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EBITDA Single-Period Income Capitalization for Business Valuation

Z. Christopher Mercer, FASA, CFA, ABAR

This article begins with a discussion of EBITDA, or earnings before interest, taxes, depreciation, and amortization. The focus on the EBITDA of private companies is almost ubiquitous among business appraisers, business owners, and other market participants. The article then addresses the relationship between depreciation (and amortization) and EBIT, or earnings before interest and taxes, as one measure of relative capital intensity. This relationship, which is termed the EBITDA Depreciation Factor, is then used to convert debt-free pretax (i.e., EBIT) multiples into corresponding multiples of EBITDA. The article presents analysis that illustrates why, in valuation terms (i.e., expected risk, growth, and capital intensity), the so-called pervasive rules of thumb suggesting that many companies are worth 4.0× to 6.0× EBITDA, plus or minus, exhibit such stickiness. The article suggests a technique based on the adjusted capital asset pricing model whereby business appraisers and market participants can independently develop EBITDA multiples under the income approach to valuation. Finally, the article presents private and public company market evidence regarding the EBITDA Depreciation Factor, which should facilitate further investigation and analysis.

What is EBITDA?[1]

EBITDA is an acronym for earnings before interest, taxes, depreciation, and amortization. It is important because, as we will see, EBITDA is the initial source of cash flow for all reinvestment in a business and for all returns to shareholders.[2]

Why is EBITDA such a ubiquitous term, particularly in the market for private businesses and in their valuation? It is not because EBITDA is uniquely capitalizable, but because it is the most comparable measure of income across a broad range of private (and public) companies. Think about EBITDA:

- EBITDA neutralizes tax differences across private companies, because it is a measure of cash flow before taxes are considered.
- EBITDA neutralizes capital structure differences. Since EBITDA measures cash flow before interest expense, buyers consider their own financing structures, regardless of the financing of sellers.[3]
- EBITDA neutralizes accounting differences. Depreciation can be straight line or accelerated, and EBITDA captures the difference in measuring cash flow. In addition, EBITDA captures differences in amortization, or differences between companies that build out their growth or purchase it.

EBITDA is, then, a "lowest-common-denominator" way to express relative value. It can be used to compare different companies at a point in time or over time or specific companies over time.

Keep in mind, however, that despite the pervasiveness of vocabulary among business appraisers and market participants, buyers do not buy EBITDA. They buy cash

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[1]I would like to thank Travis Harms, CPA/ABV, CFA, senior vice president at Mercer Capital, for reviewing several drafts of this article. Any issues or problems with the article, however, fall to me.

[2]Early readers of this article are of two minds when it comes to the following fairly lengthy discussion of EBITDA. I have taken a "by-the-line" approach to explaining the concepts in the article, which adds to the length as well as clarity, I hope. The early readers either think the discussion is interesting and enlightening, or they think it is too long and too obvious. Based on more than thirty-five years in valuing businesses and dealing with business owners, accountants, attorneys, judges, financial planners and other referral sources, and other appraisers as well, nothing is too obvious. Further, as noted in the article, very little has been written about EBITDA in the appraisal literature. As readers will see, even with a concept so "obvious" as EBITDA, there are many nuances that must be considered when analyzing EBITDA and its impact on value.

[3]EBITDA may not control for differences in capital structure related to capital leases versus operating leases. If operating leases are significant, the analyst may employ a different analysis and may employ a different valuation method.

flow. A review of current valuation texts provides little insight into EBITDA, how to analyze it, or how to capitalize it. The entire discussion of EBITDA in five valuation texts is summarized below:

1. *Valuing a Business*, 5th ed.[4] This text mentions possibly capitalizing EBITDA in calculating the terminal value for discounted cash flow valuation methods, but it indicates a preference for using the Gordon model.
2. *Financial Valuation*: *Applications and Models*, 3rd ed.[5] This volume mentions using guideline market data to capitalize EBITDA for terminal value determinations in discounted cash flow methods, but it suggests that appraisers use the Gordon model. Hitchner notes: "Using concepts such as EBIT [earnings before interest and taxes] and EBITDA can be useful because they can reflect the economics of the business better than net income and cash flow, which are very much influenced by both the company's tax planning and its choice of capital structure." He then mentions advantages of EBIT and EBITDA because they reflect the operations of the business and exclude nonoperating, financial (capital structure), and tax planning (depreciation policies) aspects that are part of net income. Because of variances in these factors across companies, EBITDA may be preferable in some instances to net income. It is noted that net operating income before replacement reserves in real estate is similar in concept to EBITDA. The final mention pertains to the invested capital/EBITDA multiple, where the text notes that public EBITDA multiples for hospitals are often considerably higher than relevant multiples for individual hospitals.
3. *Understanding Business Valuation*: *A Practical Guide to Valuing Small to Medium Sized Businesses*.[6] The Trugman book does not mention EBITDA, but it does briefly discuss EBIT.
4. *PPC's Guide to Business Valuations*. EBITDA is not found in the index, and I did not find any discussion of the topic.
5. *Valuation*: *Measuring and Managing the Value of Companies,* 4th ed.[7] The most extensive discussion of EBITDA and EBITDA multiples is found in chapter 12 of the McKinsey & Company book. The chapter focuses more on EBITA (earnings before interest, taxes, and amortization) than on EBITDA. The chapter provides a formula for deriving enterprise value/EBITA multiples that allows for the substitution of an ROIC (return on invested capital) that is different than the weighted average cost of capital (WACC) for a business being valued. The chapter discusses best practices for using multiples, enterprise value (as discussed in this article), and alternative multiples like enterprise value/sales.

Conceptual Uses of EBITDA (Assuming Some Debt and Growth)	
EBITDA	
- Capital Expenditures	Reinvestment in the Business
- Change in Working Capital	Reinvestment in the Business
- Interest Expense	Lenders' Return on Loans to the Business
- Debt Reduction	Lenders' Return of Principal Lent to Business
- Taxes	We Pay to Play
= Cash Return to Owners	What's Left (If Any)

Figure 1

The bottom line is that the earnings measure known as EBITDA has not received a great deal of attention in the valuation literature. Consider Figure 1, which takes a conceptual look at a growing company with some debt. EBITDA is the source of all reinvestment in a business, debt service and debt repayment, and the payment of taxes. If there is anything left, it is available as a cash return to owners.

Other things being equal, more EBITDA means more potential for reinvestment (and growth), loan servicing (if applicable), and/or returns to owners after taxes are paid. We will see, however, that all things are not always equal with a company over time, between similar companies, and between different industries.

Finding EBITDA

EBITDA is a measure of gross cash flow that is not found on the income statement of companies. EBITDA is not a generally accepted accounting principle (GAAP) concept. It must be derived and calculated apart from the basic income statement.[8] How do we "find" EBITDA? Consider Sample Company 1 (Table 1), which sells and/or makes stuff. The income statement might look as follows:

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[4] Shannon P. Pratt (with Alina V. Niculita), *Valuing a Business*, 5th ed. (New York: McGraw Hill Companies, Inc., 2008), 251.

[5] James R. Hitchner, *Financial Valuation: Applications and Models*, 3rd ed. (Hoboken, New Jersey: John Wiley & Sons, 2011), 280, 294, and 1120.

[6] Gary R. Trugman, *Understanding Business Valuation*: *A Practical Guide to Valuing Small to Medium Sized Businesses*, 4th ed. (New York: American Institute of Certified Public Accountants, Inc., 2012).

[7] Tim Koller, Marc Goedhart, and David Wessels, *Valuation: Measuring and Managing the Value of Companies*, 4th ed. (Hoboken, New Jersey: John Wiley & Sons, 2005), chapter 12.

[8] While depreciation and amortization are often identified on income statements, these expenses are sometimes buried within other categories. In such cases, the analyst may derive the actual expenses from the cash flow statement or from a company's internal financial statements or general ledger.

