What Does an EV/EBITDA Multiple Mean?

Valuing companies is a big part of what we do. Whether debt or equity, public or private, we need to understand value to assess if a price presents an opportunity to create alpha.

There is a rich literature on valuation, which is straightforward in theory but often challenging in practice. A business is worth the present value of future free cash flows, but forecasting the magnitude, timing, and riskiness of cash flow streams is inherently difficult. As a result, most investors rely on shorthands for the valuation process.

The EV/EBITDA multiple is among the most popular techniques to value businesses. Applied properly, EV/EBITDA can be a very helpful tool. But a naive use of EV/EBITDA leads to valuation mistakes.

We find that investors commonly employ EV/EBITDA without being fully aware of the underlying economic assumptions the multiple implies.

The spread between return on invested capital and the cost of capital, along with earnings growth, are the primary determinants of a warranted EV/EBITDA multiple. We seek to apply multiples intelligently, rigorously, and consistently.

In this report, Michael's treatment of EV/EBITDA goes from theory to practice to empirical evidence. As always, we would be pleased to discuss specific examples of how we apply these principles.

Andrew Feldstein
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What Does an EV/EBITDA Multiple Mean?

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This report is about the EV/EBITDA multiple, or enterprise value divided by earnings before interest, taxes, depreciation, and amortization. It is a widely used and misused approach to valuation. We put EV/EBITDA in historical context, define terms, and describe some of the limitations of using the multiple. We then show how to relate EV/EBITDA multiples to sound theory. We continue by sharing empirical findings to demonstrate that the market reflects the economic drivers of value and showing how multiples of EV/EBITDA and price-to-earnings relate to one another. We finish with specific recommendations for how to use EV/EBITDA multiples as effectively as possible.

Here is the bottom line: A naive use of EV/EBITDA leads to valuation mistakes. The warranted multiple is predominantly a function of value creation, growth, and risk. Companies with multiples above the warranted level underperform those with multiples below their warranted level.[1] Thoughtful investors take the time to understand the assumptions that are embedded in the multiples they use.

A Brief History of Valuation and the Emergence of EBITDA

Equity valuation techniques have evolved over time. One hundred years ago, investors valued stocks on metrics such as dividend yield, the price-to-earnings multiple, and the price-to-book value multiple.[2] For example, Benjamin Graham and David Dodd's classic text from 1934, *Security Analysis*, suggests that the dividend rate and record, earning power, and asset value are the basis for common stock valuation.[3] In 1938, John Burr Williams formalized the dividend discount model in *The Theory of Investment Value*.[4] Myron Gordon's growth model, described in 1959, showed how to capitalize dividend growth.[5] The

emphasis on dividends was well placed, as the yields on stocks remained consistently above those of investment-grade bonds until 1958. That stocks came to yield less than bonds appeared heretical to market veterans of the day, who noted that stocks are riskier than bonds and hence should yield more. But dividend yields remained below bond yields until a crisis hit the financial markets 50 years later.[6]

"Dividend Policy, Growth, and the Valuation of Shares," a paper published in 1961 by the finance professors Merton Miller and Franco Modigliani, ushered in the modern era of valuation.[7] They asked a fundamental question: What does the equity market discount? They considered four possibilities, including cash flow, current earnings

plus future opportunities to create value, the stream of dividends, and the stream of earnings. Their conclusion was a surprise. Considered correctly, these all collapse into the same model. The value of a stock is the present value of future free cash flows. This is what you learned if you studied finance in school.

But there has always been a gap between theory and practice. The main reason is that the discounted cash flow (DCF) model, while analytically sound, demands a number of judgments. The model's output varies greatly based on the inputs. There are ways to deal with this challenge, but most practitioners avoid a DCF model altogether and instead use shorthands in the form of multiples.[8] It is crucial to acknowledge that multiples are not valuation but rather a summary of the valuation process. This distinction is a point of emphasis throughout this report.

A recent survey found that the two most popular multiples are price-to-earnings (P/E) and EV/EBITDA. The survey of nearly 2,000 investors found 93 percent of them use multiples, with 88 percent applying P/E and 77 percent EV/EBITDA.[9]

The trend toward EV/EBITDA is not limited to investors. Researchers analyzed tens of thousands of annual reports and earnings releases for companies in the S&P 1500 for the decade ended 2016 and found that roughly 15 percent of them highlight EBITDA. Companies that emphasize EBITDA are on average smaller, more leveraged, more capital intensive, and less profitable than their peers.[10] The use of EBITDA is most popular in the entertainment, healthcare, telecommunications, and publishing industries.[11]

Investors have used P/E multiples for a long time, but EV/EBITDA is a relatively recent valuation proxy. Will Thorndike, an investor and the author of *The Outsiders*, credits John Malone with introducing the term EBITDA.[12] Malone is a media mogul who made his fortune with investments in Tele-Communications, Inc. and Liberty Media Corporation, among other companies. Malone joined Tele-Communications, Inc. in 1973. Exhibit 1 shows the popularity of earnings per share and EBITDA in books that Google scans. References to earnings have been roughly stable for the last 40 years, but EBITDA has trended up steadily since it burst onto the valuation scene in the late 1980s.

