



Quantifying Company-Specific Risk

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Quantifying Company-Specific Risk: A New, Empirical Framework With Practical Applications

By Peter J. Butler, ASA, CFA and Keith A. Pinkerton, ASA, CFA*

Editor's note: In this article, the authors have refined their earlier work¹ by providing a detailed example of how to select a company-specific risk premium (CSRP) for a privately held company using benchmark CSRPs derived from guideline publicly traded companies.

Contrary to widely held beliefs, business valuation analysts can quantify company-specific risk for publicly traded comparables, and then use these reference points to select a more appropriate, less subjective company-specific risk premium for a privately held company. The technique is similar to selecting a multiple for a private company by using publicly traded stock multiples. As stated in our prior work:

Even though, according to traditional financial theory, public markets do not price company-specific risk, it does not mean that it does not exist or is not quantifiable for public comparables. In all instances, the company specific risk premium for publicly traded companies is greater than 0%—yet appraisers start their benchmark analysis at 0% to determine an appropriate company-specific risk premium for privately held companies. Is this a flaw in our collective thinking?

The short answer is yes: In our prior work, we showed that company-specific risk can be quantified using observable, market-derived (empirical) data, and that 0% is an incorrect and low starting point to use for a privately held company.

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A framework to quantify CSRP

In general, prior research has suggested that there is no framework, no data, and no model to empirically quantify company-specific risk. With the introduction of this technique, we believe this criticism is no longer valid.

We start with a well-accepted formula to help calculate company-specific risk for publicly traded companies²:

$$T\beta = \beta / R = \phi_s / \phi_m$$

Where:

Tβ is a stock's total beta,

β is a stock's beta,

R is the correlation coefficient between a stock and the market (S&P 500),

φ_s is a stock's standard deviation, and

φ_m is the market's standard deviation.

Note: the standard deviation of a stock's return is the appropriate measure of total risk if the particular stock is the only asset in a portfolio. Similarly, while a private company probably is not the only asset in a business owner's portfolio, it most likely represents a significant portion of his/her net-worth, as most private business owners are not properly diversified.

Total Beta, which measures a stock's riskiness relative to the market (which has a Tβ equal to 1.0), captures total risk, including systematic risk as well as size and company-specific risk. Thus, it makes intuitive sense to use the Total Beta of publicly traded stocks to assist in benchmarking company-specific risk for a privately held company. One can then use the following formula to solve for the only unknown in the equation—company-specific risk:

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$$R_f + T\beta * ERP = TCOE =$$

$$R_f + \beta * ERP + SP + CSRP$$

Where:

R_f is the risk-free rate,

ERP is the equity risk premium,

TCOE is the total cost of equity,

SP is the size premium and

CSRP is the company-specific risk premium.

Company-specific risk can never be less than 0%

If the largest companies in the world have company-specific risk greater than 0%, then it is likely that

all companies exhibit company-specific risk greater than 0%. For example, applying the above formula to Exxon Mobil (ticker: XOM)³:

$$5.00\% + 1.45 * (6.28\%) = 13.96\% = TCOE =$$

$$5.00\% + (0.85) * (6.28\%) - 0.37\% + CSRP$$

Solving for only unknown: XOM's company-specific risk equals 4.13%.

Note that we used a supply side equity risk premium of approximately 6.3%. If we had used the long-term historical equity risk premium of 7.1% as published by Ibbotson, then we would have calculated XOM's company-specific risk equal to 4.6%.

Performing this same analysis for General Electric (ticker: GE)—the world's most valuable company based on market value of invested capital, and an excellent proxy for the market given its product line diversification—we calculated GE's company-specific risk equal to 3.4%.

We also calculated the company-specific risk for Emerson Electric, a company Ibbotson refers to as having a remarkably stable Beta over time, meaning it had a relatively high correlation coefficient with the market and potentially little company-specific risk. Nonetheless, we calculated a company-specific risk premium for Emerson Electric equal to approximately 4%.

Now, if XOM and GE have company-specific risk greater than 3%⁴, then why do appraisers start their benchmark at 0% for privately held companies?

Moreover, Rick Sias, Professor at Washington State University, recently made these observations⁵:

- A 50-stock portfolio has a one in three chance of a firm-specific return (+ or -) of at least 8.8%; and
- An investor needs to hold 15,647 securities to have a 95% chance that his/her portfolio will experience firm-specific shock of less than 1%.

Finally, when discussing large portfolios, a noted finance text states, "the weighted average of the unsystematic risk approaches zero as the number of

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equally weighted securities in a portfolio approaches infinity.”⁶ The key words: *approaches* and *infinity*.

These observations obviously refute any presumption that appraisers should start their reference point at 0%; or that a negative (less than 0%) company-specific risk premium is ever appropriate. That traditional financial theory⁷ claims this risk is diversifiable makes no difference. Analysts universally value private companies under this total risk or Total Beta concept, so we should also use this technique to value private companies under the income approach.

Practical application

In the practical example which follows, we develop multiple empirically-derived reference points to select an appropriate company-specific risk premium for a privately held company. The elegance of the approach arises from quantifying risk based on specific comparables, rather than starting at one reference point equal to 0% (mistake #1) and then guessing at adding or subtracting points without specific comparison to benchmarks (mistake #2). These common mistakes have been noted recently by courts and BV commentators⁸, making our technique particularly timely.

Our subject company. Assume Boise Brewery (BB) has \$20 million in sales and brews six different “craft” beers. It owns one brewery in Idaho and uses twenty distributors to sell its beer in the Pacific Northwest. BB only has one supplier of malt but uses multiple sources for hops, and believes that adequate sources of malt exist. BB is also highly dependent upon its founder and president.

Guideline Companies. We selected the Boston Beer Company, Inc. (ticker: SAM); Red Hook Ale Brewery, Inc. (ticker: HOOK); and Pyramid Breweries, Inc. (ticker: PMID) as BB’s publicly traded comparables. In Table 1 (on page 4), we calculated the company-specific risk for the guideline companies.

