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BETA OR TOTAL BETA? THE ANSWER DEPENDS ON THE “COMPANY” IT KEEPS

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ABSTRACT

Determining an appropriate cost of capital for a privately-held company is a very difficult undertaking. There are no specific private company benchmarks. Therefore, appraisers turn to rates of return and data from the public stock markets.

According to traditional financial theory, portfolio managers interested in well-diversified portfolio construction should use traditional betas as a measure of systematic risk when adding stocks to a portfolio. Traditional betas, on the other hand, do not mean all that much for the valuation of privately-held companies. Business owners who have placed a large majority of their net worth in one asset, unlike well-diversified portfolio owners, cannot shed company-specific risk (CSR). Unlike for publicly-traded stocks, therefore, CSR is often priced for privately-held companies.

A relatively “new” beta known as total beta captures total risk, including by definition CSR. Therefore, appraisers should use total beta benchmarks from publicly-traded guidelines to better support their selection of an appropriate discount rate to value a privately-held company.

Peter Butler has written and spoken extensively in the United States on this topic and has developed an online application for appraisers known as the Total Cost of Equity Calculator to calculate guidelines’ total betas and resulting discount rates available at www.bvmarketdata.com.

KEY WORDS

total beta, beta, total cost of equity, total risk, stand-alone asset, undiversified investor

JEL Classification: G12, G32

INTRODUCTION

At least in the United States, the Courts have not reacted very well to traditional ways of determining a discount rate for a privately-held company as shown by the quote below:

To judges, the company specific risk premium often seems like the device experts employ to bring their final results into line with their clients’ objectives, when other valuation inputs fail to do the trick.

Delaware Open MRI Radiology Associates v. Howard B. Kessler, et al

While there are data sources for all of the other components of the total cost of equity (the risk-free rate, the equity risk premium, the industry risk premium and/or the beta, and the size premium), before the “invention” of total beta, appraisers had to completely guess at the last component of risk

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– the company-specific risk premium (CSRP). As shown above, this guess has not been dependent on empirical data. Sometimes and rather unfortunately, it has been subject to manipulation.

For the last four years, I have relied upon total beta as part of a process to empirically quantify guidelines' total costs of equity (TCOE) as shown below. I then specifically, and more objectively, compare my private company to the guidelines to better support my selection of an appropriate discount rate (TCOE) to value my subject company when using the income approach to valuation. This approach has created less subjectivity and more confidence in the development of the appropriate discount rate – at least in my opinion.

In the United States, total beta has been earning converts and has been endorsed by numerous appraisers as well as PhDs. With any new theory, however, comes resistance by individuals who are content to still guess at company-specific risk (CSR). I will comment upon the more interesting feedback below.

1. DEFINITIONS

Statistically-speaking, traditional beta is defined as:

$$\beta = \sigma_{s,m} / \sigma^2 m$$

where “s” and “m” stand for stock and market, respectively.

Thus, the traditional beta of a stock is equal to the covariance of the stock with the market, $\sigma_{s,m}$, divided by the variance of the market, $\sigma^2 m$. Covariance is a statistical measure of the degree to which two variables move together.

Traditional beta can also be determined through ordinary least squares (OLS) regression and “ ρ ” is the resulting correlation coefficient between the stock and the market defined as:

$$\rho = \sigma_{s,m} / \sigma_s \cdot \sigma_m$$

where σ_s and σ_m represent the standard deviation of the stock and market's returns, respectively.

The correlation coefficient in theory will range from 1.0 (perfect, positive linear correlation) to -1.0 (perfect, negative linear correlation). In practice, these extremes are never approached.

Traditional beta is also the slope of the best-fit linear regression line between the returns of the stock and the returns of the market. Importantly, traditional beta can also be defined as:

$$\beta = \rho \cdot \sigma_s / \sigma_m$$

This equation is important to understanding the difference between traditional beta and total beta. Traditional beta combines the correlation coefficient, ρ , with relative volatility, σ_s/σ_m . Thus, traditional beta is not a pure measure of relative volatility. Total beta, on-the-other-hand, is a pure measure of relative volatility, as shown in the following equation:

$$\text{Total Beta} = \beta / \rho = \sigma_s / \sigma_m$$

Total Beta was first brought to the world of finance's attention almost thirty years ago (Camp and Eubank, Jr., 1981). The metric is concerned with volatility of returns, so it captures total risk - all market risk, industry risk, size risk, and company-specific risk - not just market risk which traditional beta purports to capture. It has long been accepted that volatility, or standard deviation, is an appropriate measure of risk for standalone assets. For appraisal purposes, this makes total beta very appealing; this total risk perspective is the reference point we use to value privately held companies most of the time.