Table 1

Sample Company 1: Representing Companies that Make or Sell Stuff			
Sales		$50,000,000	100.0%
Cost of Goods Sold (Excluding Depreciation)		$27,500,000	55.0%
Depreciation		$2,500,000	5.0%
Gross Profit		$20,000,000	40.0%
Operating Expenses			
Sales and Marketing		$6,000,000	12.0%
Administrative		$4,000,000	8.0%
Other Expenses		$3,000,000	6.0%
Amortization of Intangible Assets		$1,000,000	2.0%
Interest Expense		$500,000	1.0%
Total Operating Expenses		$14,500,000	29.0%
Pre-Tax Income		$5,500,000	11.0%
State Taxes	6.0%	$330,000	0.7%
Net Income for Pass-Through Entity		$5,170,000	10.3%

The total cost of goods sold, including depreciation, reflects 60% of revenues of $50 million, so the gross profit is $20 million, and the gross margin (gross profit as a percentage of sales) is 40%. Operating expenses total 29% of sales, resulting in a pretax margin of 11.0% and net income, after state taxes, of $5.2 million, or 10.3% of sales.

Where is EBITDA on the income statement? It isn't there. EBITDA is not an accounting concept and is not directly shown in financial statements under GAAP. To "find" EBITDA on Sample Company 1's income statement, we have to do some rearranging (see Table 2).

EBITDA for Sample Company 1 is $9.5 million, and the EBITDA margin is 19.0%. Note that while EBIT is $6.0 million, the company has expensed $3.5 million of depreciation and amortization in arriving at EBIT. This total is added back to EBIT to reach EBITDA.

Sample Company 2 is a consulting firm. Its income statement is somewhat different than that of Sample Company 1 in that there is no item called cost of goods sold. Sample Company 2 pays its professionals and support personnel, and, collectively, they deliver consulting services to clients. The other expenses for a professional services firm tend to be those of occupancy and everything else. So the income statement looks like that in Table 3.

Sample Company 2 expended 58.0% of sales on personnel costs and 10.0% of sales on occupancy expense. All other expenses, including a small amount of depreciation, totaled 10.5% of sales. This professional services business earned pretax income of $5.5 million, or 22.0% of sales. Based on experience in valuing many professional service firms, such firms tend to spend about 60% of sales on people costs, and 20% on everything else, leaving about 20% (pretax) for owners.

Once again, where is EBITDA for Sample Company 2? We derive it as with Sample Company 1 in Table 4.

As before, we begin with pretax income and add interest expense, depreciation, and amortization (none), and Sample Company 2 has EBITDA of $5.9 million with a 23.5% EBITDA margin. Note that there was a total of only $125 thousand of depreciation included in EBIT. Sample Company 1 and Sample Company 2 have the same level of pretax income ($5.5 million). Sample Company 1 has EBITDA of $9.5 million, and Sample Company 2 has EBITDA of only $5.9 million.

Assume that the appropriate EBIT multiple for both Sample Company 1 and Sample Company 2 is 8.0×. Remember this discussion of Sample Company 1 and Sample Company 2. We will conclude with the implications of this article regarding the appropriate EBITDA multiples for the respective sample companies and their respective enterprise (total capital) values.

Table 2

Finding EBITDA for Sample Company 1		
Pre-Tax Income	$5,500,000	11.0%
+ Interest Expense	$500,000	1.0%
= EBIT	$6,000,000	12.0%
+ Depreciation	$2,500,000	5.0%
+ Amortization of Intangible Assets	$1,000,000	2.0%
= EBITDA for Sample Company 1	$9,500,000	19.0%

Table 3

Sample Company 2 - Representing Companies that Deliver Services			
Sales		$25,000,000	100.0%
Operating Expenses			
People Costs		$14,500,000	58.0%
Occupancy Costs		$2,500,000	10.0%
Depreciation		$125,000	0.5%
Interest Expense		$250,000	1.0%
All Other Costs		$2,125,000	9.0%
Total Operating Expenses		$19,500,000	78.5%
Pre-Tax Income		$5,500,000	22.0%
State Taxes	6.0%	$330,000	0.5%
Net Income for Pass-Through Entity		$5,170,000	20.7%

Table 4

Finding EBITDA for Sample Company 2		
Pre-Tax Income	$5,500,000	22.0%
+ Interest Expense	$250,000	1.0%
= EBIT	$5,750,000	23.0%
+ Depreciation	$125,000	0.5%
+ Amortization of Intangible Assets	$0	0.0%
= EBITDA for Sample Company 2	$5,875,000	23.5%

The Gordon Model: Market Value of Equity, Discounted Cash Flow, and Enterprise Value

Two statements are considered almost universally true among those familiar with business valuation:

- The value of a business today is the present value of all future benefits expected to be derived from it (into perpetuity), discounted to the present at a discount rate appropriate to the risk associated with the expected receipt of those future benefits (or cash flows).
- The value of a business today is a function of its expected future cash flows and the growth of those cash flows in the context of the risks associated with achieving those expected cash flows.

We show the value of the equity of a business symbolically in the following equation (Fig. 2).[9]

The equation in Figure 2 would prove a bit ponderous in execution, since it calls for a forecast for all periods, effectively to perpetuity. Professor Myron Gordon proved that this equation can be simplified into a single-period capitalization equation under two limiting assumptions. The equation, often referred to as the Gordon model (or the Gordon dividend discount model) follows in Figure 3.

The two limiting assumptions in arriving at V_0, or the market value of equity, are:

- All net income is distributed to owners, retained in the business, or distributed or reinvested in some combination at the discount rate, *r*.
- The numerator, expected cash flow, grows at the constant rate of *g* (which is itself impacted by the dividend policy).

[9]Figures 2, 3, and 4 are taken from chapter 3 of my book *Business Valuation: An Integrated Theory*, 2nd ed., with Travis Harms (Hoboken, New Jersey: John Wiley & Sons, 2008).

The Gordon model equation, while not ponderous, is often not appropriate for use in valuations. When expectations for the next few years do not fit with a single-period capitalization, appraisers and market participants often employ a two-stage discounted cash flow method. Using this method, a specific forecast is developed for a finite period of years (often five, but perhaps three or ten, or until operations are expected to stabilize). Following the finite forecast period, a terminal value is developed, which represents the capitalized value of all remaining cash flows into perpetuity.

The "two-stage" discounted cash flow model was developed for such circumstances.[10]

One the left side of Figure 4, there is a forecast for a finite period of years. The right-side equation estimates the terminal value by using the Gordon model. This equation is one way to develop a terminal value. The present values of all the expected cash flows (at *r*) represent the equity value of a business.

[10]The expectations for the business may be for a drop in business followed by a return to former levels followed in turn by a period of more stable growth. It is up to the analyst to decide on the specific valuation method(s) that are appropriate for a business at a particular valuation date. This equation results in V_0, the market value of equity. A similar equation based on debt-free net income (cash flow) can be used to derive enterprise (total capital) value.

$$\text{Value} = V_0 = \left(\frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_4}{(1+r)^4} + \ldots + \frac{CF_n}{(1+r)^n} \right)$$

Figure 2
Conceptual Equation Representing the Discounted Cash Flow Method

$$V_0 = \frac{CF_1}{r - g}$$

Figure 3
The Gordon Model Single-Period Income Capitalization Equation

In the textbook review regarding EBITDA above, we learned that market participants often use, and business appraisers sometimes (or often) estimate terminal values by applying relevant EBITDA multiples from the current market to projected EBITDA at the end of the finite forecast period to determine terminal values.

Business appraisers and market participants "build" equity discount rates using several versions of the capital asset pricing model adapted to business valuation. The version I use is the adjusted capital asset pricing model, as developed in my book, *Business Valuation: An Integrated Theory*, 2nd ed. (with Travis Harms).[11] Appraisers and market participants employ these "build-up" equity discount rates when using the Gordon model, where r in the equation below is the equity discount rate, to develop indications of equity value by capitalizing expected net income or net cash flow.

$$\text{Market Value of Equity (MVE)} = \frac{\text{Net Income(Net Cash Flow)}}{(r - g)}$$

The usual notation for cash flow in the Gordon model is CF_1 to denote the *next period's expected cash flow*.[12] Net income appears in the equation above to note the fact that if all net income is distributed to owners, the same market value of equity (MVE) is obtained. If the dividend payout is less than 100%, then the remaining expected cash flow will be reinvested in the business. We will show below that expected growth, g, in the equation above, is impacted by the rate of reinvestment embodied in CF_1. As the rate of reinvestment increases (and the dividend payout decreases), g is enhanced.