Table 2 (on pages 5-7) compares and contrasts the three guideline companies and our subject company across identifiable company-specific risk factors (due to space limitations, we have made this large table available online at www.bvlibrary.com/BVUextra). For these, we reviewed the companies’ Forms 10-K for year-end 12/31/05 for company-specific risk factors.⁹ With the introduction of Sarbanes-Oxley in 2002, we

believe public companies’ disclosures regarding risks, for the most part, are comprehensive.

We eliminated factors which might be more highly correlated with the size of the companies, rather than company-specific risk, since the adjusted CAPM captures small company risk¹⁰. We also ignored macroeconomic and industry factors from consideration, as the Beta (systematic risk) captures these items. Thus, we did not consider (among other factors) threats to beer demand (for overall or “craft” beers), commodity costs, and competition from spirits, wine or imported beer.

Further, we decided not to analyze metrics such as coefficient of variation of earnings, given the inability to accurately allocate the variation among macroeconomic, industry, and company-specific risk factors. We have, however, analyzed fixed versus variable costs for the companies.

Other industries will invariably reveal additional factors worthy of consideration. But at least we know cumulatively what the various factors equal for each guideline company—rather than starting at 0% and having no other references from which to add or subtract points. The ability to analyze the factors, with benchmarks, is the beauty to this technique. So let’s rank the four companies on each of the factors.

Analysis of risk

Table 3 (on page 8) lists our rankings. Based on the aggregate rankings alone, one might classify SAM as having the least amount of company-specific risk. However, we see that PMID has company-specific risk of only 4.9% compared to SAM’s 7.6%. Thus we conclude that the market does not treat all factors affecting company-specific risk the same. In this case, we believe PMID’s product-line diversification significantly dominates all other factors and lowers company-specific risk. PMID not only sells beer (57% of sales) but also sells soda pop (11%) and has restaurant operations (32%), which we view as beneficial diversification¹¹. We therefore conclude that BB’s company-specific risk should be greater than PMID’s, since BB only sells beer.

We also conclude that BB’s company-specific risk premium should be greater than SAM’s because of:

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Table 1. Guideline Companies												
Cost of Capital Assumptions												
R_f	4.84% As of 9/29/06: 20-year treasury bond											
$R_m - R_f$	6.28% Supply side equity risk premium (ERP) per Oct. 2006 BVU											
Size Premium	6.36%	2.76%										
	PMID	HOOK	SAM									
<p>Note: We used the Ibbotson supply-side ERP in this analysis. If we had used Ibbotson's ERP as of 12/31/05 equal to 7.1%, we would have calculated higher CSRPs. Had we used Duff and Phelps' recommended ERP equal to 3.5% - 6.0%, we would have calculated lower CSRPs. Since we use a supply-side ERP with Ibbotson's size premiums, the possibility exists that we are mismatching returns. However, since we are projecting the future (which is unknowable), we are comfortable with this analysis.</p>												
Comparable Companies	Ticker	12/31/2005 Net Sales ^A	BETA ^B	Debt ^A	Equity ^A	Unlevered BETA ^C	R-square ^B	R ^B	T-Stat ^B	Total Beta ^D	Cost of Equity ^E	Company-Specific Risk ^F
Boston Beer Company	SAM	\$238,304,000	0.73	\$0	\$458,000,000	0.73	0.09	0.31	5.03	2.38	19.8%	7.6%
Red Hook Ale Brewery	HOOK	\$31,098,907	0.36	\$4,999,000	\$31,880,000	0.33	0.01	0.10	1.62	3.55	27.1%	13.7%
Pyramid Breweries	PMID	\$48,358,000	0.19	\$8,234,000	\$22,930,000	0.16	0.01	0.10	1.53	1.99	17.3%	4.9%
Average												8.7%
Subject Company												
Boise Brewery	N/A	\$20,000,000	0.51			0.41					25.4%	11.0% ^G
<p>^A Sales per relevant Forms 10-K as of 12/31/05. Debt as of 6/30/06 = book value per relevant Forms 10-Q. Market value of equity per Yahoo!Finance as of October 10, 2006.</p> <p>^B Using 250 weeks of trading data from 12/24/01 - 10/2/06 and the S&P 500 as the market index. These numbers are levered beta. HOOK and PMID were statistically significant at greater than 80% confidence. SAM was statistically significant at greater than 99% confidence.</p> <p>^C $B_u = B_l / (1 + (1-t) * (w_d/w_e))$ where $t=4$. Assume subject company's unlevered beta = average of guideline companies. Assume 30% debt, 70% equity for subject company.</p> <p>Note: since we separately analyze size and company-specific risk, we believe the most appropriate conclusion for a subject company's beta to be some measure of central tendency given the subjectivity in determining how a private company will react to systematic risks. For example, according to Standard & Poor's, Anheuser Busch's beta is greater than Pyramid Breweries', contrary to one's intuition.</p> <p>^D Total beta = Beta/R</p> <p>^E Total cost of equity = risk-free rate + Total beta * (equity risk premium)</p> <p>^F Company-specific risk = Total cost of equity - risk-free rate - beta * (equity risk premium) - size premium</p> <p>^G See Table 2 and 3 and article for explanation of this result.</p>												

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Table 2 part 1 of 3

Table 2. Boise Brewery (BB) v. Guideline Companies				
Analysis of Company-specific Risk Factors				
	Boise Brewery	PMID	SAM	HOOK
Benchmark Co. Specific Risk ¹	?	4.93%	7.62%	13.65%
Factors affecting risk premium:				
Product line diversification	6 beers	Craft beer (57% of sales in 2005) Full-flavored batch brewed soda (11% of sales) 5 alehouse restaurants (32% of sales)	18 beers 4 flavored malts 1 hard cider	9 beers Markets Widmer Hefewizen 0 malts 0 hard ciders
Brewery location (company owned)	1 - Idaho	1 - California	2 - Ohio (2/3 of volume packaged here; 70 employees with union) Massachusetts	2- Washington State New Hampshire
Brewery location (under contract)	0	1 - Oregon	3 - North Carolina (no renewal of union contract - potential disruption) New York (financial issues - potential disruption) Wisconsin Use of contract brewers lowers fixed costs but increases uncertainty of future costs Able to utilize excess capacity at other brewers - if capacity constrained, operating results uncertain	0 - greater control over product quality
Distributors	20	164 One distributor represents more than 10% of sales	400 Agreements terminable by distributor on short notice	570 Uses A-B's distribution network: Note A-B owns 33.6% of HOOK stock A-B Distribution Agreement terminates 12/31/14, but may be terminated upon certain events. If terminated early, extremely difficult to rebuild network. Additional funds would be required. Moreover, if terminated, would constitute event of default under bank credit agreement. Bank could require entire loan balance immediately due. Distribution agreement with Craft Brands (Joint venture between Craft Brands Alliance and company). If terminated, significant adverse consequences. One distributor is responsible for approximately 13% of sales.

