BVR What It's Worth

Vol. 25, No. 5, May 2019

BUSINESS VALUATION UPDATE

TIMELY NEWS, ANALYSIS, AND RESOURCES FOR DEFENSIBLE VALUATIONS

Two Articles Addressing Firm Quality and Its Impact on the Size Effect

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The size effect continues to invite discussion in academia and practice. Since its discovery, the size effect has been a misunderstood phenomenon. Numerous papers have been written on the subject.

In this article, we introduce a factor that research has shown is related to the size effect: firms' quality. Two recent papers discuss the concept of firms' quality and show that it plays an important role in understanding the size effect. Valuation professionals should be familiar with:

1. Clifford S. Asness, Andrea Frazzini, Ronen Israel, Tobias J. Moskowitz, and Lasse Heje Pedersen, "Size Matters, If You Control Your Junk," *Journal of Financial Economics* 129 (2018): 479-509; and

2. Roger J. Grabowski, "The Size Effect Continues to Be Relevant When Estimating the Cost of Capital," *Business Valuation Review* 37(3) (2018).

The results reported in these two papers are important to understand the current state of the size effect.

Quality and its impact on the size effect. The paper "Size Matters, If You Control Your Junk" investigates the size effect by adding a factor for firm quality to a multifactor analysis of what drives stock prices. The quality measure is discussed in a companion paper, "Quality Minus Junk," by Clifford S. Asness, Andrea Frazzini, and Lasse Heje Pedersen.[1]

The authors define *quality* as characteristics that investors should be willing to pay a higher price for, everything else equal. They defined their quality measure based on three categories: profitability, growth, and safety. The authors formed quality indicators based on each of these categories and then formed a composite quality indicator based on all three. These categories are defined as follows:

- *Profitability* (composite of six measures of profitability): (i) gross profits over assets (GPOA); (ii) return on equity (ROE); (iii) return on assets (ROA); (iv) cash flow over assets (CFOA); (v) gross margin (GMAR); and (vi) the fraction of earnings composed of cash (ACC) per unit of book value;

- *Growth* (composite of five measures of growth): prior five-year growth in each of the first five profitability measures (GPOA, ROE, ROA, CFOA, and GMAR) where each is measured based on residual cash income,[2] not residual reported net income; and

1 C.S. Asness, A. Frazzini, and L.H. Pedersen, *Review of Accounting Studies* (2018). doi.org/10.1007/s11142-018-9470-2.

2 See Shannon Pratt and Roger Grabowski, Appendix 3A, "Alternative Measures of Economic Income," and Appendix 4A, "Equivalency of Capitalizing Residual Income," in *Cost of Capital: Applications and Examples,* 5th ed. (John Wiley & Sons, 2014).

BUSINESS VALUATION UPDATE

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Business Valuation Update™ (ISSN 2472-3657, print; ISSN 2472-3665, online) is published monthly by Business Valuation Resources, LLC, 111 SW Columbia Street, Suite 750, Portland, OR 97201-5814. Periodicals Postage Paid at Portland, OR, and at additional mailing offices. Postmaster: Send address changes to *Business Valuation Update (BVU)*, Business Valuation Resources, LLC, 111 SW Columbia Street, Suite 750, Portland, OR 97201-5814.

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- *Safety* (composite of five measures of safety): market beta (BAB[3]) (i.e., low beta indicates low risk); leverage (LEV) (i.e., low leverage indicates low risk); credit risk (measured by O-score and Z-score[4] (i.e., low bankruptcy risk indicates low risk)); and volatility of return on equity (EVOL) (i.e., low volatility of ROE indicates low risk).

One would expect that, all else being equal, investors should be willing to pay a higher price for the stock of companies with greater profitability, more rapidly growing profits, and those deemed to be safer.

Measures of individual company profitability, growth, and safety are based on each company's ranking compared to all other companies during the same period.

As an example, the *profitability* score of any company (x) for GPOA, z(GPOA), is based on calculating GPOA for each individual company, then giving each company a ranking ($r_i = \text{rank}(x_i)$) based on GPOA (highest to lowest), calculating the mean of the rankings (μ_r) and the standard deviation of the rankings (σ_r). Each company's score is then scaled relative to the other companies: $z(x) = z_x = (r_i - \mu_i)/\sigma_i$, that is, what is the subject company's rank in each period compared to the average rank of all companies in each period relative to the dispersion of rankings. For example, if the z-score statistic of a company's GPOA is 2, it means that company's GPOA is two standard deviations from the mean of the GPOA for all companies observed, which also puts it in the top 2.5 percentile of the sample. This puts each measure on an equal footing.

