Valuation Strategies

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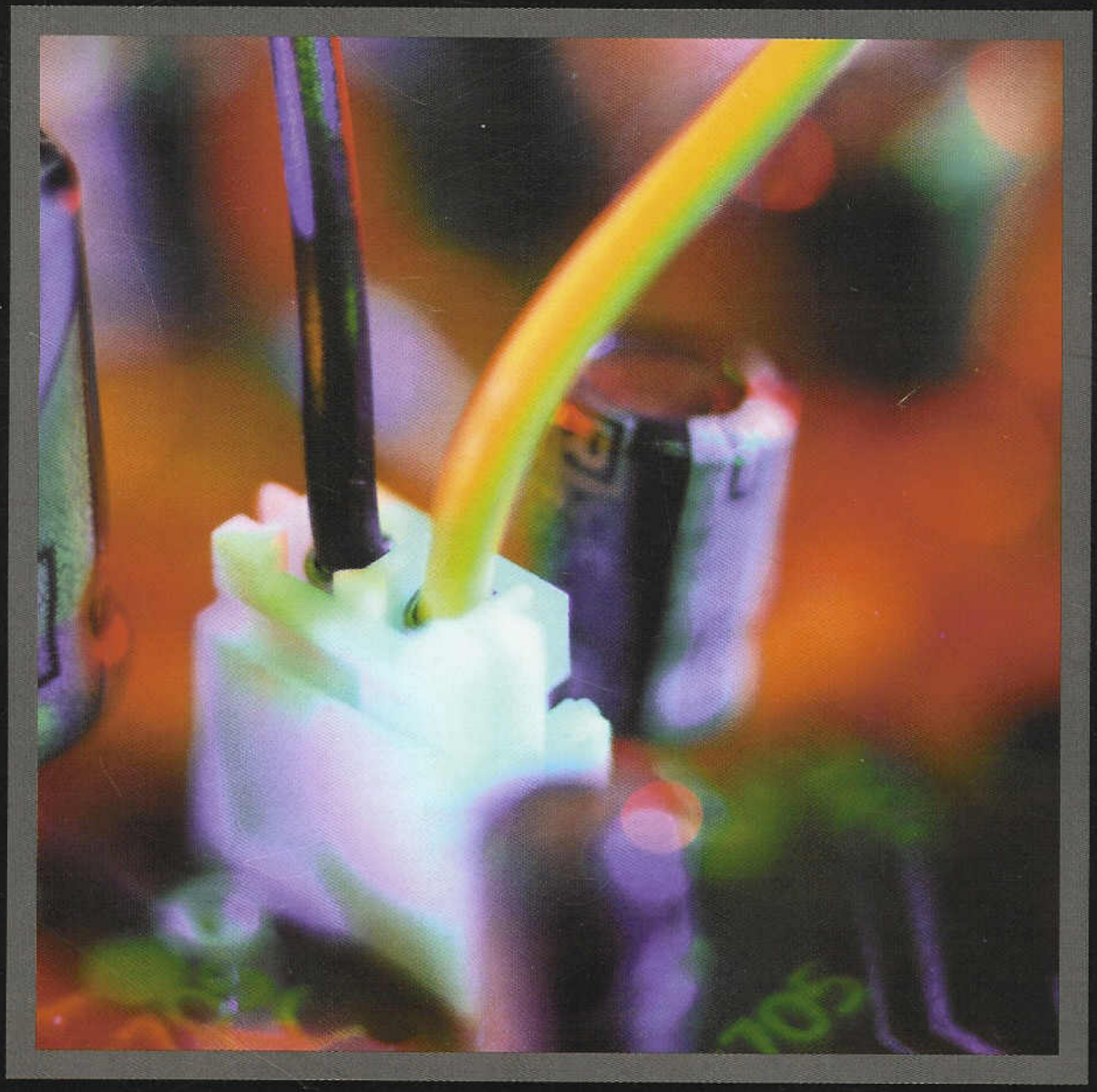

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Adjusting Guideline Multiples

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ADJUSTING GUIDELINE MULTIPLES FOR SIZE

BECAUSE GUIDELINE COMPANIES OFTEN ARE A SUBSTANTIALLY DIFFERENT SIZE THAN THE COMPANY BEING VALUED, GUIDELINE COMPANY MULTIPLES MUST BE ADJUSTED TO ACCOUNT FOR THE DIFFERENCES.