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Location of sales	Pacific Northwest	Washington, Oregon and California represented 80% of beer sales 38 states Company believes states above most competitive	Primarily U.S. (99%) Canada Europe Caribbean Pacific Rim	Entire contiguous U.S., however, concentrated in Northwest Company believes Pacific Northwest is most competitive region Faces extreme pressure in Washington State
Supplier	Only 1 supplier of malt Hops - from competitive resources	Fulfills raw material requirements through various sources	Only 1 supplier of malt 2 suppliers of hops 1 year supply of hops on-hand Maintains sufficient supply of yeast Single source supply of glass and labels (Believes alternatives glass supplies are available) (Long term contracts shielded company from price increases, however, contracts will renew)	Only 1 supplier of malt Hops - from competitive resources Maintains sufficient supply of yeast Access to multiple competitive sources of glass
Foreign currency exposure	None	Not significant	Does not hedge but significant exposure for raw materials	No need to hedge foreign exposure
Trademarks	Multiple	Multiple	Multiple	Multiple
Litigation	None	Pending claims in the aggregate not expected to be material	Yes - company believes it has meritorious defenses. However, if lose suit, then could harm company's operations	Yes - not likely to have material impact
Management depth	Highly dependent upon founder	Dependent upon key executives	Highly dependent upon founder, who also has significant influence over company (voting rights)	Dependent upon CEO and CFO
Quality and stability of earnings	High level of fixed and semi-variable costs causes gross margins to be especially sensitive to changes in sales volume	Operates restaurants - higher fixed costs Sensitive to changes in volume	Lower level of fixed and semi-variable costs due to partial reliance upon contract brewers	High level of fixed and semi-variable costs causes gross margins to be especially sensitive to changes in sales volume

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Access to capital	Private	Negative working capital; but not overly concerned; Relatively short accounts receivable terms	No concerns	A-B Distribution agreement significantly restricts ability to raise capital
Exposure to variable rate debt	No	Yes, but no outstanding principal	No long-term debt, much less variable debt	\$5.175 M subject to floating rate: LIBOR plus 1.75% Loan subject to default if A-B Distribution Agreement terminated
Subject to dilution from options	No	Yes, but as of 12/31/05 weighted avg. exercise price approximately equal to stock price.	Yes, weighted avg. exercise price = \$16.18; stock price at \$25. 1,854,700 shares outstanding	Yes, but as of 12/31/05 weighted avg. exercise price approximately equal to stock price.
Unique Regulation	Recent law change in Washington State eliminating requirement to sell through wholesalers will adversely impact operations.	Federal Alcohol and Tobacco Tax and Trade Bureau (TTB) audit Maximum exposure estimated at \$1.5 M; Washington state reg.	None	Recent law change in Washington State eliminating requirement to sell through wholesalers will adversely impact operations, the company's most important territory
Subject to paying earn-out	No	Yes, but to date milestones have not been met	No	No
Net operating loss carry forwards	No - S-corporation	Federal \$9.6 M: Yes through 2023, starting to expire in 2017 State \$2.6 M: Yes through 2024, starting to expire in 2006	Yes, amount not stated	Federal \$30.2 M: Yes, expire from 2012 - 2024 State \$500,000 tax-effected: Yes, expire from 2006 - 2019
Controls and procedures	Adequate	Deficiency surrounding monitoring and oversight	Satisfactory	Satisfactory
¹ Calculated using $CRSP = TCOE - R_f - B * ERP - SP$				

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1) the relative distribution of factors between “Most Risk” and “Least Risk” in the aggregate; and 2) the relative distribution of factors between “Most Risk” and “Least Risk” for critical factors such as product line diversification, geographic concentration/location of breweries, and location of sales.

But we also believe that BB’s company-specific risk premium should be less than HOOK’s premium

of 13.7%, which is greatly influenced by its distribution and marketing agreements with Anheuser-Busch and Craft Brands, respectively. If either agreement terminated early, it would be extremely difficult for HOOK to rebuild its distribution network or re-launch its marketing and advertising activities without severe negative impact on its sales and operational results.

Thus, we now have an observable, market-driven range of company-specific risk premiums for microbreweries between 7.6% and 13.7%. Where does BB fit?

Again, based on the distribution of rankings, BB’s company-specific risk premium is closer to HOOK’s than SAM’s. Thus our range has narrowed to 10.6% (mid-way between SAM and HOOK’s company-specific risk premiums) and 13.7%¹². Given the relative distributions of risk between BB and HOOK (please note that BB had more “Least Risk” factors

and more “Less Risk” factors, and HOOK had more “Moderate Risk” factors, not to mention HOOK’s exposure to potential cancellation of its distribution contract with Anheuser-Busch), we determined that BB’s company-specific risk premium should be closer to 10.6% than 13.7%. We, therefore and somewhat subjectively, conclude that BB’s company-specific