3 The nomenclature BAB is adopted from A. Frazzini and L.H. Pederson, "Betting Against Beta," *Journal of Financial Economics* (111), pp 1-25.

4 See Pratt and Grabowski, "Bankruptcy Prediction Models," pp 409-412.

The *profitability* score for a company in each period is the composite z score of the six profitability z scores:

$$Profitability = z(z_{(GPOA)} + z_{(ROE)} + z_{(ROA)} + z_{(CFOA)} + z_{(GMAR)} + z_{(ACC)})$$

The *growth* score for a company in each period, which is a composite z score (relative ranking of growth among all companies) of the first five profitability measures, where Δ denotes the five-year change in each measure of residual income per share, divided by the lagged scaler (e.g., assets per share, equity per share, etc.), is:

$$Growth = z(z_{(\Delta GPOA)} + z_{(\Delta ROE)} + z_{(\Delta ROA)} + z_{(\Delta CFOA)} + z_{(\Delta GMAR)})$$

The *safety* score for a company in each period, which is a composite z score (relative ranking of growth among all companies) of the five measures of safety, is:

$$Safety = z(z_{(BAB)} + z_{(LEV)} + z_{(O\text{-}score)} + z_{(Z\text{-}score)} + z_{(EVOL)})$$

Finally, the authors combine the three measures into a single quality score for each company's stock in each period:

$$Quality = z(profitability + growth + safety)$$

Using the composite *quality* score, the authors form portfolios of high-quality and low-quality stocks and calculate the QMJ factor (the difference between high-quality and low-quality companies' returns for the respective portfolios over time). The QMJ factor is created from a composite measure of quality—investing "long" in quality stocks and selling junk stocks "short."

Testing for the size effect. In "Size Matters, If You Control Your Junk," the goal of the research is to determine if the market prices firm quality and if including that factor has an impact on the size premium. They investigated the consistent relevance of the size effect by showing that a portion of the returns of a portfolio built by taking a long position (buying) in small stocks and a short position (selling) in large firms is statistically significant even after controlling for other potential risk factors. The authors show that size is priced in the market and that all the challenges to the size factor become irrelevant after controlling for quality.

By adding the quality factor (quality minus junk—QMJ) to a multiple regression of various factors from Fama-French (F-F) research and other studies, the authors explain a greater proportion of observed returns and differentiate between size and quality factors.

Recall that the F-F models were developed in response to the empirical failure of CAPM to fully account for the high returns observed for certain types of companies. These include two types of companies in particular: small companies (generally defined as small-capitalization of equity, "small-cap" stocks) that have historically earned higher rates of return than the CAPM would predict (the size effect) and companies with a high ratio of book value of equity to market value of equity (sometimes called "value" stocks) that have historically earned higher returns than the CAPM would predict.[5,6]

To understand their methodology, let's start with the F-F three-factor model, which estimates returns according to the following formula:

$$r_i = r_f + \beta_i (r_m - r_f) + s_i SMB + h_i HML$$

where:

r_i is the expected return on company i.

5 Eugene F. Fama and Kenneth R. French, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 33, February 1993: 3-56.

6 Eugene F. Fama and Kenneth R. French, "A Five-Factor Asset Pricing Model," *Journal of Financial Economics* 116 (1) April 2015:1-22.

r_f is the risk-free rate.

$r_m - r_f$ is the expected return on the overall market in excess of the risk-free rate often measured as an average of historical excess returns over time.

SMB is the expected return on a portfolio of small-cap stocks relative to a portfolio of large- or big-cap stocks (small-minus-big) often measured as an average of relative historical returns over time—it represents the size factor.

HML is the expected return on a portfolio of high book-to-market stocks relative to a portfolio of low book-to-market stocks (high-minus-low) often measured as an average of relative historical returns over time.

$ß_i$ is a measure of the sensitivity of the returns on company i to movements in the overall market return.

s_i is a measure of the sensitivity of returns on company i stock to movements in the returns of small capitalization of equity (small-cap) stocks relative to large capitalization of equity (large-cap) stocks.

h_i is a measure of the sensitivity of returns on company i stock to movements in the returns of high book-to-market stocks relative to low book-to-market stocks.

Thus, according to the F-F three-factor model, the expected returns consist of a risk-free rate plus three premiums for risk.

