

Counterpoint Global Insights

The Math of Value and Growth

Growth, Return on Capital, and the Discount Rate

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Introduction

The value of a financial asset is the present value of future cash flows. If you don't believe that, please put this aside and resume your normal daily activities. If you do believe that, you recognize that you have to grapple with an assessment of the magnitude and timing of cash flows as well as the appropriate rate at which to discount them.

For a company, the relevant definition of cash flow is the money that can be returned to claimholders, including the owners of the bonds and the stock. Cash flow is the profit the business earns after paying taxes minus the investments the company makes. Investments are outlays today with the expectation of profits tomorrow that make the investments worthwhile.

The magnitude of cash flows is a function of opportunity and economics. You can think of opportunity as the total addressable market (TAM), defined as the revenue a company would realize if it had 100 percent share of a market it could serve while creating shareholder value.¹ Many investors use the concept of TAM to gauge a company's potential size.

The second part of the definition is equally important and attends to the economics. A company's objective should not be simply to grow; it should be to grow such that it creates value. A company creates value when its investments earn a return higher than the opportunity cost of capital.

You can imagine that there are some very large addressable markets with poor prospects for value creation and some small markets with excellent economic prospects. The holy grail is large markets with attractive economics.

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Naturally, opportunities that are big and lucrative attract a lot of attention from current and potential competitors. Barriers to entry are crucial. Bruce Greenwald, a renowned professor at Columbia Business School, goes so far as to say that “competitive advantages are actually barriers to entry.”² So investors have to think hard about how leading companies in large markets can sustain their positions.

Understanding the magnitude and return on investments is crucial. Investments have traditionally been in the form of tangible assets that show up on the balance sheet. Examples include increases in working capital or capital expenditures. But in recent decades investments have shifted in form to intangible assets, which are expensed on the income statement and are typically absent on the balance sheet (except for when one company acquires another).³

This is important because companies that invest heavily in intangible assets and have high returns on those investments often produce poor profits, or may even lose money. As an investor, you want that kind of company to invest as much as it can. The income statement looks bad, the balance sheet looks better, and the value creation looks great.

Contrast this to generations past when tangible investments were captured on the balance sheet. In those days, the income statement looked good but the balance sheet looked bad.

Saying this differently, two companies can have the same level of investment and return on investment but very different financial statements based on where accountants record investments. Free cash flow, the number we care about, may be the same but the path to get there is different.

There’s another important aspect about companies that make large investments today. They are telling their shareholders, “We’re going to give you little or no money today but expect to give you a lot more money in the future.” That means the cash investors can put in their pockets is both a bigger amount and further in the future.

That leads to the concept of a discount rate. The rate at which you discount future cash flows is the opportunity cost of capital. An estimate of the cost of capital is the answer to the question, “What could I reasonably expect to earn for an asset of similar risk?” Asset pricing models attempt to address this question, but the details are less important than the concept.