We now look at the total capital version of the Gordon model to develop enterprise value.[13] The equation below shows both debt-free net income (DFNI) or debt-free net cash flow (DFNCF) in the numerator. The weighted average cost of capital (WACC) is substituted for r in the equity version of the Gordon model. We will examine the components of WACC below, and show how the WACC, which is an after-tax discount (or capitalization) rate, relates to enterprise-level income streams such as EBIT and EBITDA.[14]

$$\text{Enterprise Value} = \frac{\text{DFNI (or DFNCF)}}{(\text{WACC} - g')}$$

For now, note that the difference between DFNI and DFNCF is the amount of DFNI that is available after any required incremental working capital is reinvested in the business plus any amounts required for capital expenditures in excess of depreciation and amortization for a period. Greater levels of expected reinvestment should yield greater levels of expected growth (assuming reinvestment at the WACC).

The discounted cash flow method is also used to develop enterprise (total capital) values. When this is the case, forecasts are developed for finite periods on a total capital basis. This means that the beginning point for

[11] Z. Christopher Mercer, and Travis W. Harms, *Business Valuation: An Integrated Theory*, 2nd ed. (Hoboken, New Jersey: John Wiley & Sons, 2008), chapter 5.

[12] For notational convenience, the customary subscript to denote *expected* net income in the numerator has been omitted. All references to expected income to capitalize mean expected income.

[13] Valuation is inherently a cash flow concept; however, for completeness, we include DFNI in the equation. For example, if expected growth is zero, expected capital expenditures and depreciation are equal (perhaps reasonable in a zero-growth environment), and working capital requirements are nil (also perhaps not unreasonable under these assumptions), then enterprise value would be obtained by capitalizing DFNI by the WACC (less expected growth of zero). My general preference is to use the concept known as enterprise value rather than market value of total capital (MVTC) in connection with the equation above. MVTC is defined as the market values of all assets (tangible and intangible), including cash and nonoperating assets, less the market values of all liabilities (where the book value of debt is generally assumed to be its market value). The presence of significant cash on a balance sheet can skew MVTC multiples, sometimes significantly. The long-term growth rate in the enterprise value equation is labeled g' to denote that g', which reflects growth of DFNI, could be modestly different from g, which represents the growth in net income (or net cash flow), which could be influenced by leverage. Hereafter, we will use the convention g for long-term growth.

[14] The development of WACC is not controversial. Readers can confirm this by looking at the following (or other valuation texts).Shannon P. Pratt (with Alina V. Niculita), *Valuing a Business*, 5th ed. (New York: McGraw Hill Companies, Inc., 2008), chapter 9.Shannon P. Pratt, and Roger J. Grabowski, *Cost of Capital Applications and Examples*, 4th ed. (Hoboken, New Jersey: John Wiley & Sons, Inc., 2010), chapter 18.James R. Hitchner, *Financial Valuation Applications and Models* (Hoboken, New Jersey: John Wiley & Sons, Inc., 2011), chapter 6.

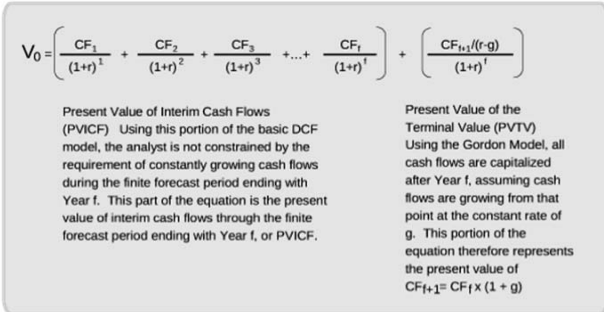

Figure 4
Conceptual Equation Illustrating the Two-Stage DCF Method

Conceptual Derivation of Debt-Free Net Cash Flow
Earnings Before Interest and Taxes (EBIT)
x (1 - Tax Rate)
= Net Operating Profit After Tax (NOPAT) (DFNI)
- Incremental Working Capital for Growth
+ Depreciation
- Capital Expenditures
= Debt-Free Net Cash Flow

Figure 5

most forecasts is EBIT, and DFNCF is developed as shown conceptually in Figure 5.

For growing companies, we are assuming there is some requirement for incremental working capital and that the net of depreciation and capital expenditures is negative (indicating a net reinvestment in the business). The DFNCFs for the finite forecast period are discounted to the present at the WACC (present value of interim cash flows), and a terminal value is developed.

Developing Enterprise (Total Capital) Indications of Value

In Table 5, we use the equation above to develop an indication of enterprise value. As a reminder, enterprise value is the sum of market value of equity plus market value of debt minus cash (and other nonoperating assets). Enterprise value can be thought of as a total capital value that includes equity and debt and excludes cash. For the moment, please accept the assumptions in Table 5 for purposes of discussion.[15]

Table 5 summarizes the calculations of a fairly standard use of the Gordon model, which we explain by the numbered rows:

[15] No statement is being made about expectations for growth, also effectively assuming DFNI = DFNCF. The assumptions yield nice round numbers for illustration.

Table 5

			After-Tax DFNI
1	**Debt-Free Net Income**	1	**$1,000**
2	**Weighted Average Cost of Capital (WACC)**	2	**13.0%**
3	**Less: Long-Term Expected Growth**	3	**-3.0%**
4	Debt-Free Net Income Cap Rate	4	10.0%
5	**Implied DFNI Multiple**	5	**10.0**
6	Debt-Free Net Income (DFNI)	6	$1,000
7	Implied DFNCF Multiple	7	10.0
8	**Implied Enterprise Value**	8	**$10,000**

1. Appraisers use the equation to capitalize (expected) DFNI or DFNCF, which here is assumed to be $1,000.
2. The WACC is assumed to be 13.0%.
3. Expected long-term growth of 3% is assumed for purposes of the analysis.
4. Subtract long-term growth of 3% from the WACC of 13% and derive a DFNI cap rate of 10.0%.
5. The implied multiple of 10.0× is derived by dividing 1 by the DFNI cap rate (1/10%).
6. Again, DFNI is assumed to be $1,000.
7. The multiple from row 5 is 10×.
8. The implied enterprise value is $10,000 ($1,000 × 10).

All this is straightforward. In Table 6, we illustrate that we can capitalize debt-free pretax income and achieve the same resulting enterprise value given an assumed tax rate. The pretax capitalization is also compared with the after-tax capitalization from Table 5.

Follow the right column of Table 6 by the numbered rows:

1. DFNI is the same as from Table 5, or $1,000.
2. We assume a blended federal/state tax rate of 40%.
3. Debt-free pretax income is derived by dividing DFNI by (1 – Tax Rate), and it is $1,666.67.
4. The WACC remains 13.0% as with Table 5.
5. The expected long-term growth rate is the same 3%.
6. Therefore, the DFNI cap rate is 10%, just as in Table 5.
7. The DFNI cap rate of 10% is converted into a debt-free pretax income cap rate by dividing row 6 by (1 – Tax Rate), resulting in a debt-free pretax income cap rate of 16.67%.
8. The implied debt-free pretax income multiple is therefore 6.0× (1/16.67%).
9. Row 9 is debt-free pretax income from row 3.
10. Row 10 is the debt-free pretax income multiple of 6.0× from row 8.

Table 6

Comparison of Capitalization of Debt-Free Net Income and Debt-Free Pre-Tax Income

		After-Tax DFNI		Pre-Tax DFPTI	
Debt-Free Net Income (DFNI)		**$1,000**	**1**	**$1,000**	*Same Starting DFNI*
Tax Rate	**40%**		**2**		
Debt-Free Pre-Tax Income (DFPTI)			**3**	**$1,666.67**	*Divide Row 1 by (1 - Tax Rate)*
					Insight: Equals EBIT
Weighted Average Cost of Capital (WACC)		**13.0%**	**4**	**13.0%**	
Less: Long-Term Expected Growth		**-3.0%**	**5**	**-3.0%**	
Debt-Free Net Income Cap Rate		10.0%	**6**	10.0%	
Debt-Free Pre-Tax Income Cap Rate			**7**	16.67%	*Divide Row 6 by (1 - Tax Rate)*
Implied Multiples		**10.0**	**8**	**6.0**	Divide Row 7 by (1 / Cap Rate)
Debt Free Net Income / Debt-Free Pre-Tax Income		$1,000	**9**	$1,666.67	*From Row 3*
Implied Multiples		10.0	**10**	6.0	*From Row 8*
Implied Enterprise Value		**$10,000**	**11**	**$10,000**	*Same Enterprise Values*

