Squaring the Circle: Can the Income and Market Approaches be Reconciled?

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Introduction

The Uniform Standards of Professional Appraisal Practice ("USPAP") requires business appraisers to "reconcile the applicability and relevance of the approaches, methods and procedures used to arrive at the value conclusion(s)."[1] For those who are CPAs and practice business valuation, the Statement on Standards for Valuations Services No. 1 states that you should, "… present a reconciliation of the valuation analyst's estimate or various estimates of the value of the subject interest."[2] Do these standards mean that we, as business valuation professionals, are required to do a mathematical reconciliation of the approaches and methods we use? I can see how some might interpret these standards in that way.

Those who perform valuation work in the financial reporting arena are required to follow the fair value hierarchy found in the Accounting Standards Codification (ASC). While this is not intended to be a primer on the ASC and I will not present the details of the fair value hierarchy, Level 2 of that hierarchy clearly states a preference for the market approach. At the same time, purchase price allocations and Step 2 of a goodwill impairment analysis will, most likely, require the development of a DCF model. In these cases, a mathematical reconciliation is vital.

So, the question remains, can the income approach and the market approach be reconciled? I believe the answer is yes, with the ubiquitous qualifier, "under certain circumstances." The public guideline method can be reconciled with a DCF using the Comprehensive Adjusted Public Guideline ("CAPG") method. I do not believe CAPG is the right tool in every case, nor do I believe it can be used as a black box where you input numbers and an appropriate value is the output. Critical analysis on part of the valuation analyst is always required. However, in the correct circumstance, I believe the CAPG method can be a powerful tool.

Fundamental Concepts

In order to understand the CAPG method, we must first understand a few foundational concepts. This first of these is the fact that a price-to-earnings multiple is nothing more than the mathematical reciprocal of a capitalization rate. This implies that the discount rate used in the income approach and a guideline multiple used the in public guideline company method are both a measure of the cost of capital. They may be expressed differently, but they both measure the risk associated with an investment. This means that on a basic mathematical level the income approach and the market approach are really the same thing.

Table 1:

Assumptions:		
Discount rate	=	23%
Growth rate	=	3%
Capitalization rate	=	20% (.23-.03)
P/E multiple	=	5
Earnings	=	$1,000,000
$1,000,000 * 5	=	$5.000.000
$1,000,000 / 0.20	=	$5,000,000

Under the income approach we use a measure of economic benefit (usually cash flow) and we divide it by a capitalization rate or discount rate to arrive at a value. Under the market approach we use a measure of economic benefit (i.e. earnings or EBITDA) and multiply it by a valuation multiple to arrive at a value. Mathematically they are the same.

To prove this mathematically, we can multiply a million dollars of cash flow by a P/E multiple of 5 to arrive at a value of $5 million. The mathematical inverse of the P/E multiple of 5 is 20%. We can take the same million dollars of cash flow and divide it by a 20% capitalization rate to arrive at the same $5 million value (see Table 1).

This means that the key to reconciling the income approach and the market approach is to use the same measure of economic benefit and the same cost of capital for both approaches. If we do so, we will arrive at the same value. Using the same measure of earnings should be easy enough. The real difficulty is arriving at the same cost of capital. Most of us in the business valuation profession use CAPM or its derivative, the build-up method, to estimate the cost

of capital under the income approach. With public guideline companies, the cost of capital is estimated from valuation multiples of public guideline companies. Anyone who has been in the business valuation profession for any length of time will understand that using valuation multiples from public guideline companies (unadjusted) will, more often than not, result in a value for the subject interest which is much higher than the value estimated by a DCF. In order to reconcile these divergent measures of the cost of capital, we need to identify, and quantify, where we can, the differences between the cost of capital of the public guidelines and our valuation subject. Doing so will allow us to adjust the valuation multiples of the public guidelines so that they are more appropriate to our valuation subject.

To identify and quantify the differences in the cost of capital, we must first express them in the same manner. This means converting the valuation multiple from the public guideline companies into a capitalization rate. This is done by taking the reciprocal of the multiple by dividing the number one (1) by the valuation multiple (see Table 2).

Table 2:

$$\text{P/E Multiple} = \frac{1}{\text{Capitalization Rate}}$$

This yields an earnings capitalization rate. The discount rate can be determined by adding back the expected long-term blended growth in earnings. Said another way, the capitalization rate can be expressed as the discount rate minus the blended growth rate (see Table 3).

