

Research

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Getting defensive about the small cap premium

Key points:

- The small cap premium has long been a staple of equity investing, but recently some practitioners have called its very existence into question.
- New research suggests that the mix of quality, volatility and size factors is important. This is confirmed with an analysis of the Russell 2000® Defensive Index, which combines these three factors and exhibits a strong small cap premium.
- The performance of the Russell 2000® Defensive Index points the way to exploring further multifactor combinations in the small cap asset class.

Academic researchers have been studying the small cap premium for more than 30 years. The first breakthrough, reported in a 1981 paper by Rolf Banz, was the finding that “smaller firms have had higher risk-adjusted returns, on average, than larger firms.”¹ This performance difference has come to be known as the “size effect” or the “small cap premium.” The notion of both a small cap premium and a value premium in equity returns was solidly established with the publication of papers by Nobel Prize winner Eugene F. Fama and co-author Kenneth R. French.² The Fama-French three-factor model of market, value and small cap factors has become a bedrock of academic and practitioner research.

Around the same time Banz was publishing his research, the just-formed Russell Indexes was conducting research into the behavior of investment managers who focused on smaller companies. The immediate need was for a benchmark that could be used by Russell Investment’s consulting clients to gauge the success of those managers. This led to the development, in 1984, of the Russell 2000® Index, the first index to comprehensively measure the small cap segment of the U.S. equity market.³

It is natural to ask whether the comprehensive Russell 2000 Index captures the small cap premium. One possible answer can be provided by the Fama-French three-factor model mentioned above. The equation below makes use of the Fama-French model and applies it to the Russell 2000 Index:

$$R_{2000} - rf = a + b \cdot (\text{Market} - rf) + c \cdot \text{SmallCap} + d \cdot \text{Value} + \text{error}$$

Market is the broad market factor return.⁴ The coefficient *b* is the “market beta” from the capital asset pricing model (CAPM) developed by William Sharpe.⁵ A market beta of 1.0 indicates that, all else equal, the index or portfolio on the left side tends to move up and down in percentage-wise lockstep with the broad market. *Rf* is the “risk-free rate” of financial theory, which is proxied by the one-month T-Bill return. *SmallCap* is the “small-minus-big” (SMB) portfolio return, which is calculated as the difference between the returns to the sub-portfolio of smallest cap stocks and the returns to the sub-portfolio of largest cap stocks. The coefficient *c* measures the exposure of the Russell 2000 Index to the small cap factor. *Value* is the “high-minus-low” (HML) portfolio return, which is the difference

¹ Banz, R., “The Relationship between Market Value and Return of Common Stocks,” *Journal of Financial Economics*, 1981.

² Fama, E., and K. French, “The Cross-Section of Expected Stock Returns,” *Journal of Finance*, 1992; Fama, E., and K. French, “Common Risk Factors in the Returns on Stocks and Bonds,” *Journal of Financial Economics*, 1993.

³ Koenig, D. “The Russell 2000 Index: 30 Years of Small Cap,” *Russell Index Insights*, 2014.

⁴ Fama and French use the CRSP broad market index as their market proxy, which we use here to maintain consistency with their methodology.

⁵ Sharpe, W., “Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk,” *Journal of Finance*, 1964.

It is natural to ask whether the comprehensive Russell 2000 Index captures the small cap premium.

between the returns to the sub-portfolio of highest book-to-price stocks and the returns to the sub-portfolio of lowest book-to-price stocks. Book-to-price (or book-to-market) is widely considered to be one of the most powerful indicators of how cheap a stock is – i.e., whether it is a value stock. The coefficient d measures the Russell 2000 Index's exposure to the value factor.

Regression estimates of the Russell 2000 Index against the Fama-French model for June 1996 through August 2015 are given in Table 1. The market beta was very close to 1.0, suggesting that the Russell 2000 has tended to move in lockstep with the broad market, if one did not consider other factors. The two other factors considered were the small cap and value factors, which were both statistically significant. The estimated small cap exposure was especially large and statistically significant. The value exposure coefficient d was also statistically significant, indicating that the Russell 2000 had a slight value tilt. The value tilt was a natural result of the Russell 2000 Index's inclusiveness, whereby some stocks with relatively large book values, which were likely “beaten down” in price enough to be classified as small cap, would then also have high book-to-price ratios.