Early enthusiasts cited three reasons to use EBITDA rather than a more traditional metric. First, it is

Exhibit 1: References to "EBITDA" and "Earnings Per Share" in Books, 1960-2008
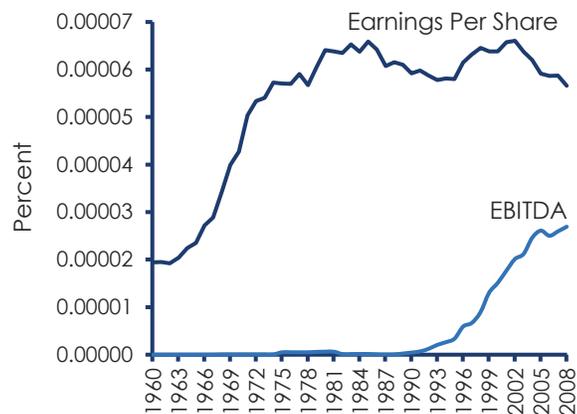
Source: Google Ngram.

a broad measure of cash flow and indicates the capacity to invest and service debt. Second, it can be relevant for companies losing money because EBITDA is often positive even when earnings are negative. Finally, EBITDA appears more applicable for companies that seek to minimize taxes by adding debt, as interest expense is tax deductible.[13]

Partly reflecting these reasons, EV/EBITDA became the main metric investors used to evaluate leveraged buyouts in the 1980s and it remains the primary way to value private equity deals.

Most analysts who work for investment banks early in their careers learn to rely predominantly on EV/EBITDA for valuation. They commonly move on to positions at private equity firms or hedge funds, bringing their valuation practices with them.[14] As alternative asset classes have grown relative to more traditional ones, so too has the application of EBITDA.

EBITDA multiples even appear frequently in the work of analysts who use a DCF model. Most DCF models have an explicit forecast period and a residual, or terminal, value to reflect the cash flows beyond the explicit period. The vast majority of private equity firms, for example, model explicit cash flows for five years and many use EBITDA multiples to estimate the terminal value.[15]

Since the terminal value can make up 70 percent or more of the enterprise value, the explicit cash flows are mostly just the path to the main event—the decision of what multiple to apply to the last year of cash flow.[16] There are effective methods to deal with this analytical challenge as well, but few investors use them.[17]

Definitions of Terms

Before proceeding, let's take a moment to define terms. Enterprise value is the value of the core operations less nonoperating assets, such as excess cash and nonconsolidated subsidiaries. Enterprise value is also equal to short- and long-term debt, debt equivalents, and other claims (e.g., restricted stock units), less excess cash and nonoperating assets, plus equity value.

EBITDA is operating profit (earnings before interest and taxes, or EBIT) plus depreciation and amortization expenses (DA). EBITDA does not reflect interest expense, taxes, or investments required to maintain or grow the business, including changes in net working capital, capital expenditures, and acquisitions. Because EBITDA can be distributed to all claimholders, it is appropriate to compare it to enterprise value.

EBITDA is not subject to generally accepted accounting principles (GAAP), but the straight calculation is based on figures that do adhere to GAAP. That EBITDA is a non-GAAP sum creates a great deal of flexibility and encourages companies to take some liberty in how they define the term. The most common of these is adjusted EBITDA, which removes non-recurring items such as restructuring charges and impairment costs and adds items such as acquisition synergies and other anticipated cost savings. For example, companies acquired by private equity firms that issued debt made adjustments that increased their EBITDA by an average of 13.7 percent in 2017, up from 9.6 percent in 2016. The industries with the largest adjustments include healthcare, gaming, and technology.[18]

Jason Zweig, a journalist at the *Wall Street Journal*, ticks off some of the other flavors he has seen: EBITDAC, EBITDAO, EBITDAP, EBITDAR, EBITDARE, EBITDAS or EBITDASC, EBITDAX, and "community-adjusted EBITDA," which, he reports, excludes such basic costs of doing business as marketing, development, and administrative expenses.[19]

Limitations of EBITDA

There is evidence that the EV/EBITDA multiple can be helpful for investors. For example, the EV/EBITDA multiple is a useful quantitative factor and explains market valuations and predicts stock returns better than operating profit does.[20]

But deep skepticism remains about its utility, especially in the value investing community, because of what it fails to reflect. For example, Warren Buffett, chairman and chief executive officer of Berkshire Hathaway, had this to say about EBITDA at Berkshire's annual shareholder meeting in 2003:[21]

> Any management that doesn't regard depreciation as an expense is living in a dream world. But of course, they are encouraged to do that by investment bankers who talk to them about EBITDA. And certain people have built fortunes on misleading investors by convincing them that EBITDA was a big deal.

> I get these people that want to send me books with EBITDA in it. And I just tell 'em, "I'll look at that figure when you tell me you'll make all of the future capital expenditures for me."

Berkshire Hathaway's vice chairman, Charlie Munger, added a more colorful quip:

> I think you'd understand any presentation using the word "EBITDA" if every time you saw that word, you just substituted the phrase "bullshit earnings."

Seth Klarman, the founder, chief executive, and portfolio manager of the very successful value investing firm The Baupost Group, shares a similar sentiment in his book *Margin of Safety*:[22]

> It is not clear why investors suddenly came to accept EBITDA as a measure of corporate cash flow. EBIT did not accurately measure the cash flow from a company's ongoing income stream. Adding back 100 percent of depreciation and amortization to arrive at EBITDA rendered it even less meaningful. Those who used EBITDA as a cash-flow proxy, for example, either ignored capital expenditures or assumed that businesses would not make any, perhaps believing that plant and equipment do not wear out.

There are at least three pitfalls to using EV/EBITDA. The first is that there is not a proper reckoning for the investment needs of the business, the concern that Buffett and Klarman express. Exhibit 2 shows the adjustments necessary to go from EBITDA to unlevered free cash flow. Both EBITDA and unlevered free cash flow are financing neutral, which means their values are impervious to the company's capital structure. You can compare both figures to enterprise value because they exclude explicit financing costs, although EBITDA does not consider investment needs and taxes while free cash flow does.

The potential danger in using EBITDA is that it understates the capital intensity of the business. As a consequence, EBITDA overstates the amount of cash a company can distribute while running the operations appropriately. While there is a well-placed focus on capital expenditures and depreciation, working capital changes and acquisitions can also be vital.