The first premium reflects sensitivity to movements in the overall stock market. Note that $ß_i$ in the F-F three-factor model is not equal to the pure CAPM beta. The second premium reflects sensitivity to movements in the prices of small companies (as measured by market capitalization) relative to large companies, the size factor.

The third premium reflects sensitivity to movement in the prices of "value" stocks relative to low book-to-market stocks.

Thus, it is not a company's size or "value" status *per se* that determines whether it has a high or low expected rate of return; rather, a company has a high or low return according to the degree of its sensitivity to movements in the prices of small-cap stocks (relative to big-cap stocks) and "value" stocks (relative to "growth" stocks with low book-to-market stocks). High book-value-to-market-value ratio companies have been termed *value stocks* (though, sometimes, a high book-value-to-market-value ratio indicates a *distressed stock*). Low book-value-to-market-value ratio stocks have been termed *growth stocks* (or contrasted with a distressed stock, considered a *nondistressed stock*).

The authors used a standard asset pricing theory test where a long/short portfolio formed based on the characteristic in question is regressed against the other remaining factors. When building a long/short portfolio, we are assuming that the factor being tested explains the returns. In the example of size, by taking the difference between the return of small stocks and the return of large stocks, we are creating a mimicking portfolio that represents the size premium. If any other known risk factors cannot explain this mimicking portfolio return, it implies that size potentially proxies a risk factor.

The authors consider various models—the F-F three-factor model, the F-F five-factor model (which adds a relative profitability factor (RMW—robust minus weak profitability) and an investment factor (CMA—conservative minus aggressive investment) to the F-F three-factor model), and other factors reported in the literature (for example, momentum)—and, in each case, add a quality factor, the QMJ factor, and various other measures of quality.

For example, one analysis the authors performed was to test the existence and significance of the

size effect after controlling for the risk factors: F-F three-factor model plus a momentum factor plus the QMJ factor. They ran the following regression:

$$SMB_t = \alpha + \beta(r_{M,t} - r_{f,t}) + \beta_{-1}(r_{M,t-1} - r_{f,t-1}) + h\,HML_t + m\,UMD_t + q\,QMJ_t + \varepsilon_t$$

testing whether the size premia in time t (SMB_t) is impacted by the market risk in the current period t $\beta(r_{M,t}-r_{f,t})$ or the prior period t-1 $\beta_{-1}(r_{M,t-1} - r_{f,t-1})$ to control for thin trading in small stocks, the relative pricing of value stocks in period t (h x HML_t), the stock price momentum in period t (stock price increases compared to stock price decreases, up-minus-down—*UMD*) in period t (m x UMD_t) and the relative pricing of quality stocks compared to junk stocks in period t (q x QML_t).

The objective of this regression is to test the significance of the fixed component (α) that is not related to any of the other risk factors. If α is economically and statistically significant, it would imply that small stocks yield a higher return than large stocks even after controlling for the other risk factors.

The authors find that, when any quality factor (composite or subgroup) is added, α becomes highly significant. The addition of other factors derived from the F-F five-factor model and other studies to test the impact of the various factors on the existence and significance of size effect over time does not change these results.

The authors go on to use alternative nonmarket value measures of size ("fundamental" measures of size). Market value of equity as a measure of size may introduce a bias when ranking companies because characteristics of the company other than size may affect a company's market capitalization. In other words, some companies might be small (as measured by market cap) because they are risky (high discount rate), rather than risky because they are small (small assets or small income).[7] One simple example could be a company with a large asset base but a small market capitalization of equity as a result of high leverage or depressed earnings. Another example could be a company with large sales or operating income but a small market capitalization attributable to being highly leveraged. Second, market capitalization of equity may be an imperfect measure of the risk of a company's operations.

Therefore, the authors test the size effect using the following measures of size: book value of assets; book value of equity, sales; book value of property, plant, and equipment (PP&E); and number of employees.

In addition, the authors test for the existence and significance of the size effect across 30 industries and 23 countries outside of the United States and over different periods.

Observations. The authors find that a key variable in explaining the changing size effect over time is the market's pricing of firm quality (as measured by profitability, stability, growth, and safety) versus junk. They find that this relationship has a far stronger explanatory power than other factors (relationship of size to the market, value, or momentum). This finding holds whether size is measured by market capitalization or non-market-based (fundamental) measures. Further, this finding holds for each of the 30 industries and 23 countries studied.