Table 7

Developing a Range of Implied EBITDA Multiples Under a Reasonable Range of Assumptions

Assumptions and Calculations		**Lower**		**Higher**
Calculated Results				
Equity Discount Rates	1	**20.0%**		**15.0%**
Pre-Tax Debt	2	**6.0%**		**6.0%**
Tax Benefit of Debt @	3	-2.4%	**40.0%**	-2.4%
After-Tax Cost of Debt	4	3.6%		3.6%
Portion of Enterprise Value for Equity	5	**70.0%**		**70.0%**
Portion of Enterprise Value for Debt	6	30.0%		30.0%
Weighted Average Cost of Capital	7	**15.1%**		**11.6%**
Expected Long-Term Growth *(g)*	8	**-3.5%**		**-4.5%**
Debt-Free Net Income Cap Rate	9	11.6%		7.1%
DF Pre-Tax Cap Rate (EBIT Cap Rate) *DFNI Cap Rate / (1 - Tax Rate)*	10	**19.3%**		**11.8%**
EBIT Multiples (1 / EBIT Cap Rate)	11	5.2		8.5
EBITDA Depreciation Factors	12	**1.30**		**1.20**
EBITDA Multiples *(Row 11 / Row 12)*	13	**4.0**		**7.1**

11. Row 11 is the product of rows 9 and 10, which yields an implied enterprise value of $10,000, which is identical to the enterprise value derived from capitalizing DFNI.

This "proof" may seem trivial, but it is important for the remainder of the article.

Note that on line 3 of Table 6 showing debt free pre-tax income, we see the "insight" that debt-free pretax income equals EBIT. This is true because pretax income plus interest expense is earnings before interest and taxes, or EBIT.

A Single-Period Income Capitalization Technique to Capitalize EBITDA

With this background, we can now, using the total capital version of the Gordon model, build capitalization rates and multiples for EBIT and EBITDA. A range of equity discount rates from 15% to 20% is used in Table 7. The components of this range include the approximate market yield on twenty-year Treasury bonds at the time of writing (about 2.5%), an equity risk premium of about 5.5%, a base size premium of about 6%, and additional, specific risk factors ranging from about 1% to 6%.[16]

Similar assumptions are made every time appraisers use the adjusted capital asset pricing model (CAPM) to develop equity discount rates. The remaining assumptions

[16]For simplicity, assume that a beta of 1.0× is appropriate for the range of companies being considered. Further analysis can be performed to examine the impact of beta on this analysis. On balance, we are assuming that the companies considered range in size from perhaps $5 million in value to $100 million or more for our purposes here.

are discussed in Table 7. I hope that no reader is offended by the general range of assumptions, which are fairly typical in the valuation of a broad range of private companies.

The last assumption in Table 7 is a range of EBITDA Depreciation Factors from 1.20 to 1.30. The EBITDA Depreciation Factor is defined as:

$$\text{EBITDA Depreciation Factor} = 1 + \frac{\text{Depreciation}}{\text{EBIT}} = \frac{\text{EBITDA}}{\text{EBIT}}$$

To the best of my knowledge, this factor has not been written about before. It measures the portion of EBIT represented by depreciation (and amortization) and, with the addition of 1, is converted into a factor to deflate EBIT multiples to comparable EBITDA multiples. The EBITDA Depreciation Factor measures the relationship between EBITDA and EBIT. It is identical to the quotient of EBITDA/EBIT.

As we will see, the EBITDA Depreciation Factor measures an economic relationship that is important in valuation. Please assume that the indicated range of 1.20 to 1.30 is reasonable for now. We will examine market evidence regarding this factor in the Appendix to this article to substantiate the reasonableness of the assumed range.

Like with most ratios, the EBITDA Depreciation Factor can look unusual if EBITDA is particularly low for a given period, or even if it is particularly high. Analysis will determine if there are any appropriate normalizing adjustments that might account for an outlier factor. In addition, while any valuation analysis is performed as of a point in time, i.e., the valuation date, it is always good to look at any company's EBITDA Depreciation Factor over time when deriving the factor.

Table 7 develops a range of EBITDA multiples based on the assumptions noted above and introduces a technique to develop EBITDA multiples using the adjusted CAPM.

The following numbers correspond to the numbered rows in Table 7.

1. Begin with an equity discount rate of 15% in the right column ranging to 20% in the left column. This range of discount rates is appropriate for a broad range of private companies.
2. Assume the pretax cost of debt is 6.0%.
3. The assumed tax rate is 40%, which reflects a blended federal and state rate. This shields a portion of the cost of debt (2.4%).
4. The calculated after-tax cost of debt is therefore 3.6% (6.0% − 2.4%).
5. We have assumed 70% equity in the capital structure. This is in the range of equity capitalization for many private companies having debt.[17]
6. The resulting debt capitalization is 30% (1 − 70% attributed to equity).
7. These first four assumptions (equity discount rate, cost of debt, tax rate, and capital structure) are made every time appraisers develop a WACC. The calculated WACCs range from 11.6% (right column) to 15.1% (left column). WACC is calculated by taking the sum of the weighted after-tax costs of equity and debt as developed in standard fashion.
8. Assume long-term growth in the range of 3.5% (left column) to 4.5% (right column). This range is reasonable range for many private companies over the long run.[18]
9. Subtract the long-term expected growth rate from the WACC to develop debt-free net income capitalization rates. The selected assumptions yield a range of DFNI capitalization rates of 7.1% to 11.6% (line 9). To this point, we have developed WACCs and enterprise-level (total capital) capitalization rates in a very common and accepted fashion. Appraisers follow the general methodology leading to line 9's total capital capitalization rates routinely.
10. Convert the DFNI capitalization rates to debt-free pretax income capitalization rates ranging from 11.8% to 19.3%. We do so by dividing the after-tax capitalization rates on line 9 by one minus the assumed tax rate of 40%. We showed in Table 6 that we have changed no economics in converting the after-tax capitalization rate into a pretax capitalization rate.
11. Almost finally, on line 11, we convert the debt-free pretax income capitalization rates into EBIT multiples ranging from 5.2× to 8.5× by calculating (1/EBIT Cap Rate).
12. Assume a range of EBITDA Depreciation Factors from 1.20 to 1.30. We will discuss this factor in more detail shortly, but this range is reasonable for many companies.

[17]The purpose of this assumption is not to consider leverage in the context of a leveraged buyout, where the mix could, for larger companies, flip to 70% debt and 30% equity, with an accompanying enhancement in the price being paid and the riskiness of transactions. This mix of debt and equity is well above normal operating leverage for private companies. The purpose here is to make a reasonable assumption based on observation of private companies that do operate with debt.

[18]These expected growth rate ranges are for illustrative purposes only. The analyst must be able to support the reasonableness of any growth rate assumption in valuations performed using the method introduced in this article or any other valuation method.

13. Finally, we convert the range of EBIT multiples to a range of EBITDA multiples by dividing the assumed EBITDA Depreciation Factors into the EBIT multiples developed on line 11. The calculated range of EBITDA multiples is 4.0× to 7.1×.

We have developed a range of EBITDA multiples in Table 7. However, this technique could as well be employed to develop a single multiple for a single-period capitalization of EBITDA.

Until line 9, the technique is identical to that of developing traditional WACCs and debt-free net income (net cash flow) capitalization rates. While not shown in Table 7, the implied debt-free net income (net cash flow) multiples for capitalization rates of 11.6% to 7.1% (line 9) range from 8.6× to 14.1×. However, most appraisers and market participants have no frame of reference to assess the reasonableness of debt-free net cash flow multiples, which are not typical market multiples considered by market participants.

As noted above, the only additional assumption needed to derive EBTIDA multiples is that of the EBITDA Depreciation Factor. This factor is discussed at more length in the remainder of this article and in its Appendix. Analysts can examine the relationship between EBIT and EBITDA (i.e., the EBITDA Depreciation Factor) for any company or group of companies. They can perform similar analyses for peer groups of private companies where such information is available, and they can look at the relationship for companies in guideline public company groups. They can also examine the overall analyses of the EBITDA Depreciation Factor for private companies and the Standard and Poor's (S&P) 500 (nonfinancial) companies found in the Appendix. The information provided will show that the range of assumptions on line 12 above is reasonable for discussion purposes.