Table 1. Russell 2000 Index 1996:06 – 2015:08

| | Constant | Market beta | Small cap (SMB) | Value (HML) | R-squared |
|---------------------|----------|-------------|-----------------|-------------|-----------|
| Estimated exposures | -0.002 | 1.01 | 0.78 | 0.26 | 0.97 |
| (T-stat) | (-2.58) | (72.01) | (41.46) | (12.99) | |

Sources: FTSE Russell and Kenneth French website. Data as at August 2015. Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see the end for important legal disclosures.

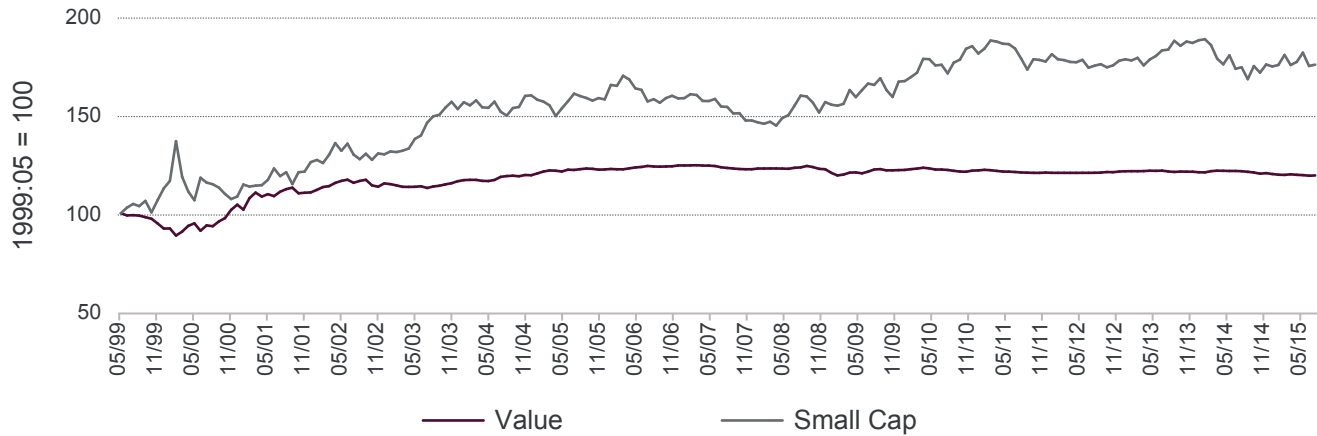
Table 1 establishes that the Russell 2000 Index has had a statistically significant exposure to the Fama-French measure of the small cap premium. But how did that contribute to performance? To get a sense of that, we calculated the performance of the Russell 2000 Index by factors. This was accomplished by running three-year rolling regressions of the Russell 2000 Index against the Fama-French model from June 1996 through August 2015 to capture time-varying exposures, then multiplying the exposures by the time-varying returns to the Fama-French portfolios, and summing them. This produced smoothed contributions to total index return not accounted for by the market factor or the constant. Figure 1 displays the results.⁶

Measured this way, the annualized index return attributed to the small cap factor within the Russell 2000 Index was 3.5%, while the return to the much smaller value tilt was 1.1% per annum. The compounded annual total return for the Russell 2000 Index was 7.6%, which suggested that a substantial portion of the total return was attributable to the small cap premium. This would seem to be compelling evidence in favor of efforts to capture the small cap premium through the Russell 2000 Index. Despite this evidence, doubts about the very existence of a small cap premium have been voiced, and that is the subject of the next section.

Despite this evidence, doubts about the very existence of a small cap premium have been voiced,

⁶ The series must begin at May 1999, because this is calculated from three-year rolling regressions.

Figure 1. Performance by factor within the Russell 2000 Index



Source: FTSE Russell and Kenneth French website. Data as at August 2015. Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see the end for important legal disclosures.

Doubts about the existence of a small cap premium

Some recent articles have called into question the existence of a small cap premium.⁷ Some have argued that the small cap premium has disappeared since the 1980s, when it was first discovered. The performance of the Russell 2000 Index was often cited to support the claim. Table 2 shows the performance of the small cap Russell 2000 Index versus the large cap Russell 1000® Index since 1996. The average arithmetic return of the Russell 2000 Index was a bit greater than that of the Russell 1000 Index, but once the “volatility drag” of the Russell 2000 Index was taken into account, either through Sharpe ratios or compounded returns, the Russell 2000 Index had actually underperformed the Russell 1000 Index during this period.