Table 3:

$$\text{P/E Multiple} = \frac{1}{\text{Discount Rate - Growth}}$$

The discount rate can be further broken down to its individual parts via the CAPM (see Table 4).

Once we understand these mathematical relationships, reconciling the costs of capital becomes an exercise of substituting one or more of the above variables applicable to the public guideline for a variable that is more applicable to the valuation subject. This means adjusting the multiples from the public guidelines for differences in size, other unsystematic risks, and expected growth. This paper

is not intended to present the details of how to quantify these differences. Doing so would take up more pages than we have available here. As such, I will provide summaries of how these adjustments are made.

Table 4:

$$\text{P/E Multiple} = \frac{1}{(R_f + RP_m + RP_s + RP_u) - g}$$

Where:		
R_f	=	Risk free rate
RP_m	=	Equity risk premium
RP_s	=	Size premium
RP_u	=	Other unsystematic risk premium
g	=	Expected blended long-term growth

Adjusting the Public Guideline Multiples

The first of these adjustments is probably the most obvious. Public guideline companies are usually much larger than most private subject companies we work with. Empirical data tells us that larger companies are generally thought of as being less risky than smaller companies. More specifically, the Duff & Phelps' Risk Premium Report and Morningstar's SBBI yearbook provide the data needed to make adjustments for differences in size. To adjust for differences in size, we simply substitute the subject interest's size premium for the public guideline's size premium. For example, if the public guideline has a size premium of 3% and our valuation Subject has a size premium of 6%. We replace the guideline's 3% with the Subject's 6% in the formula shown in Table 4.

Adjusting the public guidelines for other unsystematic risk (aka company specific risk) is more subjective than adjusting for size. The company specific risks for the public guidelines can only be imputed. We can find and estimate all the other CAPM variables for the public guidelines, leaving us to solve the equation for the company specific risk in order to determine its amount. And, of course, the company specific risk for the valuation subject is a matter of professional judgment. Assuming we determine that the company specific risk for a public guideline is 2.5%, and the valuation subject has a company specific risk of 4.5%, we would replace the guideline's 2.5 % with the Subject's 4.5% to adjust for differences in company specific risk.

Table 5:

$$\text{P/E Multiple} = \frac{1}{(R_f + RP_m + RP_s + Rp_u) - g}$$

$$\text{Unadjusted } 11.11 = \frac{1}{(0.03 + 0.055 + 0.03 + 0.025) - 0.05}$$

$$\text{Adjusted } 6.25 = \frac{1}{0.03 + 0.055 + 0.06 + 0.045 - 0.03}$$

The subjectivity of the adjustment for expected growth lies somewhere between the adjustment for size and the adjustment for other unsystematic risks. Online data sources provide analyst's estimates of future growth for many public companies. But these estimates are limited to estimates for the next year and for the next five years. That means the valuation analyst must make a judgment about the public guideline's growth beyond five years. This task is made easier under the concept of "mean reversion." In this context, mean reversion suggests that over the long-term, growth rates of most companies will revert to the mean growth of the overall economy. Data indicates this rate of growth is between 2.5% and 3%. With the 5-year analysts' estimated growth and the concept of mean reversion, we can compute a blended long-term growth expectation for each public guideline company.

Assuming a public guideline has an expected blended growth of 5% and our subject company has an expected blended growth of 3%. We would replace the guidelines expected growth of 5% with the subject's expected growth of 3% to adjust for differences in growth. Table 5 illustrates the adjustments for size, other unsystematic risk and growth.

By making these adjustments, we see that the guideline P/E multiple in the example goes from 11.11 down to 6.25. The mathematical formula that accomplishes the same procedure is shown in Table 6.

Table 6:

$$\text{Adjusted Multiple} = \frac{1}{\frac{1}{\text{Guideline Multiple}} + \theta + \mu + \lambda}$$

Where:

θ	=	Subject size premium less guideline size premium
μ	=	Subject unsystematic risk less guideline unsystematic risk
λ	=	Guideline growth less subject growth

When we input the same variables into this formula as were used in the previous example, we see that it yields the same result — the guideline P/E multiple is adjusted from 11.11 to 6.25 (see Table 7.)