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Ranking of Company-specific Risk Factors				
	Most Risk	Moderate Risk	Less risk	Least Risk
Factors affecting risk premium:				
Product line diversification	BB	HOOK	SAM	PMID
Brewery location (company owned)	BB	HOOK	PMID	SAM
Brewery location (under contract)	BB/HOOK		PMID	SAM
Distributors	HOOK	BB	PMID	SAM
Location of sales	BB	PMID	HOOK	SAM
Supplier	No meaningful differences			
Foreign currency exposure	SAM	PMID		BB/HOOK
Trademarks	No meaningful differences			
Litigation	SAM	HOOK/PMID		BB
Management depth	BB	SAM		PMID/HOOK
Quality and stability of earnings	BB	HOOK	PMID	SAM
Access to capital	BB	HOOK	PMID	SAM
Exposure to variable rate debt	HOOK	PMID	BB	SAM
Subject to dilution from options	SAM	HOOK/PMID		BB
Unique Regulation	HOOK	PMID	BB	SAM
Subject to paying earn-out	PMID			BB/SAM/HOOK
Net operating loss carry forwards	HOOK	PMID	SAM	BB
Controls and procedures	PMID	BB		SAM/HOOK
Summary: Distribution of Rankings				
BB	7	2	2	5
HOOK	5	6	1	4
PMID	2	7	5	2
SAM	3	1	2	10

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risk is equal to 11.0%¹³, resulting in a discount rate of 25.4% (see Table 1). Note: This conclusion assumes that the underlying cash flow projection has been constructed in a reasonable manner corresponding with the overall risk of the company.

Other appraisers might come to different conclusions; however, we have provided logical and defensible support for our opinion. Arbitrarily adding (or worse) subtracting points no longer seems defensible.

One might ask why we don't just look at the comparables' total cost of equity to determine a total cost of equity for our subject company. The reason: Separating total risk into the various components lowers the inherent subjectivity of the analysis, since we separately account for systematic risk and the small company risk premium, making our conclusion of the company-specific risk premium more "accurate." As a "sanity check," one can compare the total cost of equity conclusion (25.4%) with the guideline companies' total costs of equity.

Also, relative to one of our benchmarks, we applied a "negative" company-specific risk premium (i.e., 11.0% is less than 13.7%). However, since our reference point is no longer 0%, the conclusion is positive 11.0%, as opposed to negative 2.7%.

Finally, we did not find a relationship between market risk and company-specific risk; i.e., the highest beta stock (SAM) did not have the highest company-specific risk (HOOK). Moreover, we did not find a relationship between size and company-specific risk; i.e., the largest company (SAM) did not have the lowest company-specific risk (PMID). We were not necessarily expecting to find any relationships, but it is important to note that company-specific risk is separate and unrelated from market risk and the size premium.

A quantum leap from traditional methods

While this technique is not perfect and does not completely remove subjectivity from the analysis, it is a quantum improvement over traditional methods to "calculate" company-specific risk.

Previous methods of starting at 0% are simply incorrect: As we've shown, even XOM and GE have company-specific risk! Moreover, if you start at 0% for

every guideline company, then you have no framework or guide to properly quantify company-specific risk. Under this approach, appraisers all have a framework. Reiterating from our prior work, and as shown in this microbrewery example:

[T]he benefits of [our] approach reside in the quantitative approach to the calculation and the ability to specifically compare the comparables with each other and with the subject company—rather than just starting at 0%, an arbitrary and incorrect reference point.

Further, just as risk-free rates, betas, equity risk premiums, and size premiums vary throughout time, so do Total Betas and company-specific risk premiums¹⁴. This further reinforces the use of our technique. We are now able to use timely data—or at least as timely as our calculation of Total Beta, which is dependent upon historical data, to form our company-specific risk conclusion. (Remember, we could always calculate a forward-looking Total Beta for many publicly traded stocks.) Gone are the days when an appraiser could subjectively add 1% for lack of management depth or 2% for customer concentration risk, or use factor models (including the plus/minus procedure, the numeric procedure and the listing procedure), with little or no analysis of how current conditions might price these risk factors.

Factor models, such as the Black/Green Build-Up Summation Method and Finison/Dailey Model™, among others, while useful in prompting appraisers to look at company-specific risk factors, are not rooted in empirical data and thus are completely subjective. Simply stated, these approaches do not rely upon empirical data, much less timely data, to support their conclusions.

Moreover, if you do not consider any companies as appropriate guidelines, you must still perform some analysis (whether using this technique or the more subjective analyses) in quantifying company-specific risk. At least this method permits an appraiser to retrieve a Form 10-K from companies in the pertinent industry and analyze them for company-specific risk, since by definition, the risk is just that: company-specific and not incorporated in Beta (systematic risk) or the size premium. With this technique, we have created an empirical approach to benchmark company-specific risk.

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Based on prior statistical analysis, this approach may not be applicable for all comparables. However, as we stated in our prior work, this could be an indictment of the CAPM as much as our technique. One possible explanation for the calculation of very high CSRPs (outside our current paradigm) is that some stocks might be more efficiently priced than others; i.e., there might be some unexplained randomness to returns that are not dependent upon systematic or unsystematic risks. Our calculation of company-specific risk assumes either one of the following:

- There is no unexplained randomness to stock price returns. (This applies better to some stocks than others, and the analyst must determine the quality of this assumption for each guideline company). Or,
- Unexplained randomness (to the extent that it exists) is part of company-specific risk.

In any event, we believe it is incumbent upon the appraiser at least to explore analyzing the particular comparables in a case, to form credible opinions regarding company-specific risk. This analysis is similar to rejecting a guideline company's multiple as not being useful to determine an appropriate multiple for a private company. If the closest comparables are not statistically relevant or lead to questionable conclusions, then consider broadening your search.

A three-point summary

In sum, we have shown the following:

1. Yes, you can quantify company-specific risk for publicly traded stock (empirical data), whether or not it is diversified away. This is no different than calculating or relying upon betas, equity risk premiums and size premiums—all commonly accepted measures of risk calculated from publicly traded stock returns. This technique takes the CAPM one step further. If you are comfortable with the CAPM, you should be comfortable with this technique.
2. If you have reasonable benchmarks (such as we had in the microbrewery industry), then you can analyze the possible sources of unique risk behind each benchmark and appropriately—and less subjectively—fit your subject company inside the framework; and

3. This technique requires significantly more work than most of us have previously done to determine company-specific risk. However, it eliminates much of the subjectivity in calculating company-specific risk, and thus leads to more accurate and defensible conclusions of value.

We recognize that people are resistant to change. However, just because this technique is new and contrary to popular belief does not mean that it is not a better way to analyze and quantify company-specific risk. All other methods to date do not quantify it. We highly encourage you to become an early adopter of this technique.