2. OBSERVATIONS

Total Beta will always be greater than the traditional beta since “ ρ ” will never equal with 1.0

a perfect, positive linear relationship between a stock and the market). From the other side of the equation: the standard deviation of a particular stock will almost always be greater than the standard deviation of the market, making total beta greater than 1.0. Dividing traditional beta by " ρ " results in a metric, total beta, which is only dependent upon relative standard deviation.

If one takes a close look at the formulas for total beta and beta, it should now come as no surprise that a low correlation coefficient, ρ , resulting in a low beta (with low market risk) may simultaneously conceal a highly volatile stock (with high total risk). Moreover, I have performed a limited amount of research. It appears that total beta is (generally) more stable than traditional beta. This has to do with the large variability in the correlation coefficient, ρ , as opposed to large variability in the standard deviation of the stock, σ (generally).

Total Beta also captures 100% of a company's total risk when all risks are properly disclosed and the market for the stock is efficient. No other measurement of beta comes remotely close to this ability. We are all aware that traditional betas often have extremely poor abilities to capture stocks' returns. In fact, most traditional betas explain substantially less than 30% of stocks' total return (Ibbotson SBBI, *2008 Valuation Yearbook*), leaving more than 70% to other forces, such as potentially other systematic risk factors, size risk, unsystematic risk, and possibly other reasons.

3. THEORY

Professor Damodaran of New York University's Stern School of Business was, presumably, the first to apply this "new" metric, total beta, in the capital asset pricing model (CAPM). Professor Damodaran replaced traditional beta with total beta in the Nobel-prize winning formula as follows:

Risk-free Rate + Total Beta x Equity Risk Premium

Please keep in mind, this equation is only applicable as a proxy for privately-held companies. TCOE will not be priced in the public stock markets since CSR is diversified away (at least partially, if not completely) in well-diversified portfolios. In other words, total risk is not priced in the public stock markets. On-the-other-hand, appraisers often value privately-held companies as stand-alone assets where total risk is priced. Therefore for any valuation assignment, the TCOE proxies created by public guidelines will serve as reference points (excellent starting points) to determine the appropriate cost of capital of a closely-held firm for use in the income approach.

I then carefully compare public disclosures of risk of my various guidelines against one another with known risk factors for my subject company. While this step is still subjective, it is far less subjective than merely guessing at an appropriate CSRP, which the Courts in the United States have been extremely critical of.

As implied above, appraisers who choose to directly observe TCOEs do not need to estimate a beta, a size premium or, for that matter, a CSRP for a privately-held company. Theoretically, if you have only one number to defend, it could make a deposition and/or cross examination a bit easier.

4. ALLEGED CONTROVERSIES

While this technique is being recognized by some as a great contribution to the body of knowledge, it also has received some resistance. In my opinion, the criticisms have been misguided. An interesting observation is that total beta and the TCOE equation violate the CAPM. Of course, they violate the CAPM. The CAPM tells us that CSR is not priced. Total beta and the TCOE equation price total risk. Interestingly, the mere presence of privately-held companies also

violates the CAPM. The CAPM depends on the assumption that investors buy the market portfolio – by definition, a well-diversified portfolio. When business owners choose to invest a large majority of their net worth in a privately - held company they no longer hold a well-diversified portfolio. Moreover, it should be intuitively obvious that the TCOE equation replaces beta with total beta – a clear violation of the CAPM.

Another alleged criticism is that whether investors are diversified or undiversified in the public markets, they both receive the same rate of return. This is absolutely true. The criticism is then why are we increasing beta to total beta to increase the rate of return required for (relatively) undiversified business owners.

The reason total beta is an excellent proxy to use for private companies is the fact that undiversified investors in the public markets are price-takers. Diversified investors, such as institutional investors, are the marginal investors in the public markets. Diversified investors set the prices of (most) publicly-traded stocks. (Relatively) undiversified investors set the price for privately-held companies. Therefore, appraisers need to “improve” beta by using total beta as a replacement in the CAPM to account for who is setting the prices in each respective market.

