VALUATION

Practical Evidence and Theoretical Support for Total Beta

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In response to Sarah von Helfenstein's article, "Resolving Total Beta" (pages 23–32), we do not feel it is necessary to debate every point. Instead, we will focus on the "big picture" in layman's terms, and then show the theory behind Total Beta and/or private company Beta.

She writes, "I will begin by stating my position, in two parts. Statement 1: No matter what arguments are used to justify a set of equations that underlie proposed new applications of theory, if those equations violate known and settled fundamental principles, and it cannot be demonstrated that they create a new universe of theory and principles (e.g., the theory of relativity v. Newtonian physics), they should not be used."

Total Beta and/or private company Beta are not anything new, it has been *Daubert*-tested,[1] and is based on modern portfolio theory, as shown below.

Next, Ms. von Helfenstein states, "Statement 2: Based on its violation of critical fundamental principles and its demonstrable lack of creation of a new universe of theory, I suggest that Total Beta should not be accepted by our profession as a 'market Beta' substitute for quantifying the total cost of equity, or a proxy for the 'total risk' of privately held companies, or even as 'another useful insight into the historical risk profile of a proxy firm.'"

We developed Table 1 from Professor Damodaran's website as of January 2010, where he posted industry Betas and Total Betas. To calculate Ke (cost of equity using Beta) and total cost of equity (TCOE using Total Beta) of each industry, we used a risk-free rate of 4.6 percent and an equity risk premium of 5.7 percent.

We ask the simple rhetorical question, if you were valuing a *privately held company* in any one of these industries, which Beta better captures the risk associated with a privately held investment and is a good starting point in the valuation process? The answer should be readily apparent to any one who has ever performed a valuation, countering

TABLE 1: COMPARING COST OF EQUITY USING BETA AND TCOE USING TOTAL BETA

INDUSTRY	KE FROM CAPM (BETA) IN %	TCOE (TOTAL BETA) IN %
Apparel	11.2	29.3
Auto & truck	9.3	17.4
Biotechnology	11.0	36.0
Building materials	9.7	20.8
Computer software/svcs	10.8	28.6
E-commerce	11.6	28.2
Food processing	8.7	18.1
Heavy construction	13.8	26.6
Internet	11.0	37.3
Office equipment/supplies	9.6	20.5
Publishing	9.9	23.5
Restaurant	11.2	27.0
Retail store	11.2	25.8
Semiconductor	14.1	35.8
Wireless networking	12.2	30.0

1 *Alamar Ranch, LLC (Idaho), and YTC, LLC (Idaho) v. County of Boise*, U.S. District Court for the District of Idaho (Civil Case No. 1:09-cv-00004 BLW).

Ms. von Helfenstein's claims that Total Beta should not replace Beta.

More importantly, we also challenge Ms. von Helfenstein (or any other naysayer) to refute the following as a violation of existing financial theory.

To demonstrate the simplicity of Total Beta (and/or private company Beta), we will use the example of an investor in the following situation:

- Of his total wealth, 50 percent is in the market index (w_1) and 50 percent in a private company (w_2).
- The risk-free rate (r_f) is 5 percent.
- The return on the market index (r_m) is 11 percent.
- The standard deviation of market returns (σ_m) is 20 percent.
- The standard deviation of the private company returns (σ_s) is 40 percent.
- The correlation of the private company returns with market returns (ρ_{sm}) is 0.50.

The Total Beta of the private company is 2.0 (or s_s/s_m = 40%/20%). Note that CAPM Beta equals 1.0, or (40%/20%)*.5. Unlike Ms. von Helfenstein, however, we would not use CAPM Beta (1.0) to value our private company. For that matter, in this example, we also would not use Total Beta (2.0) because the investor is neither completely diversified (which Beta presumes) nor completely undiversified (which Total Beta presumes).