The authors find that the size effect holds in periods where other researchers have claimed the size effect has disappeared.[8] The authors

7 Jonathan B. Berk, "A Critique of Size Related Anomalies," *Review of Financial Studies* 8 (2) (Summer 1995): 225–286.

8 Countering the arguments of, say, Clifford S. Ang, in "The Absence of a Size Effect Relevant to the Cost of Equity." *Business Valuation Review* 37, no. 3 (2018): 87-92; and critiques such as those of Michael A. Crain, The State of Affairs on Size Premiums, Spring 2012 Philadelphia ASA Chapter Business Valuation Seminar (April 20, 2012).

also find that the size effect holds not only during the month of January (the "January effect"), but through other months as well.

The authors also examine the relationship between the size effect and liquidity. They conclude that liquidity differences between company stocks and liquidity risk (price impact) can help explain the size effect (i.e., small capitalization companies typically have lower liquidity and higher liquidity risk), whereas the liquidity differences are not correlated with the quality premium. This confirms the observations of Rolf Banz, the author of the first paper on the size effect, that size might not be a priced factor in its own right, but that size may correlate with other unknown factors.[9]

The Asness et al. paper is discussed in another recent paper on the size effect, "Fact, Fiction and the Size Effect," by Ron Alquist, Ronen Israel, and Tobias Moskowitz, in which those authors detail the misconceptions about the size effect and differentiate facts from fictions.[10]

Alquist et al. acknowledge the results Asness et al. report: "[I]n addition to resurrecting the size premium, controlling for quality also reconciles many of the empirical irregularities associated with the size effect that we (and the literature) have documented."

Implications of the size effect in estimating the cost of capital for nonpublic businesses. In "The Size Effect Continues to Be Relevant When Estimating the Cost of Capital," the author finds that the size effect is still relevant after segregating high-risk firms from quality firms.

Small companies are believed to typically have greater expected rates of return compared to large companies because small companies are inherently riskier. However, this leaves the question of why small-company stock returns have not *consistently* outperformed large-company stock returns for various periods. Some commentators question the validity of the size effect if it is not consistent or disappears at times. When talking about expectations, two factors are considered: the probability and the magnitude.

One can argue that advocates of the size effect can find satisfaction in the erratic performance of small-cap company stocks. If you believe that small-company stocks are riskier than large-company stocks, then it probably follows that small-company stocks should not always outperform large-company stocks in *all* periods. This is true even though the expected returns are greater for small-cap stocks over the long term.

By analogy, bond returns occasionally outperform stock returns. For example, in 2007, 2008, 2011, and 2014, long-term U.S. government bonds significantly outperformed large-cap company stocks (total return on bonds equaled 9.9% compared to the return on large-cap stocks of 5.5% in 2007; 25.9% compared to -37.0% in 2008; 27.1% compared to 2.1% in 2011; and 24.7% compared to 13.7% in 2014), yet few would contend that, over longer investment horizons, the expected return on bonds is greater than the expected return on stocks (for the entire period 2007 through 2016, the total returns on long-term U.S. government bonds was less than the returns on large-cap stocks, 6.5% compared to 6.9%).[11]

We observe that the size effect is *cyclical*: the small-stock premium (returns of small-cap companies versus large-cap companies) tends to

9 In the recent paper, Sungjun Cho, "The Size Premium and Macrovolatility Risks: Evidence From U.S. and U.K. Equity Markets," *International Journal of Finance & Economics*, the author shows that, after controlling for periods of high volatility of industrial production growth, the size effect becomes significant, implying that small firm investors require compensation during uncertain times.

10 Ron Alquist, Ronen Israel, and Tobias J. Moskowitz, "Fact, Fiction, and the Size Effect" (May 12, 2018). Available at SSRN: ssrn.com/abstract=3177539.

11 *2017 SBBI Yearbook*.

move in cycles, with periods of negative premia followed by periods of high premia. It has been suggested that periods in which small-cap firms have outperformed large-cap firms have generally coincided with periods of economic growth. At least one study contends that the variability in the size effect over time is predictable because large-cap firms generally outperform small-cap firms in adverse economic conditions. Credit conditions are exceedingly important for all firms but especially for small firms. Small firms generally are at a disadvantage when it comes to financing, and suppliers of debt capital are less likely to lend to small firms in periods of adverse economic conditions.[12] Furthermore, since the late 1990s, many companies have faced a perceived lack of pricing power. In this type of environment, small firms are likely to be at a disadvantage.[13]

For these reasons, analysts should not be surprised to find small-cap stocks underperforming large-cap stocks for even lengthy periods. The cyclicality is part of the risk of small companies; if small companies *always* earned more than large companies, small companies *would not* be riskier in the aggregate.