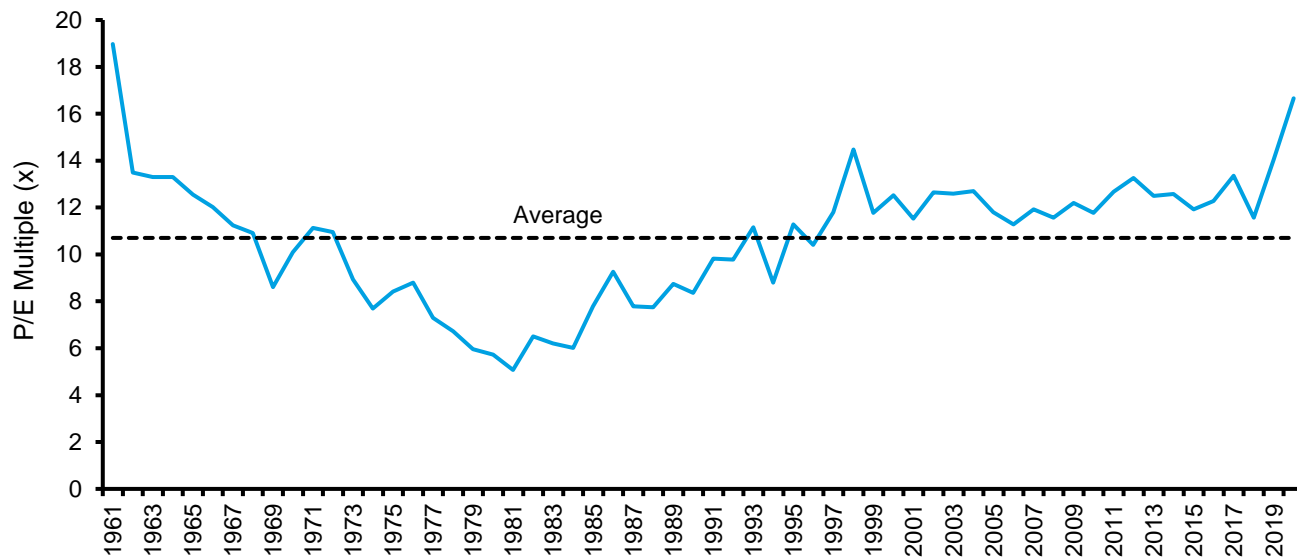
Investors generally “value” businesses using multiples. The most common are price/earnings (P/E) and enterprise value/earnings before interest, taxes, depreciation, and amortization (EV/EBITDA).⁴ Multiples are not valuation. They are a shorthand for the valuation process. Importantly, multiples obscure the value drivers that investors most care about. These include growth, return on incremental invested capital, and the discount rate. As a consequence, investors who do not think in first principles will not understand the justified changes in multiples as the result of changes in these value drivers.⁵

Let’s start with the basic example of the commodity P/E multiple. This is the multiple you should pay for \$1 of earnings into perpetuity assuming no value creation. You calculate the multiple by taking the inverse of the cost of equity capital. For example, if the cost of equity is 8 percent, the commodity P/E multiple is 12.5 ($1/0.08 = 12.5$).

The classic way to calculate the cost of equity is to start with a risk-free rate and add an equity risk premium (ERP). In the U.S., the risk-free rate is typically the yield on the 10-year Treasury note, and the ERP is the return you expect given the additional risk you assume to own stocks.

The cost of equity and hence the commodity P/E multiple move around because the risk-free rate and ERP move around. Exhibit 1 shows the commodity P/E multiple from 1961 through May 2020. The multiples are based on estimates of the equity risk premium by Aswath Damodaran, a professor of finance at the Stern School of Business at New York University and a leading expert in valuation.

Exhibit 1: The Commodity P/E Multiple, 1961-2020



Source: Aswath Damodaran and Counterpoint Global.

Note: 2020 as of May 31/June 1 using COVID-adjusted ERP.

You can see that the commodity P/E multiple got as low as 5.1 in 1981 when interest rates hit their generational peak and that the multiple as of June 1, 2020 is 16.7.⁶ The baseline multiple, which assumes no value creation, has averaged 10.7 for the full period but has varied quite a bit over this time. The actual P/E multiple for the S&P 500 has been about 35 percent higher than the commodity P/E multiple since 1961, with most observations between 20 and 65 percent higher.

The goal of this report is to show how valuations change as we vary assumptions about growth, return on incremental invested capital, and the discount rate. We will discuss these changes in terms of P/E multiples, but a discounted cash flow model drives the calculations. We can measure the impact of various assumptions because we can control the value drivers in the model.

A few more thoughts before we turn to the analysis. First, the distinction between value and growth investing is hollow. Warren Buffett, chairman and chief executive officer of Berkshire Hathaway, correctly called it “fuzzy thinking.”