The second pitfall is that multiples, including EV/EBITDA, do not explicitly reflect risk. We are interested here in business risk. Operating leverage, the percentage change in operating profit as a function of the percentage change in sales, is a suitable measure of business risk. For instance, the operating profit of a business with high operating leverage is very sensitive to changes in sales, whereas sales changes have a more muted effect on the operating profit for a business with low operating leverage.

The final problem has to do with taxes. Two companies with the same EBITDA and capital structures may pay taxes at dissimilar rates. As a result, the EV/EBITDA multiples will be justifiably different. Essentially, the shortcomings of EBITDA reflect the items that reconcile EBITDA to free cash flow in exhibit 2.

Exhibit 2: From EBITDA to Unlevered Free Cash Flow

EBITDA
(Earnings before interest, taxes, depreciation, and amortization)
　　　Relates to enterprise value

− **Depreciation**

= **EBITA**
(Earnings before interest, taxes, and amortization)

− **Cash taxes**

= **NOPAT**
(Net operating profit after taxes)

− **Investments**

　• Change in net working capital

　• Capital expenditures – depreciation
　　　Capital intensity

　• Acquisitions – divestitures

= **Unlevered free cash flow**　　　Relates to enterprise value

Source: BlueMountain Capital Management.

From Theory to Practice–Part I

In their pathbreaking paper on valuation, Miller and Modigliani provide a formula that is core to understanding value. They say:

The value of the firm = steady-state value + future value creation

Over the last 60 years, roughly two-thirds of the value of the S&P 500 price was attributable to steady-state value and the other one-third to future value creation. Both pieces are important.[23] Appendix A discusses how to model businesses with declining cash flows.

Here's an intuitive way to think about it.[24] Say you owned 10 mature and profitable restaurants. Assuming the current profits persist for the foreseeable future, those restaurants are the foundation for the steady-state value. Now consider the possibility of opening new restaurants that are worth more than they cost to build. That is future value creation.

The important point is that future value creation is based on three elements: finding projects that generate a positive spread between the return on invested capital (ROIC) and the weighted average cost of capital (WACC), how much you can invest in those projects, and how long you can find those projects in a competitive world.

Note that the latter elements, how much and how long, only create value if there is a positive spread between ROIC and WACC. If the spread is zero, the second term on the right side of the equation collapses to zero. Indeed, the second term can be negative if the investments fail to earn the cost of capital.

This illuminates the critical lesson that you have to start with the spread between ROIC and WACC. Calculating ROIC and WACC correctly is a prerequisite to doing this analysis appropriately. Growth creates a lot of value only when the spread is positive and large, has no effect when the spread is zero, and destroys value when the spread is negative. Too many executives and investors focus on growth without recognizing the need for a positive spread in order to create value.

We will apply these principles to EV/EBITDA multiples in a moment, but we can start with a simpler example to make the concepts concrete. The body of exhibit 3 is populated with the

Exhibit 3: Warranted P/E Multiple for Various Assumptions about ROIC and Growth

	Return on Invested Capital			
	4.0%	8.0%	16.0%	24.0%
4.0%	7.1x	12.5x	15.2x	16.1x
6.0%	3.3	12.5	17.1	18.6
8.0%	NM	12.5	19.4	21.8
10.0%	NM	12.5	22.4	25.7

(Left axis: **Earnings Growth**)

Source: BlueMountain Capital Management.
Note: Assume all equity financed; 8% cost of capital; 15-year forecast period.

theoretical P/E's that are the result of various assumptions about return on invested capital, which you see across the top, and earnings growth rates, which you see down the left side.[25] For simplicity, we have assumed an all-equity financed business and a cost of capital of 8 percent, but as we will see shortly these specific assumptions are not critical to the general conclusions we can draw.

Three points are clear upon examination of the P/E's. The first is if a company earns exactly its cost of capital—eight percent in this case—growth doesn't matter. The company is on an economic treadmill, so speeding up or slowing down doesn't matter. The second term on the right side of the Miller and Modigliani equation collapses to zero, and all we can count on is the steady-state value.

When returns are above the cost of capital, growth becomes extremely valuable. For example, when the ROIC is 24 percent, going from 6 to 10 percent growth lifts the warranted P/E ratio from 19 to 26. Companies with a high ROIC are very sensitive to changes in expected growth rates.

If a company is investing at a rate below the cost of capital, growth is bad. The faster it grows, the more wealth it destroys. You see this when a company announces an acquisition that adds to earnings per share but reduces market capitalization. The market renders its judgment on the deal's economic value.

Our task now is to translate these core principles into EV/EBITDA multiples.

From Theory to Practice–Part II

In order to go from theory to the relevant EV/EBITDA multiples, we need to discuss three interrelated topics: capital intensity, return on invested capital, and leverage.

Let's start with capital intensity. At the core of Buffett's and Klarman's concerns is the fact that EBITDA fails to acknowledge a business's capital needs. We can address this topic empirically through a detailed study of the capital allocation practices of the top 1,500 industrial companies in the U.S. over the last 40 years.[26]

There are three major forms of investment that show up on the balance sheet: changes in net working capital, capital expenditures minus depreciation, and acquisitions minus divestitures.

Overall, net working capital does not demand a lot of investment. Net working capital, excluding cash, has averaged roughly $220 billion for the top 1,500 industrial companies in the U.S. since 1980. That said, working capital needs vary a great deal by sector.

It is useful to analyze a company's cash conversion cycle (CCC), a calculation of how long it takes a company to collect on the sale of inventory. The CCC equals days in sales outstanding (DSO) plus days in inventory outstanding (DIO) less days in payables outstanding (DPO). Good working capital management is associated with high returns on invested capital.

Capital expenditures are a significant investment over time, second only to acquisitions in total dollars spent. Analysts commonly use depreciation as a proxy for maintenance capital expenditures and fail to consider the investment necessary to support value-creating growth. Capital expenditures have averaged about 1.5 times depreciation for the top 1,500 industrial companies in the U.S. over the past 4 decades.