¹ “Company-Specific Risk—A Different Paradigm: A New Benchmark,” *Business Valuation Review* (Spring 2006), abstracted in the Jan. 2007 *BVU*.

² A proof of this formula appears in the *Business Valuation Review* article.

³ We calculated Beta, Total Beta, and R using weekly returns from December 24, 2001 through October 2, 2006 (250 trading weeks) with the S&P 500 as the market benchmark. We used size premiums from *Stocks, Bonds, Bills and Inflation Valuation Edition 2006 Yearbook* (Ibbotson Associates, 2006) (“Ibbotson”), for companies with market capitalization between \$16.1 B and \$367.5 B. We also used the adjusted closing prices for both the index and XOM as calculated by Yahoo!Finance, which account for dividends as well as any stock splits.

⁴ We are not claiming that another company can not have a company-specific risk premium less than 3%-4%, as a company's size premium may mathematically lower a firm's company-specific risk premium, the residual in the equation. To investigate this further, we calculated the CSRPs for 4Kids Entertainment (ticker: KDE), which had the highest market capitalization in decile 10, according to Ibbotson. We calculated KDE's CSRPs equal to more than 6%. Thus, we feel confident in making the assertion that all companies' CSRPs are greater than 0%.

⁵ At his presentation “How Diversifiable is Firm-Specific Risk?” to the CFA Society of Idaho on October 20, 2006.

⁶ Ross, Stephen A., Westerfield, Randolph W., and Jaffe, Jeffrey, *Corporate Finance* (3d edition)(Irwin, 1993) p. 325.

⁷ Some academic studies have determined that company-specific risk matters a great deal in investment returns.

⁸ In *Gesoff v. IIC Industries Inc.* 2006 Del. Ch. LEXIS (May 18, 2006)(abstracted in Sept. 2006 *BVU*) the Delaware Chancery declined to add a CSRPs in computing the cost of capital when the expert analysis was “unmoored to any objective financial analysis the court can reasonably evaluate.” We also quote Roger Grabowski in the Oct. 2006 *BVU*: “One thing we do recognize is that the valuation profession can use more tools grounded in market observations to help develop discount rates.”

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⁹ There could be a potential mismatch in timing, since we calculated Total Beta based on five years of data but used last year's Form 10-K to analyze company-specific risk. Thus additional analysis for a specific engagement may be warranted. One potential solution is to calculate a forward-looking Total Beta. (Remember, $T\beta = \phi_s / \phi_m$.) One could calculate implied volatilities, or forward-looking standard deviations, for individual stocks (assuming they have options) as well as for the market based on the Black-Scholes Option Pricing Model.

¹⁰ Thus we have not ranked market value of equity, book value of equity, market value of invested capital, book value of invested capital, sales, net income, EBITDA or number of employees, etc. We note, however, that some of these factors have embedded elements of company-specific risk.

¹¹ The market may not view all diversification as beneficial. For example, conglomerate-type diversification into unrelated product lines may actually increase company-specific risk.

¹² We believe BB's company-specific risk premium is less than 13.7%. However, another brewery might display larger company-specific risk than the top-end of this range of guideline public companies. Conversely, another microbrewery might warrant a smaller CSRP than the lower-end of the range. In other words, guideline companies may not always bracket a subject company, making determination of an appropriate CSRP more subjective than this example.

¹³ This technique is most appropriate for use with the CAPM, particularly if an appraiser does not incorporate an industry risk premium in the build-up approach. If one uses this technique in the build-up approach and does not use an industry risk premium, then other "company-specific" factors will have to be analyzed in Table 2. In any event, we agree with Jay Fishman, FASA, who criticized the use of the build-up approach and particularly the industry risk premium (see Editor's column, *Business Valuation Review*, Spring 2006). Because Total Beta is dependent upon Beta (CAPM), we highly encourage appraisers to use this technique in conjunction with the CAPM.

¹⁴ See, Bennett, James A., and Sias, Richard W., "Why Company-Specific Risk Changes over Time," *Financial Analysts Journal* (Volume 62, Number 5).

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SPECIAL REPORT

Quantifying Company-Specific Risk: The Authors Answer Your Questions

Note: Keith Pinkerton and Peter Butler's recent article "Quantifying Specific-Company Risk: A New Empirical Framework" (Feb. 2007 *BVU*), followed by a BVR telephone conference in March, sparked a lively debate and numerous questions from our well-informed, insightful BV community. Here's a complete round-up of the discussion.

Warren Miller (Beckmill Research): Valuation of closely held companies is about causality. How does your research contribute to helping professionals understand what causes what you say is company-specific risk?

Keith Pinkerton/Pete Butler: Causality is critical. In our hypothetical example [in the *BVU* article], we pointed out eighteen different characteristics in the micro-brewery industry that appeared to be primarily company-specific risk (CSR) factors. Other industries invariably will reveal other factors; you must look at public filings in each industry to determine appropriate causality.

WM: In applying this method, what is the range of risk premiums you have found, and for what size of companies (measured in revenues)?

KP/PB: The lowest company-specific risk premiums (CSRPs) we have found are in the range of 3–4%, for General Electric and Exxon Mobil (companies with billions of dollars in revenue). This led to our conclusion that appraisers should never automatically start their benchmark analysis at 0%. Also, the determination of CSRPs depends on the analyst's selection

of the appropriate equity risk premium (ERP). As to the top-end of the range, we have calculated a CSRPs around 27%, for a company (ticker: DCAI) that had about \$41 million in revenue at the time. This is not the ceiling; and as we pointed out in the *BVU*, we have found no relationship between size and company-specific risk.

Andrew Manchir (Goelzer Investment Banking): What article (or articles) on Professor Damodaran's website would you recommend on the 'total beta' concept?

KP/PB: Noted NYU Prof. Damodaran has published *Investment Valuation* (2nd Edition, 2002), and its Chapter 24, "Valuing Private Firms," refers to the total beta technique. His website also contains references (no articles): <http://pages.stern.nyu.edu/~adamodar/>.

Warren Miller: Has the total beta concept been peer-reviewed in any academic journal?