The

market approach is an important tool for the business valuator. Guideline companies provide a real-world basis for a valuation conclusion. However, guideline companies often are of a significantly different size than the company being valued.

The first section of this article summarizes selected published evidence concerning the effects of size differences. The remaining sections show how guideline company multiples should be adjusted for these size effects. The adjusted guideline company multiples reflect the information in the original multiples as if they had been derived from firms that were the same size as the subject company.

Size Matters

The fact that the size of a company has an impact on value is well documented. The data compiled both by Ibbotson Associates and by Grabowski and King of PriceWaterhouseCoopers demonstrate the existence of a size premium for smaller stocks. Larger companies historically have lower expected returns that translate into higher value. Smaller companies, on the other hand, are perceived as more risky, and therefore the expected returns (discount rates) are greater.

This is shown by the data in Exhibit 1, which includes the rates of return for NYSE companies broken down by size deciles. From the largest firms in the first decile (with an arithmetic mean of 12.13%) to the smallest firms in the tenth decile (with an arithmetic mean of 20.73%) the difference is 8.60%.

In most cases, there will be a difference between the size of a particular guideline company and the size of the *subject* company whose value is being determined. Suppose the guideline company is in the eighth decile but the subject company is in the tenth decile.[1] Based on the data in Exhibit 1, the equity *discount* rate for the guideline company [K_G] would be 3.93% lower than the equity discount rate for the subject firm [K_S].

Types of Multiples Considered

Most valuators would agree with the sort of modification of equity discount rates for the effects of size described in the preceding paragraph. This article focuses on corollary modifications to "multiples."

Initially, two types of *base* guideline company multiples will be discussed: equity multiples and invested capital multiples. These multiples are related to the commonly used valuation models by which:

1. The value of equity is found by dividing the expected net cash flow to equity by the equity capitalization rate, and
2. The value of invested capital is found by dividing the expected net cash flow to invested capital by the invested capital capitalization rate.

After showing how these base guideline company ratios should be adjusted for the effects of size, variant forms of these base ratios will also be adjusted.

Adjusting Base Equity Multiples

The base guideline equity multiple [$Multiple_E$] is the equity value divided by the expected net cash flow to equity. It is generally recognized that this multiple is equal to the reciprocal of the equity *capitalization* rate [$Cap\ Rate_E$], and that the equity capitalization rate, in turn, represents the equity discount rate [K] less the equity growth rate [G_E]. These relationships are summarized in Equation 1-E.

Equation 1 - E: $$Multiple_E = \frac{1}{Cap\ Rate_E} = \frac{1}{K - G_E}$$

Assume a guideline company had a P/E multiple[2] of 11.111 before considering any adjustments, and an equity growth rate of 5%. This would be consistent with an equity discount rate of 14% and an equity capitalization rate of 9%.

$$11.111 = \frac{1}{9\%} = \frac{1}{14\% - 5\%}$$

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Suppose, as in the preceding section, that this multiple had come from a guideline company in the eighth size decile, but the subject company were in the tenth size decile. How might the guideline company multiple be adjusted to reflect this size difference?

In the preceding section it was pointed out that the equity discount rate for the larger guideline company would be lower than the equity discount rate for the subject firm by $[\theta = K_G - K_S]$ 3.93%.