Acquisitions are by far the largest source of investment. Here's a common analytical mistake: Investors extrapolate a historical EBITDA growth rate that is in part the result of acquisitions but don't consider appropriate investments in their forecasts. As a result, they underestimate the capital required to achieve that growth. For most companies, it is proper to forecast organic growth only and to assume that acquisitions are likely to have little impact on shareholder value.

The global economy continues to shift from tangible to intangible assets.[27] Companies generally expense investments in intangible assets, including brands and acquired customers, which is reflected in EBIT. But when an acquirer buys a target, it must reflect tangible and intangible assets, as well as goodwill, on its balance sheet. The acquirer must then amortize the intangible assets. As a result, the mix of "DA" in EBITDA has been shifting from depreciation to amortization.[28] Exhibit 4 shows that amortization was one-half of 1 percent of depreciation and amortization in 1980 and is now about 22 percent.

The pattern in exhibit 4 reflects two major revisions in accounting standards for business combinations. The first, implemented in 2002, eliminated a method called "pooling of interests," which allowed companies to simply combine their balance sheets and, as a result, sidestep the need to reflect intangible assets on the balance sheet.

The accounting rule also ended the amortization of goodwill for those companies using the purchase method. The purchase method required the buyer to record the difference between the seller's market value and book value as goodwill on its balance sheet. This goodwill was then amortized for up to 40 years. The implementation of the standard led to a sharp drop in amortization that you see in the middle of the exhibit.

Exhibit 4: Amortization As a Percentage of Depreciation and Amortization
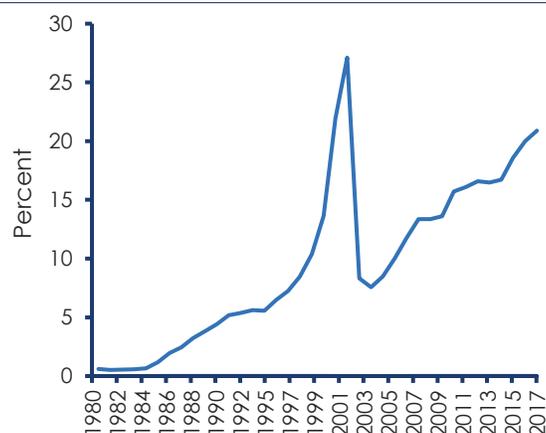
Source: Credit Suisse HOLT and Bloomberg.
Note: Top 1,500 U.S. industrial companies.

The second revision, introduced in 2007, changed acquisition accounting and served to increase the amount of intangible assets relative to goodwill. The sharp rise in amortization is a consequence of these accounting changes, rising investment in intangible assets, and a robust market for mergers and acquisitions.

The amount of depreciation and amortization a company recognizes is a function of its capital intensity, the asset lives it assumes, and its acquisitiveness. One useful measure of capital intensity is the relationship between EBIT and DA. EBIT is a higher percentage of EBITDA for capital-light businesses than for capital-intensive businesses.

Exhibit 5 shows the contributions of EBIT and DA to total EBITDA by sector, as well as the EBITDA Depreciation Factor, defined as EBITDA/EBIT.[29] The universe is the Russell 3000 excluding companies in the financial services and real estate sectors.

The top panel shows the median values and the bottom panel shows the aggregate values. Appendix B shows the same analysis by industry.

For some sectors, including consumer staples and information technology, EBIT is about three-quarters of EBITDA. For other sectors, such as telecommunication services and energy, DA is the larger component of EBITDA. Use of EBITDA creates a risk of understating capital intensity for companies with high EBITDA Depreciation Factors.

The second topic that provides a bridge from theory to practice is the significance of ROIC. The critical concept is return on incremental invested capital (ROIIC). ROIIC compares the change in NOPAT in a given year to the investments made in the prior year. For example, if a company's NOPAT increases $200 this year and it invested $1,000 last year, the ROIIC is 20 percent ($200/$1,000).[30]

Exhibit 5: Contributions of EBIT and DA to Total EBITDA by Sector

Using Medians Sector	Percentage of EBITDA		EBITDA Depreciation Factor
	EBIT	**DA**	
Consumer Staples	79	21	1.27
Health Care	74	26	1.35
Industrials	71	29	1.40
Consumer Discretionary	70	30	1.42
Materials	67	33	1.49
Information Technology	66	34	1.52
Utilities	61	39	1.63
Telecommunication Services	42	58	2.38
Energy	41	59	2.42
Universe	**67**	**33**	**1.49**

Using Aggregates Sector	Percentage of EBITDA		EBITDA Depreciation Factor
	EBIT	**DA**	
Consumer Staples	77	23	1.30
Information Technology	74	26	1.35
Industrials	69	31	1.45
Health Care	67	33	1.49
Consumer Discretionary	65	35	1.54
Materials	63	37	1.59
Utilities	55	45	1.81
Telecommunication Services	45	55	2.20
Energy	21	79	4.80
Universe	**63**	**37**	**1.59**

Source: Bloomberg.
Note: Data for calendar year 2017; Russell 3000 as of May 31, 2018 excluding financial services and real estate sectors and companies with negative EBIT.

When ROIIC is high, a company can achieve its growth targets while investing a modest amount. High ROIIC businesses are more valuable than low ROIIC businesses because they need to invest less for a given rate of growth. Less spending on investment means more money for investors.

As a result of this, we should expect that industries with low EBITDA Depreciation Factors have higher ROICs than industries with high EBITDA Depreciation Factors. Exhibit 6 shows that this relationship generally holds true. This aligns with your intuition as a businessperson that it is very difficult to generate high ROICs in capital intensive industries.