KP/PB: Unknown, but to the best of our knowledge, we have not seen any criticisms of Prof. Damodaran's work. Professor Ashok Abbott (West Va. Univ.) has also indicated that our total beta calculations are "very clean" and conceptually sound, and responded to the peer-review question by email:

Use of standard deviation as a measure of the risk of an asset in a standalone situation is quite appropriate. Market-based beta is an appropriate measure of risk for an asset held in a diversified portfolio. This is widely accepted and you can cite a number of finance textbooks on this.

For what it is worth, total beta makes intuitive sense. The other side of the equation for Total beta = θ_s / θ_m . Thus, total beta is a measure of the volatility (standard deviation) of a stock relative to the standard deviation of the market, and will generally be greater than 1 as

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the total risk of any one security will be greater than the risk of an index, which benefits from diversification. (Note that market beta measures a stock's covariance with the market and total beta measures a stock's standard deviation relative to the market.)

In summary, standard deviation measures total risk—if you only have one security in your portfolio. We also know that risk as measured by standard deviation and return are linearly related. So, we like the calculation of the total cost of equity (TCOE) equal to the risk-free rate + Total Beta x ERP (note the linear relationship just like the CAPM and the security market line).

Warren Miller: The 15,000-stock number quoted from the Washington State University professor contradicts the CFA regimen.

KP/PB: We agree. During the conference, we quoted the following from Dr. Richard Sias' (WSU) research: "An investor needs to hold 15,647 securities to have a 95% chance [his or her] portfolio will experience firm-specific shock of less than 1%."

The CFA curriculum teaches the CAPM (Capital Asset Pricing Model) and its inherent assumption that investors may 'diversify away' company-specific risk with a much lower number of securities. However, Prof. Sias is a retained speaker for CFA Societies worldwide; his recent presentation to the CFA Society of Idaho posed the following:

How Diversifiable is Firm-Specific Risk? Contrary to conventional wisdom, investors cannot easily eliminate firm-specific risk, and there are, and always have been, large diversification gains possible by holding many more securities than the 20 to 50 traditionally recommended. Although it is well known that diversifying across a small number of stocks (20-50) eliminates most of the firm-specific risk associated with holding a single security, and the standard deviation of such portfolios quickly approaches that of the market portfolio, neither of these facts is sufficient to warrant the generally accepted conclusion that relatively few securities are required to form a well-diversified portfolio.

Investors' ability to eliminate firm-specific risk is, in fact, much more limited than previously recognized. For example, in recent years, one-fifth of randomly chosen portfolios of 50 stocks experienced, on average, an annual firm-specific shock of 16%. Because investors' ability to eliminate firm-specific risk through diversification is a central tenet of asset pricing, market efficiency, and portfolio management theories, the results have a number of important implications for managers, including limits to arbitrage, the persistence of pricing anomalies, managers' ability to 'closet' index, and optimal portfolio size.

Patricia Trusty (Goelzer): What number of shares is needed to have a 67% chance of shock less than 1%? What number is needed to have a 95% chance of shock less than 2%?

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KP/PB: We do not know, but recommend that you contact Dr. Sias (Sias@wsu.edu) to learn more about his research. Note: Pete Butler and Prof. Sias will be co-presenting this topic at an advanced ASA BV conference in October.

David Fuller (VALUE, Inc.): You said to use this method to apply observed CSR of public companies to private company valuations because private companies are typically priced on the basis of their total beta. (1) What is the basis for this statement? (2) Are their studies that prove more accuracy or more consistency with market approach data? (3) Finally, are there situations where a private company would be priced on CAPM beta rather than total beta?

KP/PB: (1) The basis for the first statement is that private companies are typically priced on a total return metric, and total beta measures total return.

(2) There are no studies to prove more accuracy or consistency with market approach data (as this technique is so new). However, since we do not start at 0%, all else being equal, this technique will provide a lower indication of value than the more subjective factor models. It is up to the analyst to reconcile the income and market approaches, given the inherent strengths and weaknesses of each.

(3) Yes, there are situations where a private company will be priced on CAPM beta, primarily when a publicly traded company is purchasing a private company or a private company is going public. (This is Prof. Damodaran's conclusion.) However, if CSR is never fully diversified away, even public companies should at least (on some level) consider CSR in their investment decisions.

Neil Beaton (Grant Thornton, LLP): The companies we valued in *Gesoff v. Ilc Industries* (Dela. Chancery, May 2006) were all foreign-based, in markets without a lot of companies, data or volume. (1) How would you apply your "technique" to foreign markets? (2) How could you provide the data from which judges would be able to replicate your calculations, so they could make their own conclusions?

KP/PB: (1) If the foreign market is developed, we could apply this technique, using an appropriate for-

ign stock index as our proxy, instead of the S&P 500. However, it sounds like the *Gesoff* companies were in undeveloped markets, which makes application of this technique problematical, since it is based on empirical data. But we would run the calculations and determine 'comparable' CSRs to see if the conclusions made sense. This technique assists appraisers in quantifying CSRs for private companies. If for whatever reason, the conclusion is suspect or not appropriate as a benchmark, then exclude it from further consideration, as you would other methods.

(2) The calculation is actually quite simple and can easily be replicated in Microsoft Excel using either regression or calculation of standard deviations. Remember, Total Beta is either Beta/R or θ_s/θ_m . One can then easily solve for the CSR using arithmetic. $CSR = (Total\ Beta - beta) \times ERP - size\ premium$. In reality, this would be no more difficult than trying to explain the QMDM or the WACC to the judge.

Warren Miller: Your computation of 4 Kids Entertainment, Inc. (ticker: KDE) beta is 1.04. Capital IQ's is 1.85. Does this make sense to you?

KP/PB: Maybe. As you know, betas change over time. This further supports our technique, which captures timely data and even potentially forward-looking data through the use of implied volatilities (if available). Having said that, one can calculate betas in different ways and the discrepancy can be large. Thus we recommend that when using this technique, analysts calculate beta themselves. It is not hard and Capital IQ does not provide the correlation coefficient, R (at least, not on finance.yahoo.com), which is necessary to calculate Total Beta if one is using Beta/R instead of θ_s/θ_m .