Another criticism is that no academic researcher uses total beta in their research on rates of return. If I was an academic, I would not use total beta to analyze public stock market returns either. We know that total beta is a total risk metric since it is dependent upon standard deviation. We know that total risk (TCOE) is not priced for publicly-traded stocks because of the benefits of diversification. Well-diversified (marginal) investors can either completely (traditional theory) or partially (recent research) shed CSR.

Moreover, the academic literature is mixed on the topic of whether idiosyncratic risk matters for publicly-traded stocks. Some researchers such as Malkiel (2002) and Goyal et al. (2003), for example, have found a positive relationship between idiosyncratic risk and excess stock returns; while others (Guo et al. (2003)) have found a puzzling negative relationship between idiosyncratic risk and future stock returns. Even if there is a relationship (positive or negative), it stands to reason that 100% of idiosyncratic risk is not priced for publicly-traded stocks since even relatively undiversified investors have some level of diversification and can shed at least some CSR.

One thing is certain; however, the private markets price idiosyncratic risk and often, price it completely. For proof, I asked the audience at the American Society of Appraisers’ Advanced Business Valuation Conference in October 2009 (an audience of approximately 350) if anyone had ever asked to see a business owner’s stock portfolio statements to better assess his/her relative diversification. Not one appraiser (that I could see) raised their hand.

While required rates of return for privately-held companies are based on the prospective buyer pool, often the current owner of the subject company may be a good proxy to assess the diversification of the buyer pool. This leads me to believe that when we in the business valuation industry have placed a completely subjective CSRP on a company, we have considered the company to be a stand-alone asset where total risk is completely priced. In other words, we as an industry have not taken the time to determine the likely diversification levels, or not, of the potential buyer pool.

If total risk is completely priced, then use total beta in the CAPM equation. If an appraiser determines that he or she wants to consider the relative diversification of the prospective buyer pool, then he or she can account for that (subjectively) by decreasing the total beta, all else being equal. For more information on this adjustment, please see frequently asked question (FAQ) # 46i under the Butler Pinkerton tab at www.bvmarketdata.com. Either approach provides more empirical data than the business valuation industry has ever had before.

5. PRACTICAL APPLICATION

This section will highlight total beta's applicability for appraisers around the world. While I have chosen to highlight wireless equipment companies operating out of Canada, I could have selected any industry in any country.

To keep this section relatively short and simple, I have selected only two Canadian companies which trade on the Toronto Stock Exchange to compare with my (fictitious) subject company. Please keep in mind that the better your comparables, the better the applicability to your subject company, all else being equal. One disclaimer on this issue: at least in the United States, many appraisers build-up the discount rate and use an industry risk premium from the pertinent Standard Industrial Classification (SIC) code. One excellent use of this technique is to calculate TCOEs for some (or all) of the companies representing the SIC code to compare with the opposing expert's conclusion on the appropriate discount rate.

Our subject company, Wireless Networks ("WN") manufactures wireless networking equipment for a wide spectrum of industries across the globe, similar to the two guidelines described below. For a more complete comparison, please see table 3.

Sierra Wireless was founded in 1993. The web-site includes the following: *It has a track record of leading the way with new wireless technologies and solutions. We focus on wireless devices and applications, offering a comprehensive portfolio of products and services that reduce complexity for our customers. With sales, engineering, and research and development teams located in offices around the world, we also offer a network of experts in mobile broadband and M2M (machine-to-machine) integration to support customers worldwide.*

From Tranzeo Wireless Technologies' web-site: *TZT leads the wireless broadband industry as a premier manufacturer of high-performance wireless network equipment that allows communities and businesses to communicate without boundaries.*

Tranzeo's full spectrum of point-to-point and point-to-multipoint radios, WiMAX equipment, and mesh network solutions are designed for wireless internet service providers, governments, campuses, military, carriers, enterprise customers, and systems integrators around the globe.

5.1. Empirical Data

I obtained the following from the Total Cost of Equity Calculator (the "Calculator") available at www.bvmarketdata.com.