What, then, is the private company Beta (B_s) and total cost of equity (r_s) that we should use for this private company? These calculations can be accomplished in four easy steps, which can be found in any corporate finance textbook—contrary to Ms. von Helfenstein's views that Total Beta violates existing financial theory.

Step 1: Calculate the variance of the portfolio.

$$\sigma_p^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{12} \sigma_1 \sigma_2$$

$$\sigma_p^2 = 0.05^2 \text{ x } 0.20^2 + 0.50^2 \text{ x } 0.40^2 + 2 \text{ x } 0.50 \text{ x } 0.50 \text{ x } 0.50 \text{ x } 0.20 \text{ x } 0.40$$

$$\sigma_p^2 = 0.0700 \ldots \text{and} \ldots \sigma_p = 0.265$$

Step 2: Calculate the required rate of return on the portfolio.

$$r_p = r_f + \frac{\sigma_p}{\sigma_m}(r_m - r_f) = 0.05 + \frac{0.265}{0.200} \text{ x } 0.06 = 0.1295$$

Step 3: Noting that the Beta of the portfolio is the weighted sum of the individual asset Betas, we express required rate of return in terms of average Beta.

$$r_p = r_f + (w_m \beta_m + w_s \beta_s)(r_m - r_f) = 0.05 + (0.50 \text{ x } 1.0 + 0.50 \text{ x } \beta_s) \text{ x } 0.06 = 0.1295$$

Step 4: Solve for private company Beta of the private company stock, and calculate the total cost of equity.

$$\beta_s = 1.64 \ldots \text{such that} \ldots \text{ rs = rf + } \beta_s(r_m - r_f) = 0.05 + 1.64 \text{ x } 0.06 = 0.1484$$

The total required risk-adjusted return on this portfolio is the weighted cost of capital (0.50 x 11.00% + 0.50 x 14.84%) of 12.95 percent, which is the required rate of return derived in Step 2 above. The weighted average Beta on this portfolio is 1.32 (0.50 x 1.00 + 0.50 x 1.64), which also gives us the required return in Step 2 above. Please note: B_s equals something in-between Beta (1.0: perfect diversification) and Total Beta (2.0: no diversification) since our private company investor is partially diversified.

Pretty simple, isn't it? The equations above are a little different than those in "A Tale of Two Betas" (*The Value Examiner*, January/February 2011, pg. 21), but the logic is the same and you get the same answers. Why do the naysayers try to make this so much more complicated than it really is?

Moreover, we have shown that for realistic weightings of most private companies in prospective business owners' portfolios (70 percent and above, for example), theoretically correct private company Beta is not materially different than practically correct Total Beta.

Now that we have an equation for Total Beta, when is it appropriate to use? All investors compete for assets. The question is, "Who is competing for my private company?" Fair market value is based on what a knowledgeable, willing, and unpressured buyer would probably pay to a knowledgeable, willing, and unpressured seller. The buyer pool matters. If buyers have the pricing power they will price for all of their risk.

If an undiversified buyer, who uses Total Beta, competes with a fully diversified buyer, who uses the CAPM, the undiversified buyer will be outbid by the fully diversified buyer. The undiversified buyer in this case cannot price for all of his or her risk. If this buyer were competing against other undiversified buyers, then why can't he or she price for all of his risk? Ask yourself this question: How many large public funds, which are fully diversified and therefore use the CAPM, are competing for the purchase of the corner grocery store in my neighborhood?

Whenever we add a company-specific risk premium (regardless of how it is calculated), we assume the scenario above whether we realize it or not because:

- Why would we add a company-specific risk premium when the buyer is diversified such that this risk can be diversified away?
- Why would we add a company-specific risk premium when the buyer does not have the pricing power to realize it (i.e., competes with buyers who utilize the CAPM)?

In summary, Total Beta is now both *Daubert*-tested and endorsed by PhDs (academics and practitioners). Until Ms. von Helfenstein or anyone else can prove an error with the modern portfolio theory equations above, it will continue to gain acceptance in our community. VE

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