Insights

FTSE Russell

The objectives of factor indexes

What are factors?

In finance and investment theory, factors are variables that drive equity returns. In recent decades there has been great interest in identifying factors that help explain equities' behavior, and factor research has been actively pursued across other asset classes, such as fixed income and currencies.

Some drivers of individual equities' returns are clearly idiosyncratic meaning that they are specific to the stock or company itself. A strike affecting a particular company is an example of such stock-specific risk. Stock-specific risk can be reduced by portfolio diversification.

By contrast, systematic risk is common to a group of securities as a whole and cannot be reduced by diversification. Such systematic risk can be seen as caused by exposure to a common factor (or factors). In the same way as insurers receive insurance premia for assuming particular categories of risk, systematic risk in the equity markets generates a return premium that can be earned by investors willing to assume the risk.

The concept of systematic risk is closely tied to the Capital Asset Pricing Model (CAPM), a theory introduced in the 1960s.

Single and multi-factor models

CAPM is a single factor model. It assumes that a single factor (market risk) is the primary driver of stocks' returns. Equities offer investors this long-term risk premium for holding relatively subordinated claims on companies' assets and their future earnings.

However, since CAPM was first introduced, there has been empirical evidence of the existence of other factors which, in addition to market risk, can help to explain equities' performance. Academics have put forward a number of theories to explain the returns earned by exposure to these additional factors.

Although equity market researchers and index firms may differ in the precise set of factors they use, there is a reasonable degree of consensus regarding the scope of factors. In its global equity market factor framework FTSE Russell uses eight factors: value, size[1], momentum, residual momentum[2], (low) volatility[3], quality[4], liquidity[5] and yield.

Individual factor risk premia can be seen as the "reward" to investors for accepting a particular type of systematic risk: according to Andrew Ang, Professor of Finance at Columbia University, investors accumulate factor risk premia for accepting the risk of losses during market downturns. In Ang's words, "investors reap long-run factor premia by embracing risks that lose money during bad times, but make up for it the rest of the time with attractive rewards"[6].

For example, the value factor premium may represent compensation for higher levels of default risk. The size factor premium, which accrues to investors holding small-capitalization stocks, may represent compensation for owning less widely researched and riskier companies. The liquidity factor premium can be seen as an additional reward for holding less liquid stocks.

Other explanations for the existence of factor premia are behavioural or structural; in other words, they result from collective biases among investors or from restrictions that limit arbitrage activity. For example, the momentum factor, which reflects the tendency for persistence in equity price movements, may result from an initial under-reaction among investors to new information affecting companies' valuations, followed by a subsequent over-reaction (a behavioural explanation). A structural explanation for the momentum factor return is that trading costs inhibit arbitrageurs seeking to counteract temporary overshoots in share prices.

Factor investing

Factor-based investing can be seen as an alternative method of portfolio construction. Whereas traditional portfolio approaches focus on diversifying across asset classes, geographies and industries, a factor approach aims at diversifying across factors.

As interest in factor investing has grown, academic studies have shown that a large proportion of the excess returns historically generated in equity markets by active managers can be attributed to exposure to systematic factors.

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[1] See Fama, E., French, K., (1992), "Common risk factors in the returns on stocks and bonds", Journal of Financial Economics 33 and http://www.ftse.com/products/downloads/FTSE_Value_Factor_Paper.pdf

[2] See http://www.ftse.com/products/downloads/FTSE_Momentum_Factor_Paper.pdf and Jegadeesh, M., Titman, S., (1993), "Returns to Buying Winners and Selling Losers", Journal of Finance 48/1; Carhart, M., (1997), "On Persistence in Mutual Fund Performance", Journal of Finance 52/1

[3] See Haugen, R., Baker, N., (1991), "The Efficient Market Inefficiency of Capitalization-Weighted Stock Portfolios", Journal of Portfolio Management 17/1

[4] See http://www.ftse.com/products/downloads/FTSE_Quality_Factor_Paper.pdf

[5] See Pastor, L., Stambaugh, R., (2001), "Liquidity Risk and Expected Stock Returns", Journal of Political Economy 111/3

[6] See Ang, A., (2013), "Factor Investing", Columbia Business School Research Paper 13/42

For example, in their 2009 evaluation[7] of the performance of Norway's sovereign wealth fund, Professors Ang, Goetzmann and Schaefer argued that a significant component of the fund's performance could be explained by exposure to systematic factors. The authors recommended that, in future, such factor exposures should be treated as part of the fund's performance benchmark.