The Calculator uses a weekly frequency for a look-back to calculate beta, total beta and the TCOE. Therefore, I calculated five different total betas (and TCOEs) for these guidelines, around our date of value of December 31, 2009, using every day of the trading week (Monday – Friday) for a five-year look-back. The reason this is done is because the different days of the week will produce different results. For example if I start with a Friday, 12/18/09, for example (Please note: there is no trading on 12/25/09, Christmas day, the closest Friday to our date of value), the Calculator will pull 261 data points from Friday closes. On the other hand, for example, if I start with a Thursday, 12/31/09, for example, the Calculator will pull 261 data points from Thursday closes.

The data is completely different, as you can see in the tables below. Thus, I do not recommend that appraisers merely rely upon printed sources for beta calculations. Printed sources do not specify the sensitivity of the calculations. As you can see, I averaged the various weekly look-back results as the best representation of beta, total beta and the TCOE for the guidelines as of the date of value.

When requested by the Calculator, I selected a 3.60% risk-free rate as representative of the appropriate risk-free rate (the 10-year Government of Canada benchmark bond yield) as of December 31, 2009. Next, I selected an equity risk premium (ERP) of 5% for the Toronto Stock Exchange, where these two stocks trade.

Based on the qualitative analysis above, I believe it is obvious that the TCOE for our subject company should be between 17.8% and 26.9%. But where?

If we merely average the two results, we get 22.4% (rounded). Now, the question remains. Is WN's total risk closer to SWs or TZT's? Based on a qualitative assessment, I have concluded that WN's TCOE should be closer to TZT's.

Thus, we have a floor created at 22.4% (the average) and a ceiling at 26.9% (TZT). Now where does this subject company fit in this narrowed spectrum?

Given operating losses and other risk factors such as violation of covenants for TZT, I believe 26.9% is too high for WN and selected 24.0% as the appropriate cost of equity.

One item to discuss is leverage. For ease of presentation, I have assumed that these companies all have the same capital structures. If in the real world this is not a reasonable approximation, then appraisers should consider un-levering the total beta calculations and then re-levering them with the assumed capital structure of the subject company using one of the accepted formulas (Hamada, Miles-Ezzell, Harris-Pringle).

Subjective? Yes, to a certain degree. However, it is not nearly as subjective as completely guessing at a CSRP in a build-up approach. This technique provided an empirical framework to make a decision. Sometimes, this method will only provide a "floor", in which case, more subjectivity will exist as to how much above the "floor" is appropriate. Other times, such as above, it will provide a "floor" and a "ceiling" and somewhat less subjectivity. In any event, it is a market approach twist to developing a discount rate – a market approach we as an industry have not had before.

Keep in mind, all discount rates have to match a company's projections. This determination has assumed that WN's projections are "reasonable". If, for whatever reason, the projections that you are valuing are atypical (high) for the company, then 24.0% may be too low.

This technique is merely one more tool (although I believe it is an outstanding tool) to select a discount rate for a private company.

Please compare and contrast it with other more subjective techniques.

6. CONCLUSIONS

In reference to the answer in the title of this article, if a company is publicly-traded and keeps "company" with many other companies in a well-diversified portfolio, then use traditional beta to measure risk. If the subject company does not have any other company so-to-speak in a portfolio, such as a privately-held company, then use total beta as the best measure of risk. A business owner, or pool of potential buyers, most likely cannot completely diversify. They are, therefore, exposed to much more market risk than what a traditional beta would indicate. Traditional beta, therefore, needs improvement in the form of total beta to capture this increased exposure.

The TCOE equation is a model to better place a forward-looking discount rate on a privately-held company when projecting cash flows. Please key in on the words, forward-looking. No one has a crystal ball. We do the best we can with what we have. And we now have, for the first time, a total risk metric for private companies – a significant improvement over traditional build-up models.

Appraisers who value privately-held companies should not only consider using total beta and the TCOE equation, but reach for them every time they perform an income approach to valuation.

I determined that both stocks were efficiently traded based on an assessment of trading volume. Therefore, these total betas and TCOEs are viable to use as proxies (starting points) to select an appropriate discount rate (TCOE) for our subject company, WN.

5.2. Qualitative Assessment

Next, I went to the public disclosures of risk and compared them to the inherent risk of my subject company.

Please see this analysis below and note that this is just one way to analyze these three companies.

You may come up with a different method and/or rank the companies in a different manner and/or subjectively determine that one risk factor is more important than another and/or include different risk factors. (Remember, this analysis is just for illustration to help appraisers with the practical side of this technique. Other industries will require other factors to consider). While subjectivity remains – at least now we have an empirical framework to analyze total risk. In short, this is the qualitative part of the analysis. Calculating the guideline TCOEs is the quantitative part.

