A MULTI-FACTOR STRATEGY FOR INDEX ENHANCEMENT

An approach to finding alpha by avoiding two of others’ biggest mistakes

One of the most powerful biases that drives stock behavior is also one of the most difficult to capture — investors’ tendency to overpay for stocks that have the possibility (however remote) of a very large payoff. In statistical terms, these stocks are described as having high positive “skew.” More popularly, they can be thought of as “lottery” stocks. “Safety” stocks, those with relatively small chance of a very large loss, display a similar, though not identical, return pattern and also fall into the positive skew group. For both lottery stocks and safety stocks, disproportionately higher expectations for future returns translate to higher current valuations and, consequently, lower future stock performance. This study proposes a multi-factor approach to outperforming an index by avoiding both of these types of stocks. We focus on a combination of three factors — value, volatility and a specific type of quality (profitability) — that in our experience characterize firms with positively skewed return expectations.

Key Findings

- Contrary to what the low-volatility literature would suggest, we show that it is not necessary to avoid all high-volatility stocks, only those that are expensive and less profitable. Similarly, not all low-volatility stocks outperform. Indeed, those that are expensive relative to their profitability actually underperform the market.

- By applying our multi-factor elimination method to benchmark constituents and then equal weighting those that remain, we are able to create portfolios that outperform all the universes sampled (Russell 1000®, S&P 500, Russell 2000® Value, Russell 2000® Growth, and MSCI EAFE), with average annual excess of returns of 2–3.6% and risk levels comparable to their benchmarks or lower. Alpha is also positive against the equal-weighted versions of the indexes, showing that outperformance is incremental to the small-cap bias inherent in equal weighting.

- The composition of the portfolios generally runs countercyclical to market environments, avoiding more lottery stocks when investor sentiment is high and more safety stocks when sentiment is low, tilting away from sectors or industries generating a lot of investor attention.

For professional investors only.
All investments involve risk, including the possible loss of capital.
Introduction

A popular type of exchange-traded fund (ETF) is the low-volatility ETF, which invests in “boring” high-dividend-paying stocks characterized by lower volatility than the rest of the market. This category of investment seems to lie at the opposite end of the risk spectrum from the more speculative high-flying technology stocks that dominate so much of today’s financial media coverage. But this obscures their common trait: both categories have return profiles for which investors are frequently willing to pay a steep premium.

The technical term for this pattern of expected returns is positive skew, which refers to how the standard bell-shaped normal distribution of possible returns is skewed in a positive direction (Figure 1a). Speculative growth companies are the classic type of high positive-skew stock. Investors assess these firms almost solely on the huge (but low-probability) payoffs that could result if their business model proves successful. These companies typically have low or even negative profits, high valuations and high stock volatility due to the higher uncertainty about their future. These lottery stocks may pay off big if successful, but they may also pay nothing at all.

In contrast, the positive skew of the low-volatility safety stocks results not from huge low-probability gains but from their lower probability of large losses, that is, the near absence of returns on the left side of the distribution (Figure 1b). Often investors pay a premium for these stocks because sentiment about the market is negative, and they are willing to pay more to avoid the anticipated drawdown of the market as a whole. Nonetheless, the realized outcomes are similar. Because these stocks, too, will enjoy higher valuations, they are likely to have a negative future performance.

The connection between high positive skew and lower realized returns has extensive support in the literature. Starting with the seminal work on the role of return distribution in the formation of equilibrium stock prices, theoretical models and empirical findings repeatedly show that, unlike with a stock’s variance, as a stock’s skew increases in relation to the market, its relative future performance declines. The main difficulty of these studies is in identifying the stocks that have higher ex ante relative skew. One can, of course, estimate the skew of a firm’s expected returns from the skew of its past returns. For example, previous studies focused on maximum daily return, historical estimates of skew, and related options activity. However, it is the actual skew of expected returns, not the skew of past returns, that investors have in mind when they bid up the prices of these stocks and that most directly affects future returns.

In this study, we use a multi-factor approach to identify stocks with positively skewed expected returns. Rather than attempting to tease out different aspects of the ex post data, we focus on the three factors — value, quality (e.g., profitability) and return volatility — that in our experience characterize high-skew firms going forward. As suggested above, we choose these factors because high positive-skew lottery stocks tend to be expensive and unprofitable considering how volatile they are, and high positive-skew safety stocks tend to be expensive relative to their profitability, even considering the stability they seem to offer. We then avoid the stocks flagged by our multi-factor method and construct portfolios from all other constituents of the benchmark.

![Positive Skew](image)

Source: QMA.


Because no stock that remains is inherently more attractive than another, we hold them in equal weights. By definition, this should be expected to introduce a small cap bias into our portfolios (as smaller companies are held in equal weight with larger ones), which can, of course, itself be a source of incremental returns.6 Thus, in addition to comparing the performance of our portfolios to the standard cap-weighted benchmarks, we also compare them to the equal-weighted versions, so we can assess how much of our alpha comes from the equal weighting and how much from avoiding safety and lottery stocks.

**Constructing the Model**

Our first step was to construct a multi-factor model for identifying high positive-skew firms based on value, quality and volatility. To assess relative value, we sorted firms into quintiles within a sector according to the ratio of their book to market value (B/M), assigning the most expensive firms (lowest B/M) to the first quintile (Quintile 0) and the cheapest (highest B/M) to the fifth (Quintile 4). We used a similar methodology to assess quality (profitability), basing our sector quintile ranks on the ratio of gross margin to total assets, with Quintile 0 encompassing the least profitable firms and Quintile 4 the most profitable. We then added these quintile ranks to obtain a combined rank for valuation and profitability that ranged between 0 (the most expensive companies with the lowest profits) and 8 (the cheapest and most profitable).