Embedding factor exposure in the benchmark in this way (for example, via the use of factor indexes) arguably provides a more appropriate performance measurement framework for active managers. Alternatively, a passive product (index-tracking) approach could be used to gain exposure to the desired factors.

Another reason for growing interest in the factor asset allocation approach is that active manager skill is hard to identify and maintain. Researchers at Vanguard Asset Management reported in 2014[8] that, based on a study of the past performance of actively managed UK funds, past performance has not been a strong indicator of future success and there is no systematic tendency for top-performing funds in one period to produce above-average performance in the subsequent period.

And once costs were taken into account, Vanguard said, the average actively managed fund underperformed its benchmark while exhibiting greater volatility. Growing investor awareness of such studies has increased demand for exposure to common factors that can be replicated relatively cost efficiently in a transparent, rules-based framework.

Defining factors

The definitions of individual factors are typically based on broad academic and practitioner consensus. For example, the measure of value used by Fama and French in 1992 was a simple one: the ratio of book value to market value (commonly referred to as "book-to-price").

However, there are alternative measures of value: for example, cash flow yield, earnings yield, dividend yield and the sales-to-price ratio. Importantly, some (such as earnings yield or book value) may be more reliant on the accounting approach taken by particular companies or in individual markets[9]. Where there is scope for subjectivity or market-specific biases, a composite scoring method for individual factors may make more sense than a single factor measure.

In its Global Factor Index Series, FTSE Russell uses the following combination of single and composite factor measures:

- Value: Composite of trailing cash-flow yield, earnings yield and country-relative sales-to-price ratio
- Size: Natural logarithm of full market capitalization
- Momentum: Total return in local currency terms over the previous year
- Residual Momentum: Residual Sharpe ratio
- Volatility: Standard deviation of 5 years of weekly (Wednesday to Wednesday) local total returns

[7] "Evaluation of Active Management of the Norwegian Government Pension Fund – Global", December 14, 2009

[8] Westaway, P., Schlanger, T., Philips, C., Thomas, C., (2014), "The Case for Index Fund Investing for UK Investor

[9] See http://www.ftse.com/products/downloads/FTSE_Value_Factor_Paper.pdf for an in-depth examination of these value measures.

- Quality: Composite of profitability (return on assets), efficiency (change in asset turnover), earnings quality (accruals) and leverage
- Liquidity: Log of the Amihud ratio (the median ratio of absolute daily return to daily traded value) over the previous year
- Yield: Natural logarithm of each company's twelve-month trailing dividend yield

Achieving controlled factor exposure in the index

Once factor definitions have been agreed upon, there remains the question of how to embed the factor exposure in the index. Ideally, a factor index should provide controlled exposure to the factor (or factors) of interest using a transparent, and consistent and general methodology.

But given that factor indexes are designed to serve both as benchmarks for particular types of investment approach and as the basis for index-replicating financial products, index designers also need to pay due consideration to levels of index capacity, diversification and turnover.