Table 2. 1996:06 – 2015:08

| | Arithmetic average return | Standard deviation | Sharpe ratio | Compounded (geometric) return |
|--------------|---------------------------|--------------------|--------------|-------------------------------|
| Russell 2000 | 9.2% | 20.1% | 0.34 | 7.6% |
| Russell 1000 | 8.7% | 15.6% | 0.41 | 7.8% |

Source: FTSE Russell. Data as at August 2015. Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see the end for important legal disclosures.

The cyclical nature of small cap performance is well known, but some researchers have concluded that this longer-term performance is predictive of the future. One theory is that the small cap premium was really a liquidity premium, which is gone now that small cap stocks are more liquid. Another is that the small cap premium disappeared shortly after the publication of the early papers, which resulted in an explosion of small cap funds that arbitrated it away. Yet

⁷ Two practitioner examples are Bryan, A. (2014), “Does the Small-Cap Premium Even Exist?,” *Morningstar*, and Kalesnik, V., and N. Beck (2014), “Busting the Myth About Size,” *Research Affiliates*.

another theory suggests that an upward bias exists in the historical data, due to inadequate treatment of delisted stocks, and so the small cap premium was never really there in the first place.⁸

The defensive insight

New research squarely addresses the doubts. Asness et al (hereinafter AFIMP) make a strong case that, once what they define as “quality” is controlled for, a stable and significant small cap premium emerges.⁹ It is worthwhile taking time to understand the definition employed in their paper. They define quality very broadly as measures of profitability, profit growth, safety and payout. In order to preempt charges of data mining, they employ a kitchen-sink approach with many characteristics. Table 3 lists them. One could usefully aggregate the AFIMP list of characteristics into two groupings. The volatility characteristics might come under the heading of “Low Volatility,” and all of the other characteristics might come under the heading of “High Quality.” These groupings of characteristics might be called “factors.”

Table 3. AFIMP paper Grouped Characteristics

| | Characteristics |
|---|--|
| Profitability (equal-weighted combination) | High gross profits over assets |
| | High return on equity |
| | High return on assets |
| | High cash flow over assets |
| | High gross margin |
| | Low accruals |
| Profit growth (equal-weighted combination) | Growth in profitability |
| | Growth in return on equity |
| | Growth in return on assets |
| | Growth in cash flow over assets |
| | Growth in gross margin |
| | Growth in accruals |
| Safety (equal-weighted combination) | Low beta |
| | Low idiosyncratic volatility |
| | Low leverage |
| | Low bankruptcy risk |
| | Low return on equity volatility |
| Payout (equal-weighted combination) | Equity net issuance |
| | Debt net issuance |
| | Net payout over profits |
| “Quality” | An equal-weighted combination of profitability, profit growth, safety and payout |

Source: Asness, C., A. Frazzini, R. Israel, T. Moskowitz and L. Pedersen (2015), “Size Matters, If You Control Your Junk,” working paper, *AQR Capital*.

⁸ These arguments are made in the Morningstar and Research Affiliates papers cited in above footnote.

⁹ Asness, C., A. Frazzini, R. Israel, T. Moskowitz and L. Pedersen (2015), “Size Matters, If You Control Your Junk,” working paper, *AQR Capital*.

The AFIMP paper builds on the authors' previous work, in which a long/short portfolio in the style of Fama and French is created for these characteristics.¹⁰ The portfolio return is constructed as the difference between the return to a sub-portfolio of stocks that rank high in these characteristics and the return to a sub-portfolio of stocks that rank low in these characteristics. The returns to the long/short portfolio are called "quality-minus-junk (QMJ)," using the AFIMP broad definition of quality. By controlling for the resulting set of high-minus-low returns, the paper shows that a significant and stable small cap premium emerged where one was not readily apparent before.

For years now Russell has been constructing an index that tilts to some of the same characteristics. In Russell's version, quality and low volatility factors are combined to form a combination called "defensive."¹¹ The Russell 2000 Defensive Index in particular employs several of the same characteristics as in AFIMP, or close variations of them. Table 4 lists the Russell characteristics. The list is much shorter than in AFIMP, as Russell has had the advantage of decades of observing active small cap managers up close to inform its selection of characteristics.¹² The overlap in content can be made clear by comparing Tables 3 and 4.