The range of single-period EBITDA multiples developed in Table 7 is 4.0× to 7.1×. Business appraisers and market participants are familiar with EBITDA multiples. They are calculated for every guideline transaction for which data are available. Multiples of EBITDA are also calculated for groups of guideline public companies by investment bankers, stock analysts, market participants, and business appraisers. From a practical standpoint, the so-called rule of thumb range of 4× to 6× EBITDA, plus or minus, that market participants and business owners throw around, often carelessly, is confirmed by this analysis. We do begin to see that there is an understandable valuation rationale for the rule of thumb ranges.

EBITDA multiples developed as in Table 7 can be used by appraisers and market participants for two primary purposes:

- Develop single-period income capitalizations of EBITDA when the circumstances warrant using the technique.
- Develop the terminal value indication when using the two-stage discounted cash flow method. The derived EBITDA multiples facilitate comparison with EBITDA multiples in the current market environment at the time of any valuation. This method "solves" any issue of "mixing" a market method with an income method in using the discounted cash flow method.[19]

In the remainder of the article, we examine the relationships among expected growth in cash flow, risk, and capital intensity (as measured by the EBITDA Depreciation Factor). The analysis is, in my view, instructive for analysts and market participants.

Risk, Expected Growth, Capital Intensity, and EBITDA Multiples

In 1989, I wrote an article for *Business Valuation Review* addressing what I then called (and still do) the adjusted CAPM.[20] The article discussed how to build up equity discount rates and to develop capitalization rates applicable for net income (or net cash flow).

The 1989 article built on publications by James Schilt and Shannon Pratt, who were among (and may still be) the first to tackle the use of the CAPM to develop discount rates and capitalization rates for business valuation.[21] The 1989 article was the first time, to my knowledge, that a build-up method for developing equity discount rates (and capitalization rates) considering long-term growth was published. In that article, a range of equity multiples was created based on ranges of assumptions regarding expected risk and growth. The calculated range of equity multiples was divided into four quadrants, similar to what we will see for EBITDA multiples below.

I have thought about extending the concept of discount rates to pretax, total capital measures of income on a

[19]As I have said for years, when analysts use the Gordon model to develop terminal value indications, it is good practice to calculate the implied EBITDA multiples as a test of reasonableness and for comparison with current market multiples.

[20]Z. Christopher Mercer, "The Adjusted Capital Asset Pricing Model for Developing Capitalization Rates: An Extension of Previous 'Build-Up' Methodologies Based Upon the Capital Asset Pricing Model," *Business Valuation Review*, 8, 4 (1989):147–156.

[21]James H. Schilt, "Selection of Capitalization Rates for Valuing a Closely Held Business," *Business Valuation News* (the predecessor to the *Business Valuation Review*) (June 1982):2.Shannon P. Pratt, *Valuing Small Businesses and Professional Practices* (Homewood, Illinois: Dow-Jones Irwin, 1986), chapter 11. Also Pratt's *Valuing a Business*, 2nd ed. (Homewood, Illinois: Richard D. Irwin, Inc., 1989). Neither book had yet provided a clear exposition for developing equity discount rates using the (Adjusted) CAPM, although they were moving in that direction. Pratt spoke of subtracting inflation (and not expected growth) from the discount rate to arrive at an equity cash flow capitalization rate.

Table 8

	Assumptions to Develop a Range of Enterprise Value / EBITDA Multiples				
1	Pre-Tax Debt	6.00%			
2	Tax Rate	40%	7	Highest Equity Discount Rate	20.0%
3	Portion Equity	70%	8	Highest Expected LT Growth Rate	6.0%
	Portion Debt	30%			
4	EBITDA Depreciation Factor	1.25			
5	Decrement in Disc Rate	1.00%			
6	Decrement in Growth Rate	0.50%			

number of occasions in the past. In particular, I was interested in developing a single-period income capitalization model to capitalize EBITDA, because of the universal nature of its use by business appraisers, business owners, and market participants, including both buyers and sellers of businesses.

The insight of the relationship between EBIT and depreciation, which led to recognition of the EBITDA Depreciation Factor, made this extension possible.

Assumptions to Develop a Range of EBITDA Multiples

Begin with a series of assumptions summarized in Table 8. The numbered rows will focus our attention on each assumption at the outset. The purpose is to develop a range of assumptions that might encompass the expected risk and growth profiles of a large number of closely held and private companies.

The assumptions are generally the same as in Table 7, but we look at ranges in a different manner (by the numbers)

1. The cost of pretax debt is assumed to be 6.0%, which seems reasonable in today's lending climate.
2. The tax rate is a blended federal and state tax rate of 40%.
3. Again, assume 70% equity in the market value capital structure. This leaves the residual assumption of 30% attributable to debt.
4. Rather than a range of depreciation factors as above, we have assumed an EBITDA Depreciation Factor of 1.25. We will not vary this assumption in the analysis. Since readers have no perspective on this assumption, let me state for now that the median EBITDA Depreciation Factor for almost 600 companies in more than twenty industry sectors (North American Industry Classification System [NAICS] Code subindustries) in the Risk Management Associates (RMA) 2014–2015 database is 1.28. Further, the median EBITDA Depreciation Factor for the nonfinancial companies of the S&P 500 Index is also 1.28 for 2014.
5. Assumption 5 helps to develop the range of equity discount rates (and corresponding WACCs) used in the analysis.
6. Similarly, assumption 6 helps to develop the range of expected growth rates for the analysis.
7. We assume the highest equity discount rate of 20%, which, with assumption 5, sets the range used in the analysis (down to 13%).
8. We also assume the highest expected growth rate of 6.0% for the analysis, which, with assumption 6, sets the range used (down to 2.5%).

A Range of Implied EBITDA Multiples for Discussion

With the assumptions in Table 8, we can, using the technique outlined in the Table 7, calculate a range of implied EBITDA multiples. The objective is to create the range so that it can reflect the potential valuations of a number of hypothetical companies with different expected risk and growth characteristics, which we do in Table 9. The shaded cells in the table are referenced in the following discussion.

Table 9 is meant to be representative and is created for discussion only. Neither the table nor any calculations in it are meant to represent the valuation of any entity. The enterprise value/EBITDA multiples calculated in Table 9 are the result of the combinations of assumptions from Table 8.

Assumptions between appraisers may differ, even considerably, in actual appraisal situations. As with any valuation, there are several key assumptions, and appraisers (or market participants, if they don't want to overpay) must develop their assumptions carefully in light of facts and circumstances in each situation.

Having set the ranges, we can begin to look at various combinations of assumptions. The valuation triumvirate is expected cash flow, risk, and growth. We now focus on expected risk and growth.

- The equity discount rates and calculated WACCs represent varying degrees of expected risk. Equity discount rates range from 13% to 20%. The

Table 9

EDF=1.25	Implied Enterprise Value / EBITDA Multiples Based on Range of Assumptions from Table 8							
Equity R	20.00%	19.00%	18.00%	17.00%	16.00%	15.00%	14.00%	13.00%
WACC	15.08%	14.38%	13.68%	12.98%	12.28%	11.58%	10.88%	10.18%
Growth	II Higher Risk / Higher Growth				IV Lower Risk / Higher Growth			
6.0%	5.3	5.7	6.3	6.9	7.6	8.6	9.8	11.5
5.5%	5.0	5.4	5.9	6.4	7.1	7.9	8.9	10.3
5.0%	4.8	5.1	5.5	6.0	6.6	7.3	8.2	9.3
4.5%	4.5	4.9	5.2	5.7	6.2	6.8	7.5	8.5
4.0%	4.3	4.6	5.0	5.3	5.8	6.3	7.0	7.8
3.5%	4.1	4.4	4.7	5.1	5.5	5.9	6.5	7.2
3.0%	4.0	4.2	4.5	4.8	5.2	5.6	6.1	6.7
2.5%	3.8	4.0	4.3	4.6	4.9	5.3	5.7	6.3
	I Higher Risk / Lower Growth				III Lower Risk / Lower Growth			

corresponding WACCs range from about 10% to 15%. Obviously, a company with an equity discount rate of 13% is a different animal than one with a corresponding equity discount rate of 20%.

- The range of expected growth rates represents varying levels of expectations for the future. The indicated range is from 6.0% down to 2.5%. There is a significant difference in expected growth over this range.
- Finally, each EBITDA multiple calculated in Table 9 is based on the assumptions in Table 8 and calculations as presented in Table 7.