Table 7:

$$6.25 = \frac{1}{\frac{1}{11.11} + 0.03 + 0.02 + 0.02}$$

Where:

θ	=	0.06 - 0.03 = 0.03
μ	=	0.045 - 0.025 = 0.02
λ	=	0.05 - 0.03 = 0.02

Invested Capital Example

The previously presented example and formula related to the P/E multiple, which measures the value of equity. In many cases we may want to arrive at a value of the invested capital for the valuation subject This can be accomplished with the addition of the ratio of market value of equity to the market value of invested capital ("MVIC"), as a variable to the equation (see Table 8).

With this formula, the guideline multiple should be an invested capital multiple, such as MVIC-to-EBIT or MVIC-to-EBITDA, and the resulting adjusted multiple should be applied to the subject company's EBIT (in the case of a MVIC-to-EBIT multiple) or EBITDA (in the case of a MVIC-to-EBITDA multiple). When we populate the variables we can see the affect of the adjustments on the multiple (see Table 9.)

Table 8:

$$\text{Adjusted Multiple} = \frac{1}{\frac{1}{\text{Guideline Multiple}} + \varepsilon\,(\Theta + \mu) + \lambda}$$

ε	=	Market value of equity divided MVIC
θ	=	Subject size premium less guideline size premium
μ	=	Subject unsystematic risk less guideline unsystematic risk
λ	=	Guideline growth less subject growth

This example shows that the public guideline invested capital multiple of 8 is adjusted down to 5.714.

Table 9:

$$5.714 = \frac{1}{\frac{1}{8.00} + 0.60\,(0.03 + 0.02) + 0.02}$$

ε	=	Market Value of Equity is 60% of MVIC
θ	=	0.06 - 0.03 = 0.03
μ	=	0.045 - 0.025 = 0.02
λ	=	0.05 - 0.03 = 0.02

Revenue Multiple Example

We can also use this technique to adjust revenue multiples. To do so, we add an additional variable representing the ratio of revenue to after-tax EBITDA. The formula containing this additional variable is found at Table 10.

When the variables are populated, we can see the impact on the revenue multiple (see Table 11.)

Table 10:

$$\text{Adjusted Multiple} = \frac{1}{\frac{1}{\text{Guideline Multiple}} + \alpha\,\varepsilon\,(\Theta + \mu) + \lambda}$$

α	=	Revenue to after-tax EBITDA ratio
ε	=	Market value of equity divided MVIC
θ	=	Subject size premium less guideline size premium
μ	=	Subject unsystematic risk less guideline unsystematic risk
λ	=	Guideline growth less subject growth

Table 11:

$$0.748 = \frac{1}{\frac{1}{0.80} + 1.25 * 0.60\,(0.03 + 0.02) + 0.05}$$

α	=	Revenue is 125% of after-tax EBITDA
ε	=	Equity – 60% of MVIC
θ	=	0.06 - 0.03 = 0.03
μ	=	0.045 - 0.025 = 0.02
λ	=	0.10 - 0.05 = 0.05 (difference in revenue growth)

It is important to note here that the growth rates need to match the multiple being adjusted. For example, earnings growth should be used with a P/E multiple, EBITDA growth should be used with a MVIC-to-EBITDA multiple, and revenue growth should be used with a revenue multiple.

Case Study

This case study is based on an actual goodwill impairment engagement where my firm performed Step 2 of the analysis. In this analysis we measured the fair value of the subject company under the public guideline company method. We also

performed a DCF analysis that was used as the basis for measuring the fair value of various intangible assets. A summary of some of the financial metrics is contained in Table 12.

Table 12: $ in millions	AIN	BLL	DOV	KMT	KTEC	NDSN	Subject
Revenue	$888.9	$7,214.7	$5,995.7	$1,740.0	$105.5	$879.4	$231.6
Gross profit	287.6	1,214.0	2,140.2	475.6	39.0	494.1	67.3
Operating income	23.8	669.1	654.4	10.5	2.9	117.3	20.4
Pre-tax earnings	28.5	477.7	566.5	(11.1)	2.2	115.7	(20.7)
Adjusted earnings	31.4	340.3	378.1	(6.0)	1.7	79.7	(13.0)
EBITDA	93.2	948.3	909.5	105.6	5.9	150.0	52.5
Total assets	1,372.2	6,792.1	7,772.3	2,357.6	80.7	1,106.2	647.0
Current assets	511.1	2,677.1	2,589.6	884.4	59.6	331.6	127.9
Total liabilities	929.3	5,313.0	3,731.9	956.9	28.4	481.9	528.8
Current liabilities	194.4	1,552.1	943.5	386.7	22.5	126.2	57.8