Size effect—more research. The author has studied whether stock returns were predicted by measures of size other than market capitalization and whether stock returns were predicted by fundamental risk measures based on accounting data. He found that, as size decreases or risk increases (as measured by fundamental accounting data), returns tend to increase (and vice versa).[14] These studies (the *Risk Premium Report—Size Study* and *Risk Study*) are updated annually.[15]

These studies differ from some of the academic research in the way the portfolios are constructed. Most research of the size effect is designed to mimic the mechanical trading strategy of investing in small-cap companies and shorting large-cap companies and measuring the excess returns that result. These researchers are not studying a firm's cost of capital.

The methodology used in the *Risk Premium Report* is akin to that valuation professionals use when identifying guideline public companies when valuing a non-publicly traded business. Valuation professionals begin their investigation by searching for appropriate guideline public companies to include in their estimation of beta and their market approach analysis, by examining the characteristics of potential guideline public companies and comparing those characteristics to those of the subject business.

The valuation professional strives to identify the hypothetical "as if publicly traded" market value of the subject company by comparing its metrics to those of publicly traded companies with comparable risk proxies and expected return characteristics as the subject company. For example, if the subject company is an established small company, the most appropriate guideline companies are those established publicly traded companies that are in the same industry but are also small. Likewise, if the subject company is not highly levered and is profitable, the most appropriate guideline pubic companies in its industry are those that are not highly levered and

12 Ching-Chih Lu, "The Size Premium in the Long Run," Working paper, December 2009. The author reports on a study he conducted comparing the average market values of common equity between companies with investment-grade credit ratings and those with non-investment-grade credit ratings for the period 1994 to 2008. He found that the companies with better credit ratings were nine to 10 times larger than the companies with poorer credit ratings.

13 Satya Dev Pradhuman, *Small-Cap Dynamics: Insights, Analysis, and Models* (New York: Bloomberg Press, 2000): 23–28.

14 Roger J. Grabowski and David King, "New Evidence on Size Effects and Equity Returns", *Business Valuation Review* (September 1996): 103-115; Roger J. Grabowski and David King, "New Evidence on Equity Returns and Company Risk", *Business Valuation Review* (September 1999, revised March 2000): 32-43.

15 Now available through the online Duff & Phelps Cost of Capital Navigator platform at dpcostofcapital.com.

are profitable. It is easy to understand in applying the market approach (i.e., applying multiples derived from guideline public companies to the subject company).[16]

The same logic follows in examining the returns of similar public companies to develop a discount rate appropriate for the subject company, i.e., the historic returns of companies with comparable characteristics as those of the subject company should be used as evidence of the likely expected returns for the subject company. That logic guided the construction of the portfolios reported in the *Risk Premium Report* studies.

The *Risk Premium Report* studies screen out speculative startups, distressed (i.e., bankrupt) companies, and other high financial risk companies. Thus, the *Risk Premium Report* summarizes the returns of relatively financially healthy, high-quality firms. This methodology was chosen to counter the criticism of the size effect by some that the size premium is a function of the high rates of return for speculative companies and distressed companies in the data set.[17]

The *Risk Premium Report–Size Studies*[18] report on size premia where size is measured in eight different measures: market capitalization of equity, book value of equity, average net income for the prior five years, market value of invested capital (MVIC), total book value of assets, average EBITDA for the prior five years, sales, and number of employees.

Using alternative measures of size has the practical benefit when estimating the cost of equity for non-publicly traded businesses by removing the need to first make a guesstimate of size (i.e., the hypothetical market cap of the subject company) in order to know which portfolio's premium to use (this issue is commonly referred to as the "circularity" issue). When one is valuing a non-publicly traded company, one is trying to determine an estimate of the size premium as if the company is publicly traded. If one needs to make a guesstimate of the subject company's market capitalization first in order to know which size premia to use, a circularity problem is introduced.

The size portfolios returns are calculated as an equally weighted average return of all companies in the size ranked portfolio. Valuation professionals are not building investment portfolios, but rather they are determining the return of a typical company with a certain size characteristic over time.

Observations. To supplement size premia data (observed premia in excess of that predicted by CAPM), the author presents exhibits that demonstrate that size premia are observed during 1981 to 2016 and 1990 to 2016. The choice of these specific periods is meant to counter the criticism that size premia have disappeared in the post-Banz periods.[19]

The author then presents analyses that show the size premia is correlated with fundamental risk

16 Some researchers erroneously claim that valuation professionals should apply an average multiple drawn from all companies in an industry whether they would be considered guideline companies or not. This faulty line of reasoning was countered in recent empirical research. See Friedrich Christian Rose Sommer and Arnt Wohrmann, "Negative Value Indicators in Relative Valuation–An Empirical Perspective," *Journal of Business Valuation and Economic Loss Analysis,* 2014, Vol. 9 (1): 23-54.