Equation 2-E shows how this difference in the equity *discount* rates can be used to find the guideline company's equity *capitalization* rate, adjusted for the size effect. In this case, the guideline company's unadjusted equity capitalization rate of 9% should be adjusted upward to 12.93%.[3]

Equation 2-E: Adjusted Cap Rate$_E$ = Cap Rate$_E$ + θ = $\left(\frac{1}{\text{Multiple}_E}\right) + \theta$

$$12.93\% = 9.00\% + 3.93\% = \left(\frac{1}{11.11}\right) + 3.93\%$$

The *adjusted* guideline equity multiple [Adjusted Multiple$_E$] can be found by using the adjusted equity capitalization rate for the guideline company as shown in Equation 3-E.

Equation 3-E: Adjusted Multiple$_E$ = $\frac{1}{\left(\frac{1}{\text{Multiple}_E}\right) + \theta}$

$$7.734 = \frac{1}{\left(\frac{1}{11.111}\right) + 3.93\%}$$

The lower multiple of 7.734 represents what the guideline company's P/E multiple would be if it were the same size as the subject company.

Adjusting Base Invested Capital Multiples

The discussion of base invested capital multiples very closely follows the relationships outlined in Equations 1-E, 2-E, and 3-E above.

The base guideline invested capital multiple [Multiple$_{IC}$] is the value of the invested capital divided by the expected net cash flow to the invested capital. This multiple is equal to the reciprocal of the invested capital *capitalization* rate [Cap Rate$_{IC}$]. The invested capital capitalization rate is the weighted average cost of capital [WACC] less the invested capital growth rate [G_{IC}]. These relationships are summarized in Equation 1-IC.

Equation 1-IC: Multiple$_{IC}$ = $\frac{1}{\text{Cap Rate}_{IC}}$ = $\frac{1}{\text{WACC-G}_{IC}}$

To adjust for the effects of size, the adjusted invested capital capitalization rate appropriate for a smaller version of the guideline company can be found as shown in Equation 2-IC.

Equation 2-IC: Adjusted Cap Rate$_{IC}$ = Cap Rate$_{IC}$ + $\varepsilon\,\theta$ = $\left(\frac{1}{\text{Multiple}_{IC}}\right) + \varepsilon\,\theta$

Notice that a new term (ε) has been introduced in Equation 2-IC.[4] This term simply represents the ratio of the equity value to the total invested capital of the firm.

Assume a guideline company had a base invested capital multiple of 11.111 before considering any adjustments. In particular, this would be the ratio of the market value of the invested capital [MVIC] to earnings before interest and taxes [EBIT] less taxes.

Further, assume as before that the appropriate increase to the equity discount rate is θ = 3.93%, and that ε = 40%. Equation 3-IC can be used to find the value of the invested capital multiple adjusted for the size effect.

Equation 3-IC: Adjusted Multiple$_{IC}$ = $\frac{1}{\left(\frac{1}{\text{Multiple}_{IC}}\right) + \varepsilon\,\theta}$

$$9.459 = \frac{1}{\left(\frac{1}{11.111}\right) + 40\% \cdot 3.93\%}$$

The lower multiple of 9.459 represents what the guideline company's base invested capital multiple would be, adjusted downward for the effects of size.

Adjusting Variations of the Base Multiples

Variations of the base multiples are sometimes used. They are formed from alternative measures of the benefits. For example, the analyst might be interested in using a multiple based on revenues as opposed to earnings.

To convert from the base measure of benefits to a variant measure, one can use a scale factor. Here α will represent the multiple required in the conversion. For example, if a guideline company has after-tax earnings of $1 million and revenues of $8 million, the value of would be 8.

When the benefits are increased by a factor of α, it follows that the resultant variation of the base multiple should be reduced by a factor of $1/\alpha$. The first two terms in Equation 4 reflect this fact. Here the base multiple is identified simply as "Multiple," but a variant of the base multiple as "VMultiple."

Equation 4: VMultiple = $\frac{\text{Multiple}}{\alpha} = \frac{1}{\alpha\text{Cap Rate}}$

The last term in Equation 4 shows that the variant multiple can be found by increasing the capitalization rate by a factor of α.