Focus on one combination in Table 9 to verify how the table works. Look at the intersection of a 17% equity discount rate and a 4.0% expected growth rate. With all the assumptions in Table 8, this combination implies an enterprise value to EBITDA multiple of 5.3×. All of the implied EBITDA multiples in Table 11 are calculated similarly.

Look at the column in Table 9 with an equity discount rate of 16%. The calculated multiples range from 4.9× to 7.6× as expected growth rises from 2.5% to 6.0%. Value, as represented by the EBITDA multiples, is positively correlated with expected growth. *More rapid expected growth yields higher EBITDA multiples and higher values, all other things being equal.*

Look now at the row in Table 9 with expected growth of 4.0%. The implied EBITDA multiples range from 4.3× where the equity discount rate is 20%, up to 7.8× where the equity discount rate is 13%. Value, as represented by the EBITDA multiple, is inversely correlated with risk. *As risk decreases, the EBITDA multiple increases and value increases, all other things being equal.*

Tradeoffs Between Expected Growth and Risk and the Impact on Value

We have, somewhat arbitrarily, divided Table 9 into four quadrants. They are cleverly called quadrants I, II, III, and IV. There are many implied EBITDA multiples in Table 9. In Table 10, we show only the ranges of implied multiples and the average multiples for each quadrant.

With fewer numbers in Table 10, we gain better insight into how EBITDA multiples relate to varying expectations regarding expected risk and growth.

- ***Quadrant I—higher risk/lower growth.*** Companies in quadrant I (and having all the assumptions in

Table 10

EDF=1.25	Implied Enterprise Value / EBITDA Multiples Based on Above Assumptions							
Equity R	20.00%	19.00%	18.00%	17.00%	16.00%	15.00%	14.00%	13.00%
WACC	15.08%	14.38%	13.68%	12.98%	12.28%	11.58%	10.88%	10.18%
Growth	II Higher Risk / Higher Growth				IV Lower Risk / Higher Growth			
6.0%	5.3			6.9	7.6			11.5
5.5%		Average				Average		
5.0%		5.5				8.2		
4.5%	4.5			5.7	6.2			8.5
4.0%	4.3			5.3	5.8			7.8
3.5%		Average				Average		
3.0%		4.5				6.1		
2.5%	3.8			4.6	4.9			6.3
	I Higher Risk / Lower Growth				III Lower Risk / Lower Growth			

Table 11

WACC 13.0%	Implied Enterprise Value / EBITDA Multiples Holding Risk Constant							
EDF Factors	1.80	1.70	1.60	1.50	1.40	1.30	1.20	1.10
Growth								
6.0%	4.8	5.1	5.4	5.7	6.1	6.6	7.2	7.8
5.5%	4.5	4.7	5.0	5.3	5.7	6.2	6.7	7.3
5.0%	4.2	4.4	4.7	5.0	5.4	5.8	6.3	6.8
4.5%	3.9	4.2	4.4	4.7	5.1	5.4	5.9	6.4
4.0%	3.7	3.9	4.2	4.5	4.8	5.1	5.6	6.1
3.5%	3.5	3.7	4.0	4.2	4.5	4.9	5.3	5.8
3.0%	3.3	3.5	3.8	4.0	4.3	4.6	5.0	5.5
2.5%	3.2	3.4	3.6	3.8	4.1	4.4	4.8	5.2

Table 8) have equity discount rates ranging from 17% to 20% (and WACCs in the range of 13% to 15%) and expected growth from 2.5% to 4.0%. The EBITDA multiples in quadrant I range from 3.8× to 5.3×. The range makes intuitive sense for the risk and growth profiles defined by the quadrant. The average of all the multiples in quadrant I is 4.5×. We calculate the averages only for perspective between quadrants.

- ***Quadrant II—higher risk/higher growth.*** Companies in quadrant II have equity discount rates ranging, like quadrant I, from 17% to 20%, but they are growing more rapidly (from 4.5% to 6.0%). The EBITDA multiples range from 4.5× to 6.9×. While still risky, companies in quadrant II, because of their more rapid expected growth, are more valuable. Again, this makes intuitive sense. The average EBITDA multiple in quadrant II is 5.5×, or 22% higher than the 4.5× average for quadrant I. For a given level of expected risk, it pays to create expectations for more rapid growth.
- ***Quadrant III—lower risk/lower growth.*** Companies in quadrant III exhibit relatively lower risk, but they are expected to grow relatively slowly. The range of equity discount rates is from 13% to 16% (and WACCs from 10% to just over 12%), and expected growth is 2.5% to 4.0%. Implied EBITDA multiples range from 4.9× to 7.8×, with an average of 6.1×. For a given level of expected growth, it pays in terms of higher EBITDA multiples to decrease expectations regarding the risk of a business. The average EBITDA multiple of 6.1× for quadrant III is 36% higher than the 4.5× average multiple for quadrant I and about 11% higher than the 5.5× average multiple for quadrant II. These calculations suggest that even relatively slow-growing companies can increase value significantly by decreasing risk.
- ***Quadrant IV—higher growth/lower risk.*** Companies in quadrant IV are generally attractive in that they have relatively good expectations for growth and lower perceptions of expected risk. Here, the equity discount rates range from 13% to 16%, and expected growth ranges from 4.5% to 6.0%. Calculated EBITDA multiples range from 6.2× to 11.5×. The average EBITDA multiple in quadrant IV is 8.2×. Quadrant IV is the place to be, but not many companies make it.

We mentioned rules of thumb for multiples of EBITDA in the range of 4.0× to 6.0×, plus or minus. Look carefully at quadrants I, II, and III in Table 12. Many combinations of expected risk and growth seem to create EBITDA multiples within this range, again, plus or minus.

Table 12

Growth 4.5%	Implied Enterprise Value / EBITDA Multiples Holding Growth Constant							
Depr Fctrs	1.80	1.70	1.60	1.50	1.40	1.30	1.20	1.10
WACC								
15.1%	3.2	3.3	3.5	3.8	4.1	4.4	4.7	5.2
14.6%	3.3	3.5	3.7	4.0	4.3	4.6	5.0	5.4
14.1%	3.5	3.7	3.9	4.2	4.5	4.8	5.2	5.7
13.6%	3.7	3.9	4.1	4.4	4.7	5.1	5.5	6.0
13.1%	3.9	4.1	4.4	4.7	5.0	5.4	5.8	6.4
12.6%	4.1	4.4	4.6	5.0	5.3	5.7	6.2	6.8
12.1%	4.4	4.7	4.9	5.3	5.7	6.1	6.6	7.2
11.6%	4.7	5.0	5.3	5.6	6.1	6.5	7.1	7.7

- Quadrant I multiples are entirely within this general range.
- Quadrant II multiples are largely within this range, and they exceed it only with lower relative risk and above-average growth expectations.
- The average EBITDA multiple in quadrant III is 6.1, and only companies with lower relative risk and higher expected growth (within the quadrant) receive multiples above this pervasive range of 4.0× to 6.0× of EBITDA multiples.
- Finally, we see that to break out of the rule of thumb range, a company needs to be in quadrant IV, where it demonstrates both relatively lower risk and relatively higher growth (in relationship to the other quadrants).[22]

Many business owners think that the primary way to create value is by increasing earnings. If earnings or cash flow increase, value certainly does tend to increase, even at the same valuation multiple.

Tables 9 and 10 suggest additional ways to work on increasing value at any given level of earnings. EBITDA multiples and value can also be increased by working on the other two elements of the valuation triumvirate, expected risk and growth. This type of analysis should help business appraisers explain the relationships between risk and growth and value to their business owner clients.

Look back at Table 9 at the intersections of the 16% and 17% equity discount rate columns and the expected growth row of 2.5%. The EBITDA multiple at a 17% discount rate is 4.6×, while the multiple at a 16% discount rate is 4.9×, or about 7% greater. Business owners can increase value by working to reduce common risks related to concentrations of customers, suppliers, products, or other risks. This will not happen at once, but over time, it is always good to be working to reduce risk, and increasing value in the process.