In the table below, “SW” stands for Sierra Wireless; “TZZ” stands for Tranzeo Wireless Technologies; and “WN” stands for Wireless Networks, our subject company.

Table 3. Relative Risk Comparison

Factor	Ranking (Least to most risk)		
2008 Sales	SW (US\$567.3M)	WN (CND\$28.2M)	TZZ (CND\$19.4M)
2008 Profits	SW (US\$62.5M)	WN (CND\$3.5M)	TZZ (CND-\$1.8M)
2009 Sales (9/30)	SW (US\$382.4M)	WN (CND\$20.1M)	TZZ (CND\$9.9M)
2009 Profits (9/30)	SW (US -\$37.2M)	WN (CND\$1.7M)	TZZ (CND-\$1.9M)
Volatility of results	TZZ	WN	SW
Geographic diversification	SW	WN	TZZ
Currency fluctuation	TZZ	WN	SW
Customer concentration	SW	WN	TZZ
Product line concentration	SW	TZZ	WN
Supplier concentration	SW	WN	TZZ
IP protection	SW	WN	TZZ
Acquisition strategy	WN	SW	TZZ
Threat of litigation	TZZ	WN	SW
Liquidity risk	SW	WN	TZZ
Leverage	SW	WN	TZZ
Global economy recession	SW	WN	TZZ
Competitive threats	SW	WN	TZZ
Management depth	SW	WN	TZZ
TCOE	17.8%	To be determined	26.9%

I also chose not to separate size premium from CSR. Is a company risky because it is small, or is it small because it is risky? Yes and Yes.

For example, is lack of management depth at the subject company a CSR issue or a size issue? Who really knows?

Despite some databases claiming to capture a size premium, it appears that they are also capturing CSR issues. With total beta in play, the separation is just not important.

Table 1 is a summary of the output from the Total Cost of Equity Calculator for Sierra Wireless:

Table 1. Sierra Wireless

	18-Dec	28-Dec	29-Dec	30-Dec	31-Dec	Average
Levered Beta	0.89	0.70	0.94	1.10	0.72	0.87
Correlation Coefficient (R)	0.32	0.27	0.32	0.35	0.27	0.31
Total Beta	2.79	2.63	2.92	3.17	2.69	2.84
Total Cost of Equity	17.56%	16.77%	18.18%	19.45%	17.07%	17.81%
Company Specific Risk Premium: CSRP	9.53%	9.65%	9.89%	10.34%	9.88%	9.86%
Additional Regression Statistics:						
Constant	-0.001	0	0	0	0	
Coefficient of Determination (R ²)	0.10	0.07	0.10	0.12	0.07	
T-Stat	5.38	4.45	5.46	5.95	4.44	
Level of Statistical Significance	99.00%	99.00%	99.00%	99.00%	99.00%	
Degrees of Freedom	258	258	258	258	258	

Thus, as of our date of value, we have two guidelines with two materially different TCOEs. Sierra Wireless only had a TCOE of approximately 17.8% (see table 1) whereas Tranzeo Wireless exhibited much more volatility and, therefore, risk from a stand-alone perspective with a TCOE equal to approximately 26.9% (see table 2).

Table 2. Tranzeo Wireless

	18-Dec	28-Dec	29-Dec	30-Dec	31-Dec	Average
Levered Beta	-0.1	0.75	0.88	0.58	0.71	0.56
Correlation Coefficient (R)	0.02	0.19	0.18	0.11	0.15	0.13
Total Beta	4.5	3.96	4.98	5.12	4.69	4.65
Total Cost of Equity	26.12%	23.42%	28.49%	29.22%	27.03%	26.86%
Company Specific Risk Premium: CSRP	23.01%	16.08%	20.51%	22.72%	19.89%	20.44%
Additional Regression Statistics:						
Constant	0.007	0.006	0.006	0.007	0.008	
Coefficient of Determination (R ²)	0.00	0.04	0.03	0.01	0.02	
T-Stat	0.32	2.84	2.64	1.68	2.26	
Level of Statistical Significance	25.00%	99.00%	99.00%	90.00%	97.00%	
Degrees of Freedom	217	218	219	219	219	

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