The final topic is leverage. In paper published in 1958, Franco Modigliani and Merton Miller showed that the value of a firm is independent of its capital structure.[31] But the invariance principle does not hold if different capital structures give rise to different tax liabilities. In plain terms, greater debt means that more of a company's cash flows go to its claimholders and less go to the government.

The standard way to reflect the value of income shielded by interest expense is in the cost of capital. For our discussion, the central point is that leverage affects the WACC and not the ROIC.

Exhibit 6: Relationship between EBITDA Depreciation Factor and ROIC
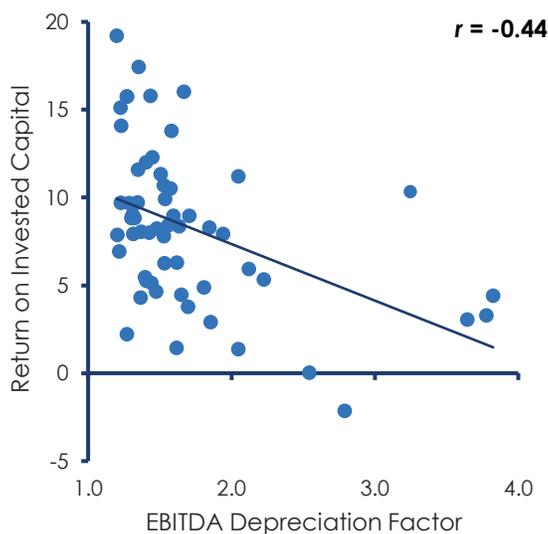
Source: Bloomberg.
Note: Aggregated data for industries; calendar year 2017; universe is Russell 3000 as of May 31, 2018 excluding financial services and real estate sectors and companies with negative EBIT.

The pecking order theory of capital structure says that companies access capital first through internally generated cash, next by raising debt, and finally by raising equity.[32] Capital intensive industries tend to use more debt financing than capital light industries because they cannot fund their growth solely through internally generated cash.

But the relationship between capital structure and ROIC is a little more complicated because high ROIC businesses can increase leverage, for example by doing a leveraged buyout, but low-ROIC businesses cannot readily delever. Businesses with high EBITDA Depreciation Factors tend to have more debt than those with low factors, but the correlation is not as strong as it is for ROIC.

We are now ready for the payoff, exhibit 7, which shows the warranted EV/EBITDA multiples assuming EBITDA Depreciation Factors of 1.2, 1.5, and 1.8. In each case, we have held the debt-to-total capital ratio constant at 20 percent and the cost of capital at 7.2 percent.[33] A couple observations are in order.

At first blush, it may not be obvious why companies with the same growth, ROIIC, and cost of capital would have different EV/EBITDA multiples, even considering the range of EBITDA Depreciation Factors. Indeed, the corporate values are the same for the matching set of assumptions. Here's the way to think about it. "Earnings" on the vertical axis is net operating profit after tax (NOPAT), a term we saw in exhibit 2. Companies with low EBITDA Depreciation Factors don't need to generate as much EBITDA as companies with high EBITDA Depreciation Factors to deliver the same amount of NOPAT.

Here's an example. Assuming a 25 percent tax rate, a company has to have EBIT of $133.3 to generate $100 in NOPAT whether its EBITDA Depreciation Factor is low or high. For a company with a 1.2 factor, depreciation and amortization is $26.7, which means that EBITDA is $160 ($160/$133.3 = 1.2). For a company with a 1.8 factor, depreciation and amortization is $133.3, which means that EBITDA is $240 ($240/$133.3 = 1.8). If you assume that incremental returns are equal to the cost of capital for both, their value is $1,389 ($100/7.2%). The low factor company is worth 8.7 times current EBITDA and the high factor company is worth 5.8 times.

Companies with low EBITDA Depreciation Factors get higher multiples than companies with high EBITDA Depreciation Factors holding other value drivers equal.

Second, the core concepts from exhibit 3 apply in exhibit 7 as well. Growth doesn't matter if your ROIIC is equal to the cost of capital, and growth amplifies the good when returns are attractive and amplifies the bad when they are unattractive. Companies that focus solely on EBITDA growth without taking into consideration return on incremental invested capital are headed for trouble.[34]

Exhibit 7: Relationship between EBITDA Depreciation Factor and ROIC

Depreciation factor = 1.2 (EBIT to EBITDA=83.3%)

Earnings Growth	Return on Invested Capital				
	4.0%	7.2%	8.0%	16.0%	24.0%
4.0%	5.5x	8.7x	9.1x	10.9x	11.5x
6.0%	3.3	8.7	9.4	12.4	13.4
8.0%	0.5	8.7	9.7	14.3	15.8
10.0%	NM	8.7	10.1	16.7	18.9

Depreciation factor = 1.5 (EBIT to EBITDA=66.7%)

Earnings Growth	Return on Invested Capital				
	4.0%	7.2%	8.0%	16.0%	24.0%
4.0%	4.4x	6.9x	7.3x	8.7x	9.2x
6.0%	2.6	6.9	7.5	9.9	10.7
8.0%	0.4	6.9	7.8	11.5	12.7
10.0%	NM	6.9	8.1	13.4	15.1

Depreciation factor = 1.8 (EBIT to EBITDA=55.6%)

Earnings Growth	Return on Invested Capital				
	4.0%	7.2%	8.0%	16.0%	24.0%
4.0%	3.7x	5.8x	6.1x	7.2x	7.6x
6.0%	2.2	5.8	6.2	8.3	8.9
8.0%	0.3	5.8	6.5	9.5	10.6
10.0%	NM	5.8	6.8	11.2	12.6

Source: BlueMountain Capital Management.
Note: Assumes a 20 percent debt-to-total capitalization ratio and a 15-year forecast period.