Look again at Table 9 at the intersection of a 16% equity discount rate column and the rows for expected growth of 4.0% and 4.5%. The EBITDA multiple where growth is 4.5% is 6.2×, or 7% greater than the multiple of 5.8× where growth is 4%. Other things being equal, increasing expected growth tends to increase multiples and value.

Look again at the multiples we have discussed. The multiple for a 17% equity discount rate and 4% growth is 5.3×, while the multiple for a 16% discount rate and 4.5% growth is 6.2×. Consider a business owner who, over a period of time, increased expected growth a little, from 4% to 4.5% **and** lowered risk, reducing the discount rate from 17% to 16%. The EBITDA multiple would increase by 17%, or from 5.3× to 6.2×. That would be a worthwhile increase, and worth a bit of effort.

The real world of market valuation is not necessarily as precise as our examples. The lesson is nevertheless clear. Business owners should always be working, over time, to move to the right on Tables 9 and 10 (by reducing risk) and up as well (by increasing growth).

Risk, Growth, and the EBITDA Depreciation Factor

In Tables 9 and 10, we examined the relationship between EBITDA multiples and various assumptions about expected risk and expected growth. In addition to differences in expected risk and growth, EBITDA multiples are also impacted by changes in relative capital intensity. In the tables above, we assumed that the EBITDA Depreciation Factor was fixed at 1.25. It can obviously vary from company to company and industry to industry, so we need to examine the impact of relative capital intensity on EBITDA multiples, as well.

Tables 11 and 12 provide calculations of implied EBITDA multiples for a range of EBITDA Depreciation Factors holding risk constant at a WACC of 13.0% while varying expected growth (Table 11), and holding expected growth constant at 4.5% while varying risk (Table 12).

Table 11 illustrates the impact of changes in the EBITDA Depreciation Factors while holding expected growth constant (along each row). For example, a company that could, over time, improve its EBITDA Depreciation Factor from 1.40 to 1.30 while holding expected growth constant at 5.0% could expect EBITDA multiple expansion from about 5.4× to 5.8×, which would represent an improvement of about 7%.[23]

Table 12 holds expected growth constant at 4.5% and varies expected risk. Look at the row where expected risk is represented by a WACC of 14.1%. A company that, over time, can enhance its capital efficiency from 1.40 to 1.30 (as represented by the EBITDA Depreciation Factor) can expect an increase in its EBITDA multiple from 4.5× to 5.8×, or about 7%.

[22]Larger companies are generally perceived to be less risky than smaller companies. To the extent that very large companies are being valued, equity discount rates may be less than the 13% lower bound for equity discount rates in Tables 9 and 10. For larger companies, depending on their growth expectations and capital intensity, there would be a bias upward in EBITDA multiples relative to the ranges noted here.

[23]"Improving" an EBITDA Depreciation Factor might result from enhanced productivity related to plant and equipment (or software) that deliver the same level of EBITDA with relatively fewer depreciable assets. Note that for companies growing above an inflationary rate, there will be some net investment of net cash flow back into the business. Appraisers need to be aware of the expected impact of growth on cash flow available for taxes and distribution. See Figure 5.

Analysis of the EBITDA Depreciation Factor can enable the business appraiser to focus on expected risk, growth, and relative capital intensity in developing EBITDA multiples.

Reprise for Sample Company 1 and Sample Company 2

Sample Company 1 has twice the level of sales as Sample Company 2 ($50 million versus $25 million). Sample Company 1 has EBITDA of $9.5 million (19.0% margin), or 62% more than Sample Company 2 ($5.875 million with a 23.5% margin). Both are successful companies. The question becomes, which is worth more?

With EBIT of $6.0 million and depreciation and amortization expense of $3.5 million, Sample Company 1's EBITDA Depreciation Factor is 1.58 (1 + $3.5/$6.0).

With EBIT of $5.75 million and depreciation of $125 thousand, Sample Company 2's EBITDA Depreciation Factor is 1.02 (1 + $0.125/$5.875).

Recall that relevant EBIT multiple for both companies is assumed to be 8.0×. We calculate EBITDA multiples below.

- Sample Company 1: 8.0/1.58 = 5.1× EBITDA multiple.
- Sample Company 2: 8.0/1.02 = 7.8× EBITDA multiple.

Sample Company 2 has an implied EBITDA multiple of 7.8×, or more than 50% greater than the 5.1× EBITDA multiple for Sample Company 1. Sample Company 2 is clearly worth *relatively* more per dollar of EBITDA than Sample Company 1.

The bottom line is that, relative to Sample Company 1, Sample Company 2 delivers more dollars of EBIT from a given dollar of sales. The result is that the markets (and appraisers) would generally deliver a higher multiple of EBITDA for companies like Sample Company 2, other things being equal.

We now calculate the enterprise values for each of the two companies.

- Sample Company 1: $9.500 million × 5.1 = $48.450 million.
- Sample Company 2: $5.875 million × 7.8 = $45.825 million.

Enterprise value for Sample Company 1 is $48.45 million, while enterprise value for Sample Company 2 is $45.825 million, or almost as much on half the sales. We have discussed the rule of thumb range of 4× to 6× EBITDA for many private companies. The entire discussion above shows why that rule of thumb range exists. However, the discussion also shows that not every company will fit into that rule of thumb range. Our sample company analysis makes this clear. There is no substitute for good valuation analysis that appropriately considers the risks, expected growth, and expected capital intensity (which impacts net cash flow) of every subject company.

Conclusion

We began this article with a discussion addressing the observation that EBITDA is the lowest common denominator measure of gross cash flow with which to compare private companies. EBITDA is the starting point for analyzing cash flow for owners.

We then introduced the EBITDA Depreciation Factor, which examines the relationship between DA, or depreciation and amortization, and EBIT. The EBITDA Depreciation Factor converts EBIT multiples to corresponding multiples of EBITDA. Market evidence regarding the EBITDA Depreciation Factor is provided in the Appendix to this article.

We introduced a technique to develop implied EBITDA multiples. Then we discussed the implications of varying assumptions regarding expected risk, growth, and capital intensity. Finally, we "valued" Sample Company 1 and Sample Company 2 to illustrate the impact of the EBITDA Depreciation Factor on relative value and enterprise value.

To my knowledge, the technique we introduced for developing capitalization rates and multiples to capitalize EBITDA has not been published previously. This technique requires the development of all of the assumptions necessary to develop the WACC for a business and requires only one additional assumption, that of the EBITDA Depreciation Factor.

Appendix A: Market Evidence for the EBITDA Depreciation Factor

Table 13 illustrates the generic EBITDA multiples related to varying EBITDA Depreciation Factors. It shows the following:

- Depreciation as a percentage of EBIT is shown ranging from 5% to 50% on the top row for purposes of illustration.
- EBITDA Depreciation Factors are then calculated, i.e., [1 + (Depreciation/EBIT)], and these factors range from 1.05 to 1.50 (second row below).
- In the third row of the table, implied EBITDA multiples are calculated based on an assumed EBIT multiple of 8.0×. We will use this as a reference point, but know that not all businesses sell for 8× EBIT.

Table 13

Developing a Range of Implied EBITDA Multiples Across a Range of EBITDA Depreciation Factors

Assumed Market Multiple of EBIT			8.0							
Depreciation as % of EBIT										
5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	
EBITDA Depreciation Factors										
1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	
Illustrative EBITDA Multiples Based on Assumed Market Multiple of EBIT										Utilities S&P 500
7.6	7.3	7.0	6.7	6.4	6.2	5.9	5.7	5.5	5.3	1.63
		Prod. Svcs RMA	Consumer Staples S&P		Median RMA 590 NAICS			Materials S&P 500		Telecom S&P 500
		1.14	1.21		1.28			1.43		2.20=>
					Median Non-Fin. S&P 500					
					1.28					
			<= Representative EBITDA Depreciation Factors =>							

- Note also, looking from left to right, the implied EBITDA multiples decrease as the EBITDA Depreciation Factors increase. The EBITDA multiples range from 7.6× with a 1.05 EBITDA Depreciation Factor to 5.3× with a EBITDA Depreciation Factor of 1.50.

Table 13 also provides a number of reference points, some of which we have noted, and others we will need to discuss.