The Russell 2000 Defensive Index includes about half of the stocks included in the Russell 2000 Index, the half with the highest quality and the lowest volatility combination.

Table 4. Russell 2000 Defensive Index factors

| | Characteristics |
|---|---|
| Quality factor (equal-weighted combination) | Low earnings variability Low leverage High return on assets |
| Low volatility factor (equal-weighted combination) | Low 60-month return volatility Low 52-week return volatility |
| Defensive factor | An equal-weighted combination of quality and low volatility |

The Russell 2000 Defensive Index includes about half of the stocks included in the Russell 2000 Index, the half with the highest quality and the lowest volatility combination. To investigate to what degree AFIMP high-minus-low factor returns might explain small cap index returns, we added the defensive, or "QMJ," variable to our extension of the Fama-French model looking at both the Russell 2000 and the Russell 2000 Defensive indexes:

$$R_{2000D} - rf = a + b \cdot (\text{Market} - rf) + c \cdot \text{SmallCap} + d \cdot \text{Value} + e \cdot \text{Defensive} + \text{error}$$

¹⁰ Asness, C., A. Frazzini and L. Pedersen (2014), "Quality Minus Junk," working paper, *AQR Capital*.

¹¹ Hintz, D. (2010), "The Third Dimension of Equity Style," *Russell Research*.

¹² Also, Russell makes a distinction between "quality" and "low volatility," whereas Asness et al fold volatility measures into their definition of quality; so the Russell definition of "defensive" conceptually corresponds to the AFIMP definition of "quality."

Table 5. 1996:08 – 2015:06

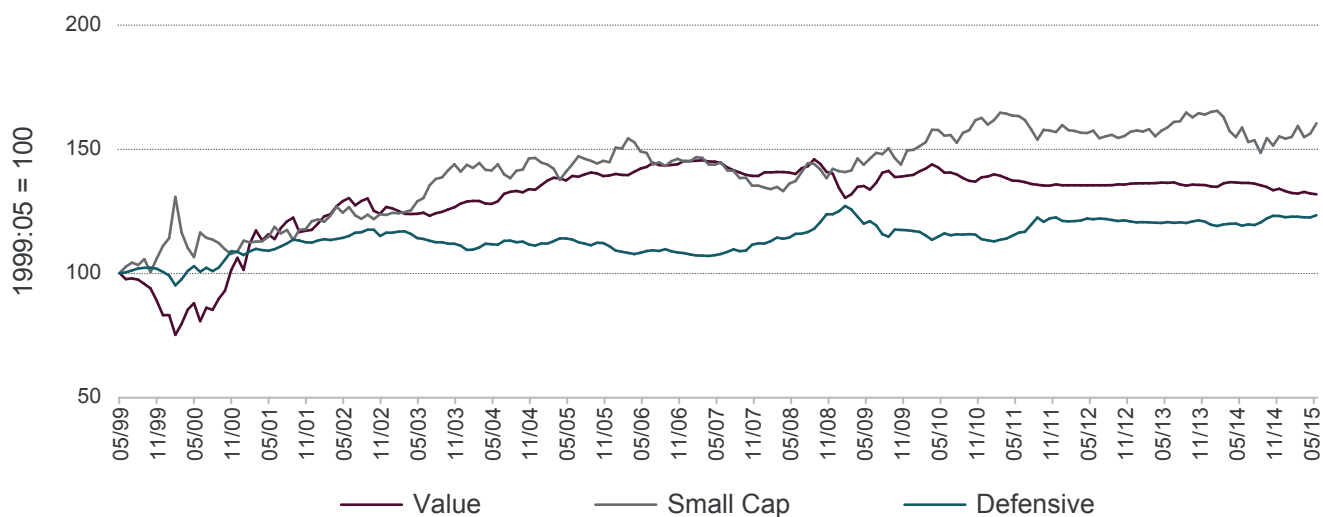
| | Constant | Market beta | Small cap (SMB) | Value (HML) | Defensive (QMJ) | R-squared |
|------------------------------|----------|-------------|-----------------|-------------|-----------------|-----------|
| Russell 2000 Index | | | | | | |
| Estimated exposures | -0.002 | 1.02 | 0.80 | 0.27 | 0.04 | 0.98 |
| (T-stat) | (-2.84) | (54.46) | (36.48) | (13.34) | (1.17) | |
| Russell 2000 Defensive Index | | | | | | |
| Estimated exposures | -0.002 | 0.98 | 0.65 | 0.52 | 0.42 | 0.92 |
| (T-stat) | (-2.73) | (38.27) | (21.84) | (19.24) | (10.00) | |