Empirical Results

Theory is great, but it is also nice to know the core findings are corroborated by the stock market. Exhibit 8 places the universe of the top 1,500 industrial companies in the U.S. on a graph, with expected return on capital minus the cost of capital on the horizontal axis and expected EBITDA growth on the vertical axis. We then segregate the population into four quadrants. The upper right corner is high ROIC and fast growth; the bottom right corner is high ROIC and slow growth; the upper left corner is low ROIC and fast growth; and the bottom left corner is low ROIC and slow growth.

Our results are consistent with what the matrices of warranted multiples suggest. The high ROIC and fast growing companies have the highest median EV/EBITDA multiples at 13.3 times, followed by high ROIC slow growth at 11.4 times. Fittingly, the market assigns the low ROIC, fast growth quadrant a multiple of 8.7 times, and the low ROIC, slow growth quadrant the lowest multiple at 8.4 times.

Exhibit 8: The Market Gets It: ROIC, Growth, and EV/EBITDA Multiples
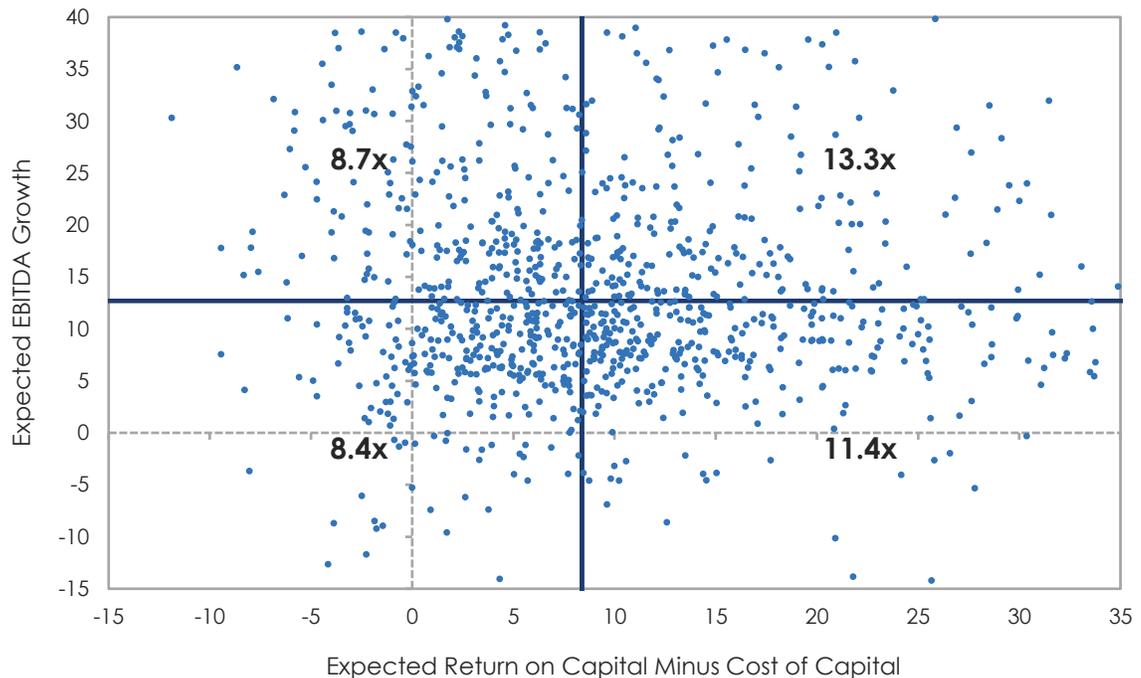
Source: Based on Credit Suisse Corporate Insights, "Managing the multiple: Weighing growth against profitability," First Quarter 2016.
Notes: As of July 29, 2018; top 1,500 U.S. industrial companies excluding those with negative EBITDA; scales are truncated for visual purposes; EBITDA growth is the consensus estimate for annualized EBITDA growth over the next three fiscal years; EV/EBITDA is the ratio of the current enterprise value to the consensus estimate for EBITDA in calendar year 2019; expected return on capital spread is Credit Suisse HOLT's cash flow return on investment (CFROI) minus discount rate for the next fiscal year.

P/E versus EV/EBITDA

We saw that P/E and EV/EBITDA are two of the most popular valuation heuristics. Exhibit 9 shows that the correlation between the multiples is high ($r = .79$) for a large sample of companies. But there are instances when two companies have the same EV/EBITDA multiple and very different P/E multiples, or the same P/E multiple and very different EV/EBITDA multiples. Analysts who use one multiple versus the other or, more perniciously, select the multiple that makes their investment case risk coming to a faulty conclusion.

The core drivers of all multiples are incremental ROIC and growth. Two companies with the same prospects for ROIC and growth can have different relationships between P/E and EV/EBITDA because of dissimilar capital structures, different tax rates, and reckoning for unconsolidated businesses.

Exhibit 9: Correlation between EV/EBITDA and P/E
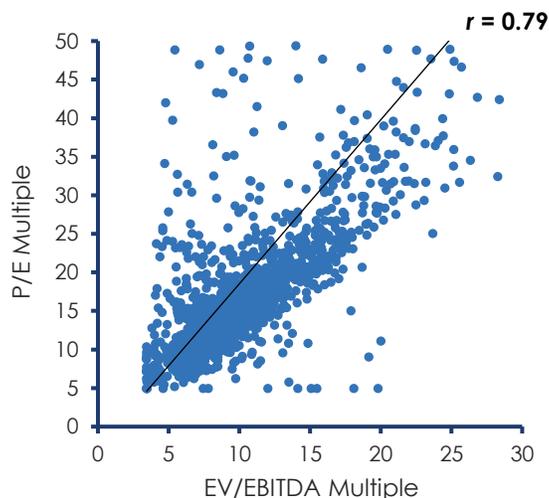
Source: Bloomberg.
Note: Top 1,500 U.S. industrial companies excluding those with negative EBITDA; as of August 1, 2018; winsorized at 1st and 99th percentiles; scales are truncated for visual purposes; the EV/EBITDA and P/E ratios are based on consensus estimates for calendar year 2019.