Using these relationships, Equation 5 shows how a variant multiple of the guideline company might be adjusted for the effects of size.

Equation 5: Adjusted VMultiple = $\frac{1}{\alpha(\text{Adjusted Cap Rate})}$

Up to this point in this section, there has been no need to distinguish between equity multiples and invested capital multiples. However, in the illustrations that follow, it will be necessary to use a different version of Equation 5 to size-adjust variations of each of these forms of multiples.

Derivation of Equation 2-IC

Equation 1-IC shows that the CapRate-IC = WACC - G_{IC}. Recalling that ε represents the ratio of the equity value to the total invested capital of the firm, the conventional formula for WACC can be written as:

WACC = $\varepsilon K + (1 - \varepsilon)(1 - t)I$,
where: t = the tax rate
and I = the interest rate.

A preliminary step to finding the Adjusted Cap Rate$_{IC}$ in Equation 2-IC would be to find an Adjusted WACC. To do so, the equity rate [K] must be appropriately increased by the addition of θ as shown in the middle term of the following equation.

Adjusted WACC = $(\varepsilon)(K + \theta) = (1 - \varepsilon)(1 - t)I =$ WACC + $\varepsilon\theta$

The last term simply shows that the original WACC can be adjusted by adding $\varepsilon\theta$. Because only size effects are being adjusted, there is no reason to change G_{IC}. Therefore, the capitalization rate can be adjusted in the same way as the weighted average cost of capital.

Adjusted CapRate$_{IC}$ = CapRate$_{IC}$ + $\varepsilon\theta$

EXHIBIT 1:
Mean NYSE Returns by Deciles, and Their Differences

Decile		1	2	3	4	5	6	7	8	9	10
	Arithmetic Mean Return	12.13%	13.55%	13.92%	14.55%	15.28%	15.60%	15.44%	16.80%	17.59%	20.73%
1	12.13%										
2	13.55%	1.42%									
3	13.92%	1.79%	0.37%	—							
4	14.55%	2.42%	1.00%	0.63%	—						
5	15.28%	3.15%	1.73%	1.36%	0.73%	—					
6	15.60%	3.47%	2.05%	1.68%	1.05%	0.32%	—				
7	15.44%	3.31%	1.89%	1.52%	0.89%	0.16%	-0.16%	—			
8	16.80%	4.67%	3.25%	2.88%	2.25%	1.52%	1.20%	1.36%	—		
9	17.59%	5.46%	4.04%	3.67%	3.04%	2.31%	1.99%	2.15%	0.79%	—	
10	20.73%	8.60%	7.18%	6.81%	6.18%	5.45%	5.13%	5.29%	3.93%	3.14%	-

Obtained from Ibbotson Associates, Stocks, Bonds, Bills, and Inflation 2000 Yearbook, Valuation Edition.

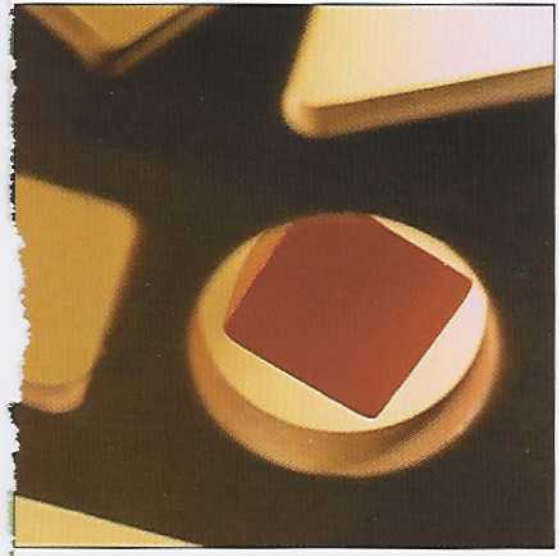
EXHIBIT 2:
Fundamental Information on Guideline Companies