WM: So, you're saying that KDE with a market cap of \$250 million has a smaller beta than GE (market cap \$355B)? Please explain that without mathematics, just logically.

KP/PB: The data are what the data are—at least mathematically. Do betas always make sense to us? No. In fact, our *BVU* article observes this for the microbrewery industry:

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Note: Since we separately analyze size and company-specific risk, we believe the most appropriate conclusion for a subject company's beta to be some measure of central tendency given the subjectivity in determining how a private company will react to systematic risks. For example, according to Standard & Poor's, Anheuser Busch's beta is greater than Pyramid Breweries', contrary to one's intuition.

We also point out that the modified CAPM separately accounts for size. Companies in different industries (e.g. health care versus high technology) have different betas, regardless of their size. Even with its problematic assumptions, the Nobel-recognized CAPM is the best approach we have. As for total beta, it explains 100% of a stock price's returns, whereas the CAPM may only explain 1%, for example.

Steve Mize (Gulf Coast Financial): If you are appraising a small business and there are no guideline companies, what approach do you take to build company-specific risk?

KP/PB: We would still look to the firm's industry to calculate CSR (even looking at companies we may have disregarded in the market approach). CSR is just that: company-specific. Historically, even though appraisers may have disregarded the guideline publicly traded company approach in favor of the income approach, we still somehow 'quantified' CSR. This technique is no different. Keep in mind, Prof. Damodaran believes that some analysts define 'comparable' far too narrowly.

Hill Johnson (Hartman Leito & Bolt, LLP): I noticed the use of modified CAPM (MCAPM) throughout the analysis. That is, MCAPM is an underlying component in the calculation of total cost of equity (TCOE). As you know, the CAPM equation was meant to be a conceptual theory, not a formula for calculating rates of return. Further, MCAPM has multiple assumptions that do not necessarily apply to private companies (e.g. all investors are risk averse, there are no transaction costs, the market has perfect liquidity, etc.). These key (and generally unwelcome) assumptions in MCAPM are precisely why so many appraisers prefer to use the Build-Up method. Do they still apply to your analysis? If so, is this a hurdle for the acceptance of your technique and its findings?

KP/PB: We agree the CAPM has some problematic assumptions, which do not apply to private companies as well as public. And yes, these key (and unwelcome) assumptions apply to our technique. While CAPM may be a conceptual theory, it has certainly morphed into the de-facto standard to calculate rates of return. We disagree, however, that these assumptions explain why many appraisers use the build-up method. The build-up approach is essentially the CAPM, except one assumes the beta is 1 and then you add/subtract the industry premium. We believe the build-up approach has become popular because it is much easier and quicker to look at an Ibbotson's industry premium rather than conduct the rigorous analysis of selecting appropriate comparables and calculating betas. (In the interest of full disclosure, we admit to having used the build-up approach ourselves.)

Essentially, this technique asks appraisers to diligently calculate company-specific risk, and not take the easy way out (which we also admit having done previously, but intend to use CAPM more in the future and this total beta concept whenever possible).

Paul Taylor (Plante & Moran): Are there circumstances where CSR guideline companies will differ from the guideline companies used in the market approach?

KP/PB: Yes, we can conceive of this occurrence to broaden one's perspective in the income approach. In our opinion, the more data the better; as long as you are in/around the appropriate industry, this technique is applicable.

Dale Lash (Rubin Brown): Would a thinly traded company used as a comparable pose any problems? What about potential overlap with a lack of marketability discount?

KP/PB: Yes, it very well could. This technique is empirically driven. To the extent that trading data may incorporate some kind of liquidity discount, one would have to consider this in assigning a lack of marketability discount to a private firm.

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Hill Johnson: (1) What do you say to people who contend that a well-documented, well-supported, qualitatively detailed CSR (by Strengths, Weaknesses, Opportunities and Threats [SWOT], Finison-Daily, etc.) is also an acceptable technique? These same people might argue that their vast experience in appraising specific industries and thousands of companies over their career differentiates their services from a web-based robot appraiser who simply uses financial inputs. Further, courts have historically accepted and praised these traditional CSR analyses when well documented and supported with evidence and reason.

(2) Do you contend that your technique is “bulletproof”? What are the key assumptions or potential ‘holes’ in your technique?

KP/PB: (1) Qualitative assessments still have their place. In our microbrewery example, we used a qualitative assessment by looking at the pertinent Forms 10-K and analyzing perceived company-specific factors to arrive at our private firm’s CSR. However, if relevant data are available to be quantified, appraisers should have a very good reason for deciding not to. Claiming “my vast experience appraising thousands of companies” is not enough. Our technique is not robotic, and we readily admit its subjective aspects (see below). We are not saying that anyone has been doing it wrong or traditional qualitative methods don’t have their place in court precedent; we are simply saying now we have a better way to complement traditional qualitative methods and make them even more reliable. Moreover, future research with Prof. Abbott (WVU) may eliminate even more subjectivity when using this total beta technique.

(2) Relative to purely qualitative assessments, we have found no ‘holes’ in our technique, the benefits of which include multiple, empirically-driven benchmarks for CSR that do not automatically start at 0% (an incorrect and low reference point). There is subjectivity to the analysis in arriving at your private company’s CSR after calculation of the guideline publicly traded CSRs, particularly if your private company does not fall within the range calculated. There is also the subjective calculation of guideline publicly traded CSRs. Depending on how analysts calculated and/or analyze

the following elements, they will arrive at different publicly traded benchmarks:

- There might a potential timing mismatch if one calculates historical beta and total beta using five years of historical returns, for example, and then keys in on last year’s Form 10-K to analyze CSR factors.
- Market beta and total beta calculations depend on the selection of the market proxy, measurement interval and measurement time period (just like CAPM).
- Should there be a decision rule related to what ‘comparables’ are considered and what are excluded? The t-stat and statistical significance may come into play here. Remember, this is a criticism of the CAPM—not total beta—and essentially everyone has accepted the CAPM. The total beta technique describes 100% of stock price returns, whereas CAPM may only explain 1%, for example.
- Selection of the appropriate ERP (historical, supply-side or forward-looking) should not be a major detractor; we don’t throw out the CAPM because this is somewhat subjective.