Assumed asset life is an example of an accounting choice that can affect multiples. Imagine two competitors have to spend $1,000 for a machine that is vital to their operations. The first company assumes the machine will have an 8-year asset life and uses straight-line depreciation, creating an annual depreciation expense of $125. The second company assumes a 10-year asset life, generating an annual expense of $100. The earnings of the second company will be higher than those of the first even as the EBITDA is identical.

A company's capital structure can also affect the P/E multiple. Consider the simple case of a debt-financed share buyback program, which serves to increase leverage by replacing equity with debt in the capital structure. The earnings per share impact of the buyback is a function of the P/E multiple and the after-tax cost of new debt. When the inverse of the P/E, E/P, is higher than the after-tax interest expense, a buyback adds to earnings per share. Assuming no change in price, this lowers the P/E. Note that a buyback's impact on earnings per share, whether it adds to or detracts from the bottom line, is independent of whether it adds to or detracts from value.

Two companies with matching ROIC and growth prospects, accounting policies, and capital structures may still have different multiples as the result of a higher or lower tax rate. (Tax rates are also relevant for ROIC, but the effect goes beyond that.) Lower tax rates increase enterprise value and earnings but have no effect on EBITDA.

Finally, some companies have unconsolidated businesses or cross holdings that may factor into a calculation of enterprise value but can distort earnings or EBITDA. When comparing the multiples of companies, make sure you are looking at the operations on a consistent basis.

Recommendations for Action

Within an investment firm, you might hear someone say, "This is an 8 times EBITDA business," or, "The comparable companies trade at 10 times EBITDA." Not a lot of thought is given to what these multiples imply about future financial performance and how the multiples may misspecify the nature of the investment. Investing in credit or equity demands a thorough analysis of cash flows and an understanding of what those cash flows imply about value.

Truth be told, most analysts use a multiple to assign a price to a company. Aswath Damodaran, a professor of finance at the Stern School of Business at New York University and a leading expert in valuation, offers the following:

> There's nothing wrong with pricing. But it's not valuation. Valuation is about digging through a business, understanding the business, understanding its cash flows, growth, and risk, and then trying to attach a number to a business based on its value as a business. Most people don't do that. It's not their job. They price companies. So the biggest mistake in valuation is mistaking pricing for valuation.[35]

Based on this discussion, here are five ideas to bear in mind:

- Evidence shows that buying a stock at a premium to its warranted multiple leads to poor excess returns and buying at a discount leads to attractive excess returns.[36] For example, Dan Rasmussen, founder and portfolio manager of Verdad Advisers, highlights analysis that suggests more than one-half of private equity deals done at an EV/EBITDA

multiple of 10 times or higher lost money, and that for every dollar put into these deals investors got only a tad more than a dollar out.[37] There is nothing magical about 10 times. The essential point is businesses have different warranted multiples that are important to understand as you buy and sell their securities.

- Use of various valuation approaches can guide you toward a central tendency of value. Research in the forecasting literature shows that combining forecasts derived from different methods can reduce error and yield more accurate predictions.[38]

- You don't want your embedded assumptions to be unmoored from the fundamental drivers of value. Before applying an EV/EBITDA multiple, be sure to consider the key drivers of value.[39] While simple, the matrices in exhibit 7 can serve as a sanity check for your valuation work.

- The vocal critics of EBITDA may be overstating their case, but the risk of underestimating the capital required to grow is real. Make sure you consider carefully what capital needs a company truly has to make sure that cash flow projections are not illusory.

- If you use EBITDA as the terminal value in a discounted cash flow model, use the average multiple over a cycle. You may introduce a substantial error if you rely on end-of-period economic assumptions.[40]

Appendix A: Modeling Declining Industries

Not all companies can maintain their current levels of net operating profit after tax.[41] For example, DVD, game, and video rental businesses and wired telecommunications carriers face secular decline. In these instances, we need to modify the steady-state value with a variation of the Gordon growth model:

Modified steady-state value = $\dfrac{\text{Net operating profit after tax } (1 + \text{growth})}{\text{Cost of capital - growth}}$

Take as an example a company that has $1,000 in NOPAT and an 8 percent cost of capital. The steady-state value is $12,500 ($1,000/.08). Let's now assume that the company's profit will decline 10 percent per year in perpetuity.

We add a negative value for growth in the numerator, which reduces NOPAT. We also subtract a negative in the denominator, which increases the discount rate. We calculate the value as follows:

Modified steady-state value = $\dfrac{\$1,000 \ (1 + -.10)}{.08 - -.10} = \dfrac{\$1,000(.90)}{0.18} = \dfrac{\$900}{0.18} = \$5,000$

Assuming this rate of decline is accurate and the market prices it properly, the steady-state multiple is 5.0 times ($5,000/$1,000).