	Bright Horizons Family Solutions, Inc.	Children's Comprehensive Services	Childtime Learning Centers, Inc.	Nobel Learning Communities, Inc.	Sylvan Learning Systems, Inc.
Ticker	BFAM	KIDS	CTIM	NLCI	SLVN
Exchange	NASD	NASD	NASD	NASD	NASD
Decile	8	10	10	10	7
Valuation Multiples*					
P/E	36.99	3.20	9.13	20.97	45.28
P/R	1.2333	0.1951	0.2745	0.4078	1.6188
MVIC/Rev	1.2358	0.3946	0.3576	0.7743	2.0770
MVIC/EBIT	21.43	5.05	6.85	12.77	28.67
MVIC/EBITDA	15.38	3.53	4.49	7.03	10.57

** Unadjusted*

EXHIBIT 3:
Adjusted Valuation Multiples

	BFAM	KIDS	CTIM	NLCI	SLVN	Mean	Median	Std. Dev.	Coeff. of Var.
P/E									
Unadjusted	36.99	3.20	9.13	20.97	45.28	23.11	20.97	17.89	0.77
Adjusted	15.08	3.20	9.13	20.97	13.91	12.46	13.91	6.67	0.54
P/R									
Unadjusted	1.2333	0.1951	0.2745	0.4078	1.6188	0.7459	0.4078	0.6402	0.86
Adjusted	0.5026	0.1951	0.2745	0.4078	0.4974	0.3755	0.4078	0.1368	0.36
MVIC/Rev									
Unadjusted	1.2358	0.3946	0.3576	0.7743	2.0770	0.9679	0.7743	0.7142	0.74
Adjusted	0.5072	0.3946	0.3576	0.7743	0.7894	0.5646	0.5072	0.2059	0.36
MVIC/EBIT									
Unadjusted	21.43	5.05	6.85	12.77	28.67	14.95	12.77	9.98	0.67
Adjusted	11.64	5.05	6.85	12.77	13.57	9.98	11.64	3.79	0.38
MVIC/EBITDA									
Unadjusted	15.38	3.53	4.49	7.03	10.57	8.20	7.03	4.85	0.59
Adjusted	9.60	3.53	4.49	7.03	7.50	6.43	7.03	2.44	0.38



In the initial example, the price-earnings multiple was 11.111. If that guideline company's revenues were eight times larger than its after-tax earnings, its price-to-revenue multiple would be 1.389. This value is an example of a variation of the guideline company's base equity multiple [$VMultiple_E$] before any adjustment for size has been considered.

The *adjusted* variant guideline equity multiple can be found from the unadjusted variant guideline equity multiple as shown in Equation 5-E.[5]

Equation 5-E:

$$\text{Adjusted VMultiple}_E = \frac{1}{\left(\frac{1}{\text{VMultiple}_E}\right) + \alpha_E \theta}$$

$$0.967 = \frac{1}{\left(\frac{1}{1.398}\right) + (8 \cdot 3.93\%)}$$

This implies that, after adjusting for size, the variant guideline multiple (in this case, its P/Rev ratio) should be reduced from 1.398 to 0.967.

Variations of the base invested capital multiples are adjusted in a similar fashion. The ratio of the MVIC to EBIT less taxes was 11.111. If revenues were 3.2 times larger than EBIT less taxes, its MVIC/Rev multiple would be 3.472 [$Vmultiple_{IC}$].

The *adjusted* variant guideline invested capital multiple can be found from the unadjusted variant guideline invested capital multiple as shown in Equation 5-IC.

Equation 5-IC:

$$\text{Adjusted VMultiple}_{IC} = \frac{1}{\left(\frac{1}{\text{VMultiple}_{IC}}\right) + \alpha_{IC} \varepsilon \theta}$$

$$2.956 = \frac{1}{\left(\frac{1}{3.472}\right) + (3.2 \cdot 40\% \cdot 3.93\%)}$$

This implies that, after adjusting for size, the variant guideline multiple (in this case, its MVIC/Rev ratio) should be reduced from 3.472 to 2.956.