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The growth information for the public guidelines and the subject company are contained in Table 13:

Table 13:	AIN	BLL	DOV	KMT	KTEC	NDSN	Subject
Historical Revenue:							
1-year	-20.4%	-4.9%	-22.4%	-33.5%	-21.4%	-21.3%	-25.9%
3-year	-4.0%	4.5%	-0.4%	-9.2%	7.5%	-0.2%	-9.51%
5-year	-0.5%	6.1%	3.4%	-3.3%	5.5%	3.1%	1.29%
Analysts' estimates							
5-year revenue	2.7%	9.0%	5.5%	12.2%	5.9%	7.1%	
5-year earnings	14.0%	12.0%	14.0%	7.18%	15.0%	14.9%	13.0%
Blended long-term growth - EBITDA	5.98%	5.81%	5.73%	2.93%	5.05%	5.50%	4.50%

Table 14 shows the computation of market value of invested capital for each of the public guidelines.

Table 14: Shrs & $ in millions	AIN	BLL	DOV	KMT	KTEC	NDSN
Stock price	$19.38	$49.22	$38.52	$24.40	$11.13	$56.71
Shares outstanding	27.6	94.1	186.2	81.4	4.9	33.6
Market value of shares	$534.8	$4,631.6	$7,172.4	$1,986.2	$54.5	$1,905.5
Market value of options	4.1	105.0	64.1	23.1	0.0	0.0
Market value of equity	538.9	4,736.6	7,236.5	2,009.3	54.5	1,905.5
Interest bearing debt	515.9	2,532.7	1,827.0	325.0	5.7	201.2
MVIC	$1,054.8	$7,269.3	$9,063.5	$2,334.3	$60.2	$2,106.7
Mkt value of equity to MVIC	0.5109	0.6516	0.7984	0.8608	0.9053	0.9045

Table 15 shows the computation of the P/E multiple, the implied cap rates and the implied discount rate for the public guidelines, and the implied other unsystematic risk.

Table 15 $ in millions	AIN	BLL	DOV	KMT	KTEC	NDSN
Market value of equity	$538.9	$4,736.6	$7,236.5	$2,009.9	$54.5	$1,905.5
Divided by adjusted earnings	$31.4	$340.3	$378.1	$(6.0)	$1.7	$79.7
P/E multiple	17.16	13.92	19.14	(334.98)	32.06	23.91
Capitalization rate (inverse)	0.0583	0.0718	0.0522	(0.0030)	0.0312	0.0418
Add blended growth rate	0.0598	0.0581	0.0573	0.0293	0.0505	0.0550
Discount rate	0.1181	0.1299	0.1195	0.0263	0.0817	0.0968
Size adjusted equity risk premium[1]	0.0851	0.0678	0.0648	0.0767	0.1112	0.0852
Implied other unsystematic risk:						
Discount rate	0.1181	0.1299	0.1195	0.0263	0.0817	0.0968
Less risk-free rate	(0.0402)	(0.0402)	(0.0402)	(0.0402)	(0.0402)	(0.0402)
Less size adjusted equity risk premium	(0.0851)	(0.0678)	(0.0648)	(0.0767)	(0.1112)	(0.0852)
Implied other unsystematic risk	(0.0072)	0.0219	0.0145	(0.0906)	(0.0697)	(0.0286)

[1] **Median of the formula derived size adjusted equity risk premia from Puff & Phelps Risk Premium Report with size measured by annual sales, 5-year average EBITDA, total assets and number of employees.**

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In the analysis we arrived at the conclusion that the MVIC-to-EBITDA multiple was the most appropriate multiple to use. We computed this multiple for each of the public guideline companies in Table 16, based on the results of the previous tables.