Next, we classified all companies in the universe into quintiles for volatility according to their standard deviation of returns in the prior 90 days, so that companies in Quintile 0 were the least volatile and those in Quintile 4 were the most volatile. We then had a dual score for each company that was in the range of 0 – 8 for valuation and profitability, and 0 – 4 for volatility. To construct the portfolios, we simply avoided all companies whose volatility score was either equal to or above their score of value plus profitability.

**First Test: Russell 1000®**

To illustrate our approach, let’s review how we proceeded with our first universe, the Russell 1000® Index. We looked at the period from 1987 to 2017, and for each month we grouped the index constituents into the value-profitability and volatility quintiles described above. We also rebalanced the portfolio on a monthly basis. Figure 2 shows the average monthly excess returns for each of our volatility and value-profitability combinations. As we can see, the stocks we avoided (those above the bold line) mostly underperformed the benchmark, while those we selected (below the line), mostly outperformed, suggesting our multi-factor strategy was successful.

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3/ Number of Avoided Firms

a. Information Technology

b. Financials

As of 12/2017.
Sources: FactSet, Russell®, Compustat, Datastream.
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Figure 4 shows the resulting cumulative excess returns and other characteristics of our multi-factor portfolio compared to both the Russell 1000® cap-weighted and equal-weighted indexes over the entire 30-year period. Consistent with the patterns in Figure 1, the multi-factor portfolio outperforms both versions of the index, with an average annual alpha of 2.62% and 0.94%, respectively. While the portfolio has a slightly higher standard deviation than the Russell 1000 (likely due partly to its equal weighting), its maximum drawdown is quite comparable. One issue of note is that the portfolio does have relatively high turnover of 8.69% per month (104% per year), which, left unchecked, could cut into the alpha actually generated in a real-world portfolio construction setting.

Extending the Approach

We next explored two main extensions of our approach. First, we addressed the relatively high turnover. Then we applied the approach internationally (to the large cap MSCI EAFE Index) as well as to three other domestic universes: the S&P 500 Index, with half the number of stocks as the Russell 1000®, and the Russell 2000® Value and Russell 2000® Growth indexes, each of which has its own distinct factor tilt. To reduce the turnover, we adopted so-called confidence bands, so that no trading would take place in a stock if its weight at the rebalancing date was already within 10% of the desired position weight based on factor scoring. We also moved from monthly rebalancing to quarterly.

When we recalculated our portfolio returns against the Russell 1000® using the confidence bands and quarterly rebalancing, annual alpha declined by a mere 20 bps to 2.42%. Most of the other portfolio characteristics also had very minor effects, with the exception of turnover, which was cut in half (52%). Furthermore, results in the other universes using the same turnover modifications were generally on par with those achieved.
in the Russell 1000®. For example, in the S&P 500, while the percentage of stocks avoided was lower (one-quarter vs. one-third), annual alpha was still 2.1% against the cap-weighted version and 0.46% against the equal-weighted version of the benchmark. The other portfolio characteristics were similar to those in the Russell 1000® universe, with a somewhat higher annual turnover of about 78%. In the MSCI EAFE, where 40% of stocks were avoided, alpha was actually higher than in the Russell 1000® — 3.32% and 1.5% against the cap-weighted and equal-weighted benchmarks, respectively — with turnover of about 90%.

An interesting pattern was seen in the Russell 2000® Value universe. There, our multi-factor portfolio outperformed the equal-weighted version of the index even more than it did the cap-weighted (2.69% vs. 2.37% annually), although this small cap value universe was also the only one in which the portfolio had a beta that wasn’t below 1 (1.01).

Some of the most compelling results were found against the Russell 2000® Growth universe. As with the Russell 2000® Value, we might expect to see lower returns against this index, given that it is already tilted toward smaller firms (presumably neutralizing much of the advantage of our equal weighting). Yet, our multi-factor portfolio outperforms both the cap-weighted and equal-weighted versions of the Russell 2000® Growth Index by 3.6% annually. Moreover, it does so with a maximum drawdown that is nearly 12 percentage points better than the cap-weighted Russell 2000® Growth (-50.77% vs. -62.42%) and more than five percentage points better (-50.77% vs. -56.04%) than the equal-weighted.

**Conclusion**

This study illustrates an attractive alternative to index investing, either as a diversifying complement to standard passive core exposures or as a stand-alone investment. It is based on the notion that many investors are willing to pay a premium for lottery stocks and safety stocks. Our approach was to avoid such stocks if they are too expensive, and to hold only the remaining benchmark constituents in equal weights. To identify the stocks we wished to avoid, we relied on three factors — value, quality (profitability) and return volatility. We avoided stocks that had higher volatility relative to their combined valuation and profitability rankings, or, alternatively, lower valuation and profitability relative to their (low) volatility.

We provided evidence that the multi-factor approach we use to construct portfolios outperforms a range of indexes, with comparable or better risk levels. We also showed that our approach outperforms the equal-weighted version of these indexes, indicating that it does not get its entire outperformance from a small-cap bias relative to the cap-weighted index. In addition to its small cap and value tilts, the portfolio takes sector exposures that are different from the benchmark as part of its avoidance of lottery and safety stocks. Moreover, in spite of avoiding many high-volatility stocks, our portfolios have only a minor low-volatility tilt. On balance, then, we believe our approach offers a reasonable alternative to index investing, one with the potential for outperformance that comes from avoiding high positive-skew stocks that are traded at a premium.

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*As of 9/30/2018.
Sources: FactSet, Russell®, Compustat, Datastream.

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