17 Financial services companies are also excluded from the analysis because the regulated nature of banks and insurance companies causes their underlying characteristics to differ from those of nonregulated companies. The *Risk Premium Report* studies should not be used to estimate cost of equity for financial services companies (i.e., companies with a SIC code that begins with "6").

18 See Chapter 7, "The CRSP Decile Size Premia Studies and the Risk Premium Report Studies–A Comparison"; Chapter 9, "Risk Premium Report Exhibits–General Information"; and Chapter 10, "Risk Premium Reports–Examples," available through the online Cost of Capital Navigator platform at dpcostofcapital.com.

19 Countering the arguments of, say, Clifford S. Ang, "The Absence of a Size Effect Relevant to the Cost of Equity," *Business Valuation Review* 37, no. 3 (2018): 87-92.

measures of the companies comprising the portfolios: average operating margin for the prior five-year period and coefficient of variation of operating margin during that same five-year period.

The author makes the following observations from the data presented:

- The increase in size premia as size decreases is not the result of significantly different amounts of debt among the companies comprising the small companies' portfolios;
- Business risk as measured by the average operating margin (i.e., a lower average operating margin indicates greater business risk) generally increases as size decreases; and
- Business risk as measured by the variability of operating margin over the prior five years (i.e., a higher coefficient of variation of operating margin indicates greater risk) generally increases as size decreases.

The author then goes on to discuss liquidity. Liquidity affects the cost of capital.[20] For this purpose, *liquidity* refers to the speed at which a large quantity of a security can be traded with a minimal impact on the price and with the lowest transaction costs. Stocks of small companies generally do not have the same level of liquidity as large-company stocks. This is likely a function of the mix of shareholders and underlying risk characteristics.

Many institutional investors do not own stocks in small companies because they have too much money to invest relative to the size of these companies or because small firms are not part of widely followed market indices that require them to allocate in these firms for benchmarking. If they are to invest as little as 1% of their available funds in a small company, they likely would control the company. Institutional investors generally want sufficient liquidity to move in and out of their positions in a single firm without disrupting the market. Therefore, one does not see the breadth of investors investing in small-capitalization stocks as one sees in large-capitalization stocks.

Furthermore, the level of information asymmetry is very high in small companies. A small number of analysts, if any at all, generally follow small companies. This makes it more difficult for investors to acquire information on and evaluate small firms, leading to a high level of uncertainty about its cost of capital.[21]

Are size premia observed for smaller companies (after adjusting for differences in beta) the result of a difference in size or differences in liquidity? Differences in liquidity certainly impact the observed returns in publicly traded stocks, but, if one is estimating the cost of capital for a small, nonpublic business, the analyst has no observations as to the liquidity that the subject company's stock might have were it public. The valuation professional can generally only hypothesize that the liquidity of the nonpublic firm would be at least similar to that of other publicly traded stocks of companies of similar size.

Fundamental risk, which is correlated with size premia, may be contributing to the liquidity effect, i.e., the greater underlying risks of small companies relative to those of larger companies may cause investors to shy away from small companies, reducing their liquidity. Thus, reduced liquidity may also be a coincident indicator of fundamental risk.

The author then goes on to address other criticisms of the size effect and the *Risk Premium*

20 See, for example, Roger G. Ibbotson and Daniel Y.-J. Kim, "Risk and Return Within the Stock Market: What Works Best?" working paper, Jan. 30, 2017. Available at zebracapital.com/research.php.

21 Ravi Bhushan, "Firm Characteristics and Analyst Following." *Journal of Accounting and Economics* 11.2-3 (1989): 255-274.

Reports some commentators made. He ends the paper by providing some practical guidance in applying size premia when estimating the cost of capital for nonpublic businesses.

Conclusion. The two papers discussed herein are important in explaining and clarifying misconceptions about the size premia. First, both papers show that the size premium is persistent, countering criticisms presented in papers that rejected the size effect where those authors used samples that included low-quality firms and failed to control for firm quality. Second, both papers raised the issue of the important relationship between size and liquidity. To sum up, while these two papers use different methodologies to measure quality, both papers conclude that the size effect continues to be observed and is significant once you take quality into account. ◆

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