Sources: FTSE Russell, Kenneth French website, and AQR Capital website. Data as at June 2015 (QMJ series only available through June 2015 as of publication date). Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see the end for important legal disclosures.

The results in Table 5 showed that adding the defensive (QMJ) high quality/low volatility factor barely affected the estimates for the Russell 2000 Index. The exposures to the market, small cap and value factors were close to what they were in Table 1, and the exposure to the defensive factor was small and statistically insignificant. That the defensive factor combination was not meaningful was not surprising, since the Russell 2000 Index was designed to be a comprehensive index that included stocks of all levels of quality and volatility.

It was a different story with the Russell 2000 Defensive Index. Compared to the results for the Russell 2000 Index, the exposure to small cap was slightly less, the exposure to value was greater, and the exposure to defensive was substantial and statistically significant. To gauge the quantitative impact of these factors on performance, we plotted the performance of the small cap, value and quality factors within the Russell 2000 Defensive Index; see Figure 2.

Figure 2. Performance by Factor within the Russell 2000 Defensive Index including a Defensive Combination of Low Volatility and High Quality Factors



Sources: FTSE Russell, Kenneth French website and AQR Capital website. Data as at June 2015. Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see the end for important legal disclosures.

Figure 2 shows that all three factors played a positive role in the performance of the Russell 2000 Defensive Index. The small cap factor delivered about 3.0% over this period; the value factor delivered about 1.7% and the high quality/low volatility (defensive) factor about 1.3%, all annualized. The three factors added up to a powerful combination, which aligns with a finding in AFIMP that size, value and quality factors positively interact. Elsewhere, the combination of high quality/low volatility (defensive) and value factors has been referred to as the “Buffett portfolio,” as these factors explain a large portion of the Berkshire Hathaway return pattern.¹³

Given that the estimated exposure to the Fama-French small cap factor was lower for the Russell 2000 Defensive Index than for the Russell 2000 Index, it may not have been immediately clear that these results had much to do with the small cap premium. AFIMP argued, however, that the small cap premium had a *lot* to do with it. They point out that, compared to large cap, small cap stocks with low quality and high volatility tend to make up a larger portion of the small cap universe. That’s often the reason why low quality/high volatility stocks had lower market capitalizations in the first place. High quality/low volatility stocks have tended to outperform low quality/high volatility stocks, including in comparisons of stocks of similar size.¹⁴ Put another way: the mix of quality and volatility has interacted with the small cap premium. The Russell 2000 Defensive Index selected only the highest quality/lowest volatility stocks from the Russell 2000 Index universe, producing a high quality/low volatility/small cap mix. The positive exposure to the value factor has naturally come along with the other factor exposures.

One could argue that it is really just high quality and low volatility that made a difference; that a small cap premium has not played much of a role. If that is true, while we might have expected the Russell 1000 Defensive and Russell 2000 Defensive indexes to have both outperformed the broader Russell 1000 and Russell 2000 indexes respectively, we would not have expected the Russell 2000 Defensive Index to have substantially outperformed the Russell 1000 Defensive Index. That’s because the Russell 1000 Defensive Index was constructed in exactly the same way as the Russell 2000 Defensive Index, except that one selects on a large cap universe and the other selects on a small cap universe.¹⁵

Figure 3 displays the performance of four Russell indexes. The Russell 1000 and Russell 2000 indexes had about the same performance over this period, as we saw in Table 2. Both of the defensive indexes outperformed their more comprehensive counterparts. But the Russell 2000 Defensive Index would have outperformed the Russell 1000 Defensive Index by a good margin: 10.0% versus 8.2% compounded and annualized over this period. The outperformance of the Russell 2000 Defensive Index cannot be due only to the quality and volatility factors. This is evidence supporting the claim that the small cap premium is better able to emerge through a sub-universe of high quality/low volatility stocks.