Summary

Equations 3-E, 3-IC, 5-E, and 5-IC all follow the same format.

Here, the original guideline company multiple, whether a base multiple or a variation of the base multiple, is identified simply as "Multiple." To find the value of an original multiple adjusted for the size effect, Equation 6 can be used.

Equation 6

$$\text{Adjusted Multiple} = \frac{1}{\left(\frac{1}{\text{Multiple}}\right) + \alpha \varepsilon \theta}$$

Where:

α = The scale factor that converts the base measure of the benefits to an alternative measure of the benefits. (If an alternative measure is not being used, then $\alpha = 1$.)
ε = The ratio of the equity value to the total invested capital of the firm; it should be used only when working with invested capital multiples. (When working with equity multiples, $\varepsilon = 1$.)
θ = The difference in the equity discount rates due to size effects as shown in Exhibit 1.

Example

For an example, we selected publicly traded companies that are actively traded in the childcare and early childhood education industry. For this example, the data included in Exhibit 1 assumed that the subject company would fit into the tenth decile if it were publicly traded. Exhibit 2 provides some fundamental information on each of the publicly traded guideline companies.

Previously cash flows were used for the base valuation multiples. As a practical matter, net income is used as the base earnings measure in this example. A closer look at the details in Exhibit 2 reveals that the larger companies, those in the seventh and eighth deciles, have higher valuation multiples. The valuation multiples have been adjusted for size according to the procedures outlined in previous sections. Exhibit 3 presents the adjusted valuation multiples along with various statistics.

Only two of the publicly traded guideline companies required adjustment since the other three were deemed to be in the same tenth size decile as the subject company. The variability in the multiples, as measured by the coefficient of variation, decreased substantially for each multiple after adjustment. The P/R multiple showed the largest improvement in variability going from a coefficient of variation of 0.86 to 0.36.

Derivations of Equations 5-E and 5-IC

Equation 5 shows that the Adjusted VMultiple can be found from the reciprocal of α (Adjusted Cap Rate).

For equity multiples the following relationships apply.

$$\alpha_E \text{ (Adjusted Cap Rate}_E) = \alpha_E \left[\left(\frac{1}{\text{Multiple}_E}\right) + \theta\right] = \left(\frac{1}{\text{vMultiple}_E}\right) + \alpha_E \theta$$

The middle term in the preceding equation was found by substituting from Equation 2-E. The last term was found by multiplying through by α_E and by recalling that $VMultiple_E = Multiple_E/\alpha_E$.

For invested capital multiples the following relationships apply.

$$\alpha_{IC} \text{ (Adjusted Cap Rate}_{IC}) = \alpha_{IC} \left[\left(\frac{1}{\text{Multiple}_{IC}}\right) + \varepsilon\theta\right] = \left(\frac{1}{\text{vMultiple}_{IC}}\right) + \alpha_E \varepsilon\theta$$

The middle term in the preceding equation was found by substituting from Equation 2-IC. The last term was found by multiplying through by α_{IC} and by recalling that $VMultiple_{IC} = Multiple_{IC}/\alpha_{IC}$.

Conclusion

Frequently, guideline companies are a different size than the subject company. Often they are larger. There is well-recognized evidence that equity rates of return for large firms are lower than equity rates of return for small firms. This article shows how to adjust guideline company multiples for size differences in a manner consistent with the rate-of-return evidence. Other adjustments arising from differences between the guideline companies and the subject company, which are not related to size, may also be required. Such adjustments have not been addressed here. ■

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1 For expository purposes, it is assumed throughout, as typically is the case, that the guideline company is larger than the subject company.

2 Here it is assumed that the expected net cash flow to equity can be approximated by after-tax earnings.

3 This follows from the fact that the equity discount rate is being adjusted upward from 14% to 17.93%.

4 See first sidebar for the derivation of Equation 2-IC.

5 See the second sidebar for the derivation of Equations 5-E and 5-IC.