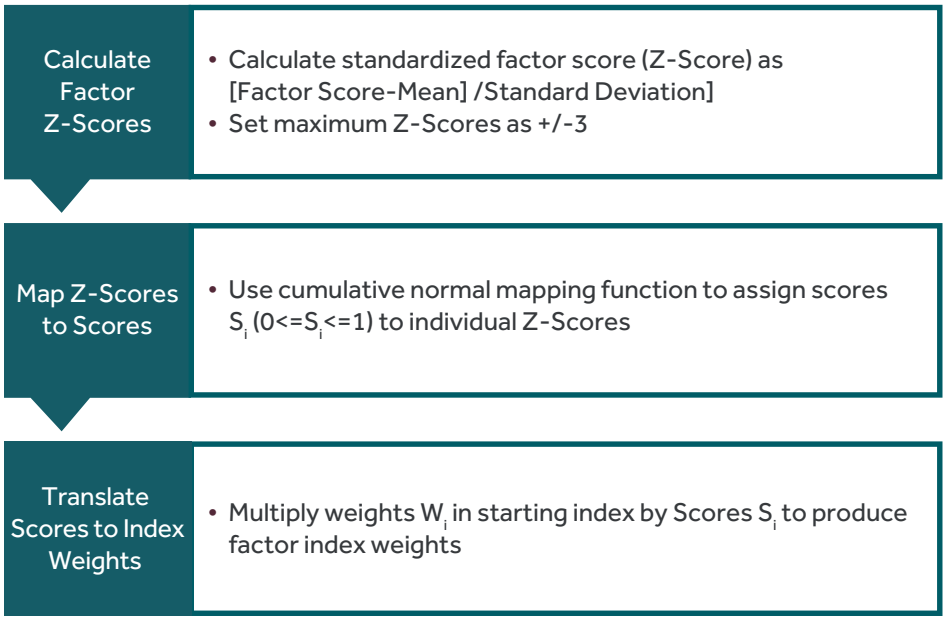
There is a natural trade-off between some of these desired characteristics: for example, maximizing the factor value of the index would be likely to lead to excessive concentration in a few stocks, resulting in potential instability of the factor exposure over time and inevitably high turnover at index reviews.

In its Global Factor Index Series FTSE Russell therefore follows the following design steps, which are intended to strike a balance between factor exposure and replicability.

- Factor scores are standardized to fall within a range of +/- 3 standard deviations from the mean factor score of zero
- Factor scores are converted into index weights that range from 0 to +1 using a cumulative normal distribution function

These two steps have the combined effect of limiting the effect of the smallest and largest factor scores within the sample and avoiding a potentially problematic concentration of the index in stocks with high factor scores.

Constructing single factor indexes



Narrowing the factor index

Factor indexes can be "narrowed" by removing stocks with the smallest contribution to the index's factor exposure objective. Stocks are removed sequentially while satisfying capacity, exposure and diversification constraints at the index level in order to increase levels of exposure to the desired factor(s).

This is done by calculating the index's levels of factor exposure, diversification and capacity each time a stock is removed until a specific constraint is violated[10].

What are factor indexes designed to achieve?

Factor indexes are designed to reflect the performance of stocks with specific characteristics that represent a given factor (or factors). They meet the growing demand for benchmarking tools to be used in factor-based asset allocation approaches, whether in active or passive management.

For example, factor indexes may be used both by investment managers seeking to benchmark the performance of portfolios with exposure to a particular type of factor (for example, value or small-cap stocks), or as the performance target in index-replicating financial products such as ETFs.

In order to serve the needs of investors, factor indexes should follow a transparent and consistent construction methodology, with due consideration for diversification, capacity and ease of replication.

[10] See the Index Ground Rules (http://www.ftse.com/products/downloads/FTSE_Global_Factor_Index_Series_Ground_Rules.pdf?305), Section 6, for further details of this procedure.

As the performance of individual factor indexes may diverge from that of the capitalization-weighted market benchmark for sustained periods, there is growing interest in diversification across factors and how best to limit potential timing risks in a factor-based asset allocation approach.

A well-designed factor index range must therefore enable market participants to use the index to inform their allocation decisions across factors and assist them in achieving simultaneous exposure to multiple factors.

For more information about our indexes, please visit ftserussell.com.

About FTSE Russell

FTSE Russell is a leading global provider of benchmarking, analytics and data solutions for investors, giving them a precise view of the market relevant to their investment process. A comprehensive range of reliable and accurate indexes provides investors worldwide with the tools they require to measure and benchmark markets across asset classes, styles or strategies.

FTSE Russell index expertise and products are used extensively by institutional and retail investors globally. For over 30 years, leading asset owners, asset managers, ETF providers and investment banks have chosen FTSE Russell indexes to benchmark their investment performance and create ETFs, structured products and index-based derivatives.

FTSE Russell is focused on applying the highest industry standards in index design and governance, employing transparent rules-based methodology informed by independent committees of leading market participants. FTSE Russell fully embraces the IOSCO Principles and its Statement of Compliance has received independent assurance. Index innovation is driven by client needs and customer partnerships, allowing FTSE Russell to continually enhance the breadth, depth and reach of its offering.

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