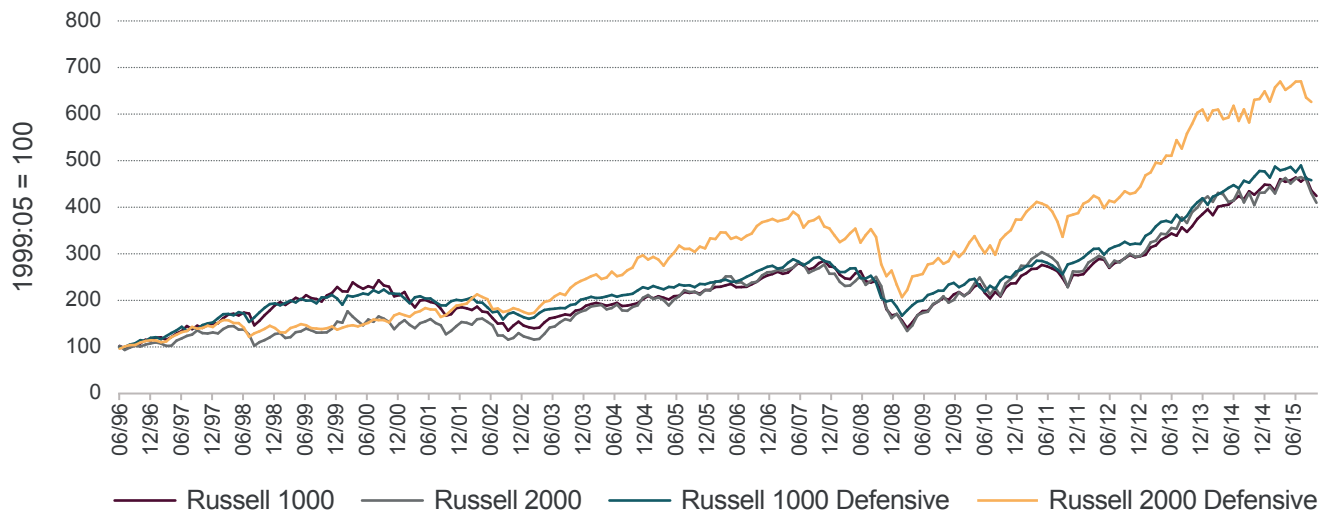
This is evidence supporting the claim that the small cap premium is better able to emerge through a sub-universe of high quality/low volatility stocks.

¹³ A. Frazzini, D. Kabiller and L. Pedersen (2012), “Buffett’s Alpha,” AQR Capital Management.

¹⁴ Asness, et. al. (2014), op. cit.

¹⁵ Paris, M., and C. Yoshimoto (2015), “Small Cap Defensive: Oxymoron, or Simply Overlooked?,” *Russell Index Insights*.

Figure 3. FTSE Russell Indexes Performance (Jun 1996 – Sep 2015)



Sources: FTSE Russell. Data as at September 2015. Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see the end for important legal disclosures.

Conclusions

What some thought was lost may have been found. The research “rediscovering” the small cap premium in AFIMP is confirmed here using Russell indexes. The mix of quality, low volatility and size matters, and it affects how much of the small cap premium can be uncovered. The Russell 2000 Index is a comprehensive measure of the small cap market, and it effectively captures the small cap premium. Its comprehensiveness means, however, that the full range of quality and volatility characteristics is included, and so at times the small cap premium may be obscured by these other factors. The Russell 2000 Defensive Index includes the half of the constituents of the Russell 2000 Index that display the highest quality and lowest volatility factors. The combination of quality and volatility factors within defensive has been shown to be a more accurate indicator of company risk than volatility alone.¹⁶ That mix of factors allows the small cap premium to show itself more explicitly and consistently.

Finally, the results here have obvious implications for multifactor investing. Defensive encompasses both quality and volatility factors, giving equal weight to each factor, which has been shown here to interact with size in a positive way. The value factor also seems to add to the positive interaction. This is further motivation for research into combining size, quality, and volatility and value factors into a multifactor framework.

¹⁶ B. Feldman (2012), “Stability is the Risk Dimension of Equity Style,” *Russell Research*.

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