Table 16: $ in millions	AIN	BLL	DOV	KMT	KTEC	NDSN
MVIC	$1,054.8	$7,269.3	$9,063.5	$2,334.3	$60.2	$2,106.7
Divided by EBITDA	$93.2	$948.3	$909.5	$105.6	$5.9	$150.0
MVIC to EBITDA multiple	11.31	7.67	9.97	22.11	10.20	14.04
EBITDA capitalization rate (inverse)	0.0884	0.1304	0.1003	0.0452	0.0980	0.0712
Add blended long-term growth	0.0598	0.0581	0.0573	0.0293	0.0505	0.0550
EBITDA discount rate	0.1482	0.1885	0.1575	0.0745	0.1485	0.1262
Subject's size adj. ERP	0.0967	0.0967	0.0967	0.0967	0.0967	0.0967
Less guidelines' size adj. ERP	(0.0851)	(0.0678)	(0.0648)	(0.0767)	(0.1112)	(0.0852)
Add subject's unsystematic risk	0.0150	0.0150	0.0150	0.0150	0.0150	0.0150
Less guidelines' unsystematic risk	0.0072	(0.0219)	(0.0145)	0.0906	0.0697	0.0286
Gross adjustment	0.0338	0.0220	0.0324	0.1256	0.0702	0.0551
Multiply by Mkt value of equity to MVIC	0.5109	0.6516	0.7984	0.8608	0.9053	0.9045
Net adjustments	0.0173	0.0143	0.0259	0.1081	0.0636	0.0498
EBITDA discount rate	0.1482	0.1885	0.1575	0.0745	0.1485	0.1262
Add net adjustments	0.0173	0.0143	0.0259	0.1081	0.0636	0.0498
Adjusted EBITDA discount rate	0.1655	0.2028	0.1834	0.1826	0.2121	0.1760
Less Subject's blended growth	(0.0450)	(0.0450)	(0.0450)	(0.0450)	(0.0450)	(0.0450)
Adjusted EBITDA capitalization rate	0.1205	0.1578	0.1384	0.1376	0.1671	0.1310
Adjusted MVIC-to-EBITDA (reciprocal)	**8.30**	**6.34**	**7.23**	**7.27**	**5.98**	**7.63**

The median of the adjusted MVIC-to-EBITDA multiples is 7.25 with a mean of 7.13. We selected the median as most applicable and computed the fair value of the enterprise as shown in Table 17.

Table 17: **$ in millions**	
EBITDA	$52.5
Selected MVIC-to-EBITDA Multiple	7.25
Enterprise value	**$380.6**

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We then developed a DCF model from management's assumptions as shown in Table 18, arriving at the same enterprise value as with the public guideline companies.

Table 18: $ in millions		Year 1	Year 2	Year 3	Year 4	Year 5	Residual
Revenue		$245.5	$275.0	$297.0	$311.8	$321.2	$330.8
Gross profit	29.0%	71.2	79.7	86.1	90.4	93.1	95.9
Operating expenses	10.96%	26.9	30.1	32.6	34.2	35.2	36.3
EBITDA		44.3	49.7	53.5	56.2	57.9	59.6
Depreciation. and amort.		36.9	36.5	36.2	36	36.2	36.3
EBIT		7.4	13.2	17.3	20.2	21.7	23.3
Income taxes	37.0%	(2.7)	(4.9)	(6.4)	(7.5)	(8.0)	(8.6)
Debt free income		$4.7	$8.3	$10.9	$12.7	$13.7	$14.7
Depreciation and amort.		36.9	36.5	36.2	36.0	36.2	36.3
Working capital needs	3.57	(3.9)	(8.3)	(6.2)	(4.1)	(2.6)	(2.7)
Capital expenditures		(1.1)	(1.2)	(1.3)	(1.4)	(1.4)	(1.5)
Cash flow to inv. cap.		36.6	35.3	39.6	43.2	45.9	46.8
Capitalization rate							11.0%
Capitalized residual							425.5
Present value factor	14.0%	0.93659	0.82157	0.72067	0.63217	0.55453	0.55453
Present values		$34.3	$29.0	$28.5	$27.3	$25.5	236.0
Enterprise value							**$380.6**

Conclusion

The income approach and the market approach can be reconciled, and one method to do so is the Comprehensive Adjusted Public Guideline method. This method allows us to analyze and identify the differences in the cost of capital derived from the build-up method and the cost of capital derived from public guideline valuation multiples. While this method will not be appropriate in all circumstances, it can be very helpful when appropriately applied.

[1] Appraisal Foundation, *Uniform Standards of Professional Appraisal Practice*, Standards Rule 9-5 (b).
[2] American Institute of Certified Public Accountants, Statement on Standards for Valuation Services No. 1, *Valuation of a Business, Business Ownership Interest, Security, or Intangible Asset*, ¶68.