Exhibit 10: Contributions of EBIT and DA to Total EBITDA for the Most Recent Year

Using Medians Industry	Percentage of EBITDA		EBITDA Depreciation Factor
	EBIT	DA	
Tobacco	93	7	1.08
Household Durables	90	10	1.11
Biotechnology	89	11	1.13
Personal Products	86	14	1.16
Household Products	82	18	1.22
Distributors	82	18	1.23
Industrial Conglomerates	80	20	1.25
Leisure Products	80	20	1.26
Food Products	79	21	1.26
Beverages	79	21	1.26
Textiles, Apparel & Luxury Goods	78	22	1.28
Aerospace & Defense	77	23	1.30
Pharmaceuticals	77	23	1.30
Professional Services	77	23	1.30
Communications Equipment	77	23	1.31
Electrical Equipment	76	24	1.31
Health Care Providers & Services	75	25	1.33
Building Products	75	25	1.33
Automobiles	74	26	1.34
Airlines	73	27	1.37
Machinery	72	28	1.38
Specialty Retail	71	29	1.41
Water Utilities	71	29	1.42
Health Care Equipment & Supplies	70	30	1.42
Semiconductors & Semiconductor Equipment	70	30	1.42
Chemicals	69	31	1.44
Diversified Consumer Services	69	31	1.45
Life Sciences Tools & Services	69	31	1.45
Electronic Equipment, Instruments & Components	68	32	1.46
Construction & Engineering	67	33	1.48
Auto Components	67	33	1.48
Gas Utilities	67	33	1.49
Commercial Services & Supplies	65	35	1.53
Media	65	35	1.55
Multiline Retail	64	36	1.56
Hotels, Restaurants & Leisure	64	36	1.56
Paper & Forest Products	63	37	1.58
IT Services	63	37	1.59
Food & Staples Retailing	62	38	1.60
Software	62	38	1.61
Internet Software & Services	62	38	1.62
Air Freight & Logistics	61	39	1.64
Containers & Packaging	61	39	1.65
Multi-Utilities	60	40	1.65
Electric Utilities	60	40	1.67
Construction Materials	59	41	1.68
Technology Hardware, Storage & Peripherals	57	43	1.74
Internet & Direct Marketing Retail	57	43	1.75
Metals & Mining	56	44	1.77
Trading Companies & Distributors	53	47	1.87
Transportation Infrastructure	51	49	1.94
Road & Rail	49	51	2.03
Marine	45	55	2.21
Energy Equipment & Services	42	58	2.37
Diversified Telecommunication Services	42	58	2.38
Oil, Gas & Consumable Fuels	41	59	2.42
Health Care Technology	39	61	2.57
Wireless Telecommunication Services	35	65	2.90
Independent Power and Renewable Electricity Producers	32	68	3.16
Universe	**67**	**33**	**1.49**

| Using Aggregates | Percentage of EBITDA | | EBITDA |
Industry	EBIT	DA	Depreciation Factor
Household Products	83	17	1.20
Household Durables	83	17	1.20
Beverages	82	18	1.22
Technology Hardware, Storage & Peripherals	82	18	1.23
Distributors	81	19	1.23
Aerospace & Defense	81	19	1.23
Biotechnology	79	21	1.27
Specialty Retail	79	21	1.27
Specialty Retail	79	21	1.27
Internet Software & Services	78	22	1.29
Food Products	77	23	1.30
Health Care Providers & Services	76	24	1.31
Building Products	76	24	1.32
Communications Equipment	76	24	1.32
Electrical Equipment	74	26	1.35
IT Services	74	26	1.35
Air Freight & Logistics	74	26	1.35
Software	73	27	1.37
Machinery	73	27	1.37
Personal Products	72	28	1.40
Hotels, Restaurants & Leisure	71	29	1.40
Textiles, Apparel & Luxury Goods	71	29	1.41
Professional Services	70	30	1.43
Airlines	70	30	1.43
Water Utilities	69	31	1.44
Auto Components	69	31	1.45
Electronic Equipment, Instruments & Components	68	32	1.47
Construction & Engineering	68	32	1.48
Media	66	34	1.51
Metals & Mining	65	35	1.53
Food & Staples Retailing	65	35	1.53
Gas Utilities	65	35	1.53
Semiconductors & Semiconductor Equipment	65	35	1.54
Chemicals	64	36	1.56
Construction Materials	63	37	1.58
Multiline Retail	63	37	1.58
Diversified Consumer Services	63	37	1.60
Leisure Products	62	38	1.62
Life Sciences Tools & Services	62	38	1.62
Trading Companies & Distributors	61	39	1.64
Health Care Equipment & Supplies	61	39	1.65
Road & Rail	60	40	1.67
Multi-Utilities	59	41	1.70
Containers & Packaging	59	41	1.71
Pharmaceuticals	55	45	1.81
Commercial Services & Supplies	54	46	1.85
Electric Utilities	54	46	1.85
Transportation Infrastructure	51	49	1.94
Industrial Conglomerates	49	51	2.05
Diversified Telecommunication Services	49	51	2.05
Health Care Technology	47	53	2.12
Paper & Forest Products	45	55	2.23
Automobiles	39	61	2.54
Independent Power and Renewable Electricity Producers	36	64	2.79
Wireless Telecommunication Services	31	69	3.25
Internet & Direct Marketing Retail	27	73	3.64
Marine	26	74	3.78
Oil, Gas & Consumable Fuels	26	74	3.82
Energy Equipment & Services	NM	NM	NM
Universe	**63**	**37**	**1.59**

Source: Bloomberg.

Note: Data for calendar year 2017; Russell 3000 as of May 31, 2018 excluding financial services and real estate sectors and companies with negative EBIT.

Endnotes

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"We need to keep investing to grow as fast as possible. Merrill Lynch says our valuation is all about EBITDA, not earnings."

EBITDA. A fancy Wall Street term for profits, with all of the financial expenses removed. It stood for "earnings before interest, taxes, depreciation, and amortization." Steady growth in EBITDA could be a sign of future strong profits, but not if it was being accomplished by manufacturing full, after-tax losses. [Ken] Lay couldn't believe what he was hearing. Was [Rebecca] Mark really arguing that the deeper into a hole she got, the better off her company would be?

"Rebecca, that doesn't make any sense," he said. "Surely you understand that if you put capital into projects with returns that are below the cost of that capital, ultimately you're going to go bankrupt."

"This is what Merrill tells me is the way things are around this industry," Mark replied. "We have to grow EBITDA. That's all that matters."

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