Christina Lam (Navigant Consulting): Since the brewery in your example is a private company, do I need to add a marketability/liquidity discount?

KP/PB: Yes, you need to take a marketability/liquidity discount. We determined Boise Brewery’s CSR from publicly traded stock (note: not thinly traded publicly stock), so these benchmarks do not include any lack of marketability issues. After determination of pre-discounted value, then apply your marketability/liquidity discount.

Anonymous: Intuitively, the use of the total variance seems to overstate the total beta. It just seems counterintuitive that the observations below the regression line on a scatter diagram are increasing the TCOE. It seems we should only be concerned about the observations above the line. Do we really want

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a total variance (R) concept to determine total beta? Again, my intuition leans toward a semi-variance. But math trumps intuition.

KP/PB: This is a very interesting observation. We also see the math behind the total beta calculation, which depends on total variance (actually standard deviation). Well-accepted financial theory holds that if you have only one asset in your portfolio, then your risk measurement depends on standard deviation, not semi-variance or semi-standard deviation.

We also like intuition, but ours (or yours) might not be another's. For example, your intuition (understandably) tells you that observations above the linear regression line are the only observations that increase the TCOE relative to the systematic (CAPM) cost of equity. Yet we see observations below the line as indications of risk, which must be accounted for. In other words, one can project the stock's return using CAPM beta; however, observations below the linear regression line failed to meet those projections—and that is risk. Did the subject company just announce the loss of a large customer, for example, leading to a materially adverse stock decline? Standard deviation, not semi-standard deviation, accounts for all observations, above and below the linear regression line, which we believe to be the appropriate measure of risk for a standalone asset.

Anonymous: Is there empirical evidence that buyers (in any market) react to differences in variability (i.e. set prices) to the degree that total beta or another variance measure predict?

KP/PB: Risk (standard deviation) and return are related in a linear fashion. Granted, this relies on historical relationships, but we have no reason to expect that this strong (positive) linear relationship will not continue in the future. As for evidence that investors look to standard deviation to make investment decisions (i.e. set prices), one need only look as far as the option markets.

J. Scott Sommerer (JSI Capital Advisors): (1) You stated (in your presentation): "Why ...do private companies receive lower multiples?" My intuition tells me the old discount for lack of marketability is the

answer, not higher company-specific risk. (2) Would it be fair to say that you think proper application of your technique would, in practice, lower the reliance on the discount for marketability in the profession?

KP/PB: (1) Lack of marketability is obviously very important for valuation of minority interests in privately held companies. Our comment regarding lower multiples refers to controlling interest valuations, where lack of marketability, if it exists, is nominal. We believe that CSR matters for investments in publicly traded stock, and do not believe there is any controversy that CSR matters for privately held companies.

(2) No, we believe that this technique has no overlap with marketability issues since we are using data from the public markets. (Disclaimer: If you use this technique with thinly traded companies as benchmarks, then there will be some overlap when assigning a lack of marketability discount for a minority interest in a privately held company.)

Neil Beaton: Is this technique applicable for early-stage companies?

KP/PB: This technique might be problematic to apply to early-stage companies, if the publicly traded company 'benchmarks' are significantly more established and mature. Back in 1999 and early-2000, this technique might have been more useful to apply when many early-stage companies were public. Coincidentally, we just valued an early-stage company; we located publicly traded "benchmarks" and calculated their CSRPs. However, the range calculated did not represent the risk of our early-stage company, and thus, we excluded the results and relied upon venture capital required rates of return. In summary, this technique is not applicable for every valuation assignment, but, in our opinion, it is certainly worth exploring.

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Q & A UPDATE

The Last Word on Company-Specific Risk

In our final follow-up to Keith Pinkerton's and Pete Butler's article "Quantifying Company-Specific Risk: A New Empirical Framework with Practical Applications" (Feb. 2007 *BVU*) and their Q&A wrap-up ("...the Authors Answer Your Questions," May *BVU*), we now present the last known inquiry to the diligent duo, below.

The question comes from the equally persistent Warren Miller (Beckmill Research). Notably, both Miller and Pinkerton/Butler will be busy this summer presenting at several conferences and local BV meetings around the country—although apparently not at the same time. For example, Miller just spoke on "A New Approach to Company-Specific Risk" at the Illinois CPA Society in Chicago in May, while Pete Butler spoke at the New York State CPA meeting that same month on "Quantification of Company-Specific Risk." Butler will be joined by Keith Pinkerton at the IBA's 2007 Symposium June 20-23 in Denver, Colorado, to present their empirical model and its practical applications.

So of course, the last word on the quantification of company-specific risk is far from spoken (or written). Hopefully the exchange among professionals will deepen the discussion on behalf of all BV analysts—as well as their clients and the courts—who continue to wrestle with this complicated but critical analysis.

Warren Miller: The efficient frontier is curvilinear, not linear. How does this affect the viability of this technique?

Pinkerton/Butler: First, by way of background, we note that the "efficient frontier" refers to the graphic representation of a feasible set of portfolios constructed from many securities, with the expected return of the various portfolios on the y-axis and the standard deviation of the portfolios' returns on the x-axis. The line connecting all of the optimum portfolios is curvilinear, starting from the minimum variance portfolio to the maximum return portfolio. "Optimum" points refer to portfolios that for any given level of standard deviation (risk) on the x-axis result in the highest return on the y-axis. Any point below the efficient set would receive a lower expected return (inefficient) than the same standard deviation on the efficient set.

Investors want to be on the efficient frontier; otherwise they will not receive the appropriate return for the given level of risk they undertake. The amount of bend in the curve is indirectly related to the correlation, or covariance, of the portfolio. The lower the correlation, the more the curve bends. This relationship demonstrates the benefit of diversification.

Thus, Warren's observation is true. However, the efficient frontier applies to well-diversified portfolios—not standalone assets. Total beta measures total risk on a standalone basis. It is very difficult (i.e., impossible) to have an efficient portfolio with only one asset. Thus, while his comment is true, it is not relevant to total beta.

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