality Index	-0.07	75.5	94.1

Source: FTSE Russell. Data is calculated as of January 18, 2019. US Quality, pure Quality and S&W Quality factor indexes based on FTSE US Index for research purposes only. Please see the end for important legal disclosures.

In Table 5, the S&W Quality index appears notably cheaper than the pure and standard Quality indexes in terms of the active Value exposure and sales-to-price and less expensive on book-to-price basis.

Charts 4 shows that the relative sales-to-price ratio for the S&W Quality index also looks very different through time to the results of standard and pure Quality indexes shown in Charts 1 and 3.

Chart 4. Relative Sales-to-Price Ratio: Selection and Weighting US Quality Index



Charts 4 shows that the relative sales-to-price ratio for the S&W Quality index also looks very different through time to the results of standard and pure Quality indexes shown in Charts 1 and 3.

Source: FTSE Russell. Monthly observations on the third Friday of each month, from September 2000 to January 2019. Index based on FTSE US Index for research purposes only. Please see the end for important legal disclosures.

Table 6 highlights the source of these valuation differences – significant off-target factor exposures that result directly from the construction technique used. Active Quality factor exposures of all three indexes are similar, around 0.5, so it is not the source of the significant differences in valuation. The S&W Quality index has active Value exposure of 0.18, and most importantly, a substantial 1.26 units of exposure to Size. It is these off-target factor exposures that are responsible for the shift in valuation relative to the pure Quality index and highlight the role that construction has in introducing off-target exposures into single factor indexes.

Table 6. Average active factor exposures September 2000 to January 2019

Index	Active Factor Exposures				
	Value	Momentum	Size	Quality	Low volatility
Quality S&W Index	0.18	-0.04	1.26	0.55	-0.13
Pure Quality Index	0.00	0.00	0.00	0.47	0.01
Standard Quality Index	0.00	0.00	-0.08	0.45	0.12

Source: FTSE Russell. Average monthly active factor exposure. Monthly observations on the third Friday of each month, from September 2000 to January 2019. US Quality, pure Quality and S&W Quality factor indexes based on FTSE US Index for research purposes only. Please see the end for important legal disclosures.

Conclusion

As factor investing becomes more popular, questions regarding factor valuations are increasingly common. Despite seemingly simple questions, answers can be far from straightforward. As with individual stocks, there is no definitive valuation metric which provides a clear answer, and different valuation metrics may well result in different conclusions. The situation is even more intricate in the case of factor indexes. The way factor indexes are constructed may introduce time-varying exposures to other factors, further muddying the valuation picture.

We have used the FTSE Russell Analytics+ tool to illustrate the relative valuations and active Value exposure of five single factor indexes: Value, Quality, Low volatility, Momentum and Size, constructed using the FTSE Russell factor tilt methodology [15] - [18]. We compare the valuation outcomes of the Quality index to those of a pure Quality factor index. The resulting valuation differences are not significant as the off-target factor exposures of these single factor indexes tend to be small. The results are similar for other factors.

We have also examined the valuation outcomes of a Quality factor index constructed using a common alternative methodology: Selection and Weighting. The substantial active off-target factor exposures resulting from this construction technique cause valuations to differ significantly from those of a pure Quality factor index. Therefore, when assessing factor valuations, investors need to be mindful of the time varying influence of both on and off-target factor exposures on the relative valuation of factors, which arise from simple construction techniques.

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