- The median EBITDA Depreciation Factor for nearly 600 RMA NAICS Code subindustries is 1.28.
- The median EBITDA Depreciation Factor for the nonfinancial companies comprising the S&P 500 Index is also 1.28.
- Several industries have median factors in the 1.2 to 1.4 range. The Utilities group in the S&P 500 has a median EBITDA Depreciation Factor of 1.63, indicating relatively higher capital intensity. The Telecom group has an EBITDA Depreciation Factor of 2.20, suggesting a very high degree of capital intensity.

The purpose of Table 13 is simply to provide perspective to readers from available market evidence about the EBITDA Depreciation Factor over a range of market factors that includes, as we will see shortly, the majority of all companies.

More perspective on the EBITDA Depreciation Factor

Depreciation can be thought of as one proxy for expected capital expenditures. It is not a perfect proxy, of course, but assume that for a company to grow, it will likely spend at least as much on capital expenditures in a year as the depreciation for that year. In other words, assume that a company's capital stock is replenished by spending the cash flow created by its noncash depreciation charges. We know that capital expenditures tend to be lumpy, but we can clearly infer something about capital intensity by examining the EBITDA Depreciation Factors.

If one company can spend a lower portion of its EBIT on capital expenditures (giving rise to depreciation) than another, otherwise identical company, then it warrants a higher EBITDA multiple, since there is more EBIT available for non-capex uses (taxes, additional reinvestment, and dividends or distributions). Not all dollars of EBITDA are created equal.

Public market evidence

We can test the general discussion with some market evidence. It is not surprising that different industries have different tendencies towards EBITDA Depreciation Factors, or different percentages of depreciation in EBIT. We look at the major nonfinancial sectors of the S&P 500 in Table 14.

Table 14 shows median and average figures for depreciation as percent of EBIT, and also the median implied EBITDA Depreciation Factors for nine major sectors for the S&P 500 Index.

The results are sorted from lowest capital intensity to highest. The median EBITDA Depreciation Factors for four broad sectors (consumer staples, industrials, healthcare, and consumer discretionary) lie in the tight range of 1.21 to 1.23, with the information technology close at

Table 14

	S&P 500 Index EBITDA Depreciation Factors Non-Financial Companies					
		Number of	Depreciation as % of EBIT		Median Implied EBITDA	
	Sector	Companies	Median	Average	Depreciation Factors	% of Total
1	Consumer Staples	40	20.98%	21.75%	**1.21**	9.7%
2	Industrials	64	21.19%	29.65%	**1.21**	15.5%
3	Healthcare	53	22.29%	32.28%	**1.22**	12.9%
4	Consumer Discretionary	85	22.75%	32.85%	**1.23**	20.6%
5	Information Technology	65	26.71%	30.40%	**1.27**	15.8%
6	Materials	30	42.94%	44.52%	**1.43**	7.3%
7	Energy	40	61.83%	77.69%	**1.62**	9.7%
8	Utilities	29	62.96%	67.92%	**1.63**	7.0%
9	Telecommunication Services	6	119.69%	133.14%	**2.20**	1.5%
10	**Total / Overall S&P Medians**	**412**	**27.81%**	**39.95%**	**1.28**	

Source: Capital IQ, Mercer Analysis as of 12/31/14
Note: Results for four outlier companies excluded

1.27. As noted, the overall median EBITDA Depreciation Factor is 1.28.

The materials sector has a median EBITDA Depreciation Factor of 1.43, while the energy and utilities sectors have median factors of 1.62 and 1.63, respectively. These sectors are clearly more capital intensive than the preceding sectors. Finally, the telecommunications sector has a median EBITDA Depreciation Factor of 2.20.

There are more than 300 companies in the following sectors: consumer staples, industrials, healthcare, consumer discretionary, and information technology. These companies represent about 75% of the nonfinancial companies in the S&P 500. The median EBITDA Depreciation Factors for these sectors range from 1.21 to 1.27. This public market evidence supports the reasonableness of the selection of EBITDA Depreciation Factors in the range of 1.20 to 1.30 in the article.

Private market evidence

We can also look at the private markets. We noted above that the median EBTIDA Depreciation Factor was also 1.28 for the portion of the RMA subindustries for which data were available. We can see the dispersion between industry subsectors in Table 15, looking at 21 sectors.

With a broader range of industry sectors, we see a broader range of implied EBITDA Depreciation Factors in the RMA database than in the table for the S&P 500 Index. Factors range from a low of 1.07 for finance and insurance, to a high of 1.88 and 1.99 for mining and public administration, respectively. The increase in EBITDA Depreciation Factors seems to make sense. Finance and insurance, with a factor of 1.07, is clearly less capital intensive than mining, where the factor is 1.86.

Now look at the first ten sectors, including: finance and insurance, wholesale trade, professional, scientific, and technical services, real estate and rental and leasing, construction (general), admin and support, waste management and remedial services, retail trade, construction (% completion basis), and manufacturing. Companies in these sectors represent more than 450 of the 594 companies in the various sectors in the RMA database, or about 75% of the total. The median EBITDA Depreciation Factors for these sectors range from 1.07 to 1.30. Therefore, we find additional support for the range of EBITDA Depreciation Factors used for analysis in the article (1.20 to 1.30) in the private markets.

Implications for business valuation

We can, in fact, examine the relationships among depreciation, EBIT, and EBITDA for any company. We can do this based on its historical financial record. We also now know that there is available market evidence to assist in making judgments about the appropriate EBITDA Depreciation Factor for any private company. Such judgments would be made, of course, in light of all facts and circumstances known at the valuation date.

As I have begun to discuss this EBITDA capitalization with business appraisers, I've been asked whether it is appropriate to look at depreciation and amortization, or whether the analysts should consider depreciation only when estimating the EBITDA Depreciation Factor. That's a good question and certainly available for analysis in any specific case.

Table 15

	Risk Management Associates 6-Digit NAICS Codes Summary of EBITDA Depreciation Factors					
		Number of	Depreciation as % of EBIT		Median Implied EBITDA	
	Sector	Companies	Median	Average	Depreciation Factors	% of Total
1	Finance and Insurance	19	6.72%	8.55%	**1.07**	3.2%
2	Wholesale Trade	67	13.51%	17.53%	**1.14**	11.3%
3	Professional, Scientific and Technical Services	33	14.29%	21.11%	**1.14**	5.6%
4	Real Estate and Rental and Leasing	11	14.78%	26.35%	**1.15**	1.9%
5	Construction - General	26	17.50%	22.73%	**1.18**	4.4%
6	Admin and Support, Waste Mgt, Rem Svcs	24	22.77%	33.63%	**1.23**	4.0%
7	Retail Trade	42	23.45%	29.50%	**1.23**	7.1%
8	Construction - % of Completion Basis	9	25.00%	39.21%	**1.25**	1.5%
9	Manufacturing	220	30.00%	33.59%	**1.30**	37.0%
10	Management of Companies and Enterprises	2	31.78%	31.78%	**1.32**	0.3%
11	Information	15	32.00%	41.68%	**1.32**	2.5%
12	Other Services (Except Public Administration)	17	36.07%	35.19%	**1.36**	2.9%
13	Transportation and Warehousing	26	37.30%	39.70%	**1.37**	4.4%
14	Agriculture, Forestry, Fishing and Hunting	17	38.33%	43.59%	**1.38**	2.9%
15	Arts, Entertainment and Recreation	8	42.30%	44.85%	**1.42**	1.3%
16	Health Care and Social Assistance	30	44.68%	51.16%	**1.45**	5.1%
17	Educational Services	6	45.17%	55.64%	**1.45**	1.0%
18	Accommodation and Food Services	6	54.22%	51.57%	**1.54**	1.0%
19	Utilities	3	75.84%	55.88%	**1.76**	0.5%
20	Mining	7	86.42%	83.59%	**1.86**	1.2%
21	Public Administration	6	99.03%	105.74%	**1.99**	1.0%
22	**Total / Overall RMA Medians/Averages**	**594**	**27.69%**	**33.15%**	**1.28**	

Source: Risk Management Associates 2014-2015 Annual Statement Studies, Mercer analysis
Note: Excludes 32 NAICS Codes for which data not available or factors reflect outliers

Further, I've been asked what should be done if a private company uses accelerated depreciation methods. It might make sense to normalize depreciation in a particular situation, just like appraisers make other normalizing adjustments to the income statement.

The point of the questions is that analysis and judgment are always appropriate, but this analysis is readily performable for any company. It should be less controversial than analysis and judgments made by appraisers regarding other components of the WACC buildup.