Buffett went on to say, “Growth is always a component in the calculation of value, constituting a variable whose importance can range from negligible to enormous and whose impact can be negative as well as positive.” He then added, “The very term ‘value investing’ is redundant. What is ‘investing’ if it is not the act of seeking value at least sufficient to justify the amount paid?”⁷

The fundamental principle is that growth only adds value when the company earns a return on its investment that is above its cost of capital. The higher the return, the more sensitive the business is to growth. Growth is

of no economic significance if a company's returns are equivalent to the firm's cost of capital. As a consequence, companies should focus not on growth per se but on value-creating growth.

Growth destroys value if investments earn a return below the cost of capital. This frequently occurs with acquisitions. The buyer proclaims that sales and earnings will be higher than before the deal was announced even as it sees its stock sag.

Buffett wrote about growth and value in 1992, which is also the year Eugene Fama and Kenneth French, professors of finance, published a highly influential paper showing that consideration of size and value along with the capital asset pricing model explained stock price returns better than the capital asset pricing model did by itself.⁸

This work popularized the value factor, which is essentially a screen for statistically "cheap" stocks as measured by multiples such as price/earnings and price/book.⁹ This in turn led to the categorization of investment managers as "value" or "growth" based on this factor, which further reinforced the false dichotomy that Buffett sought to redress.

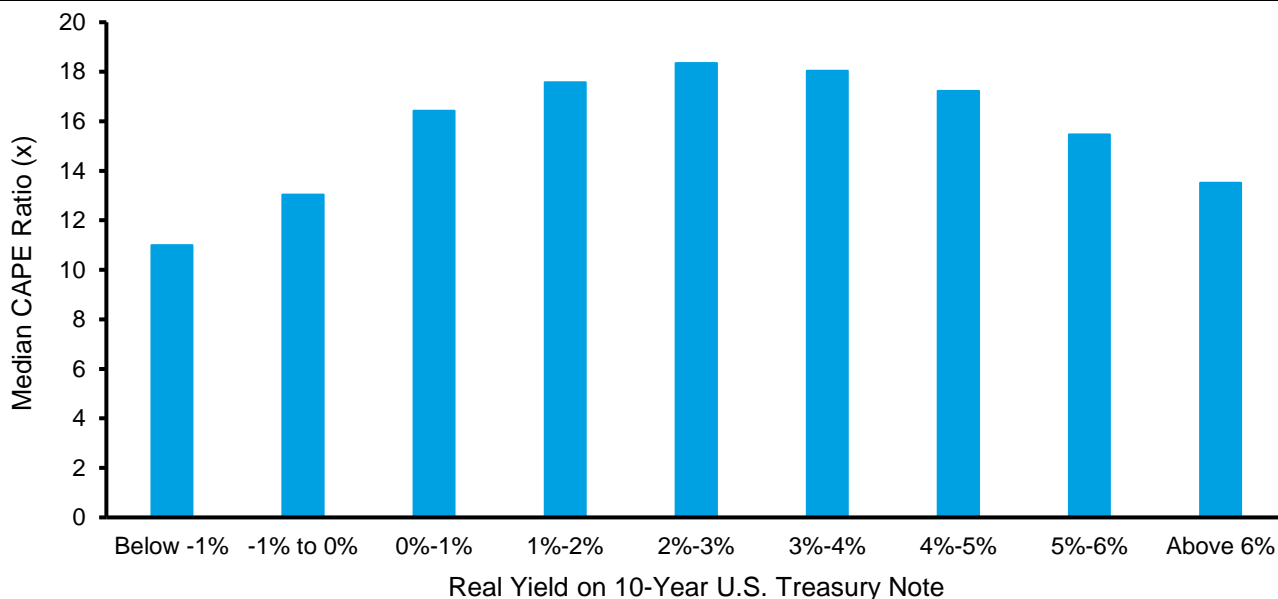
A second thought relates to the concept of duration. More familiar to bond investors than stock investors, duration measures the weighted average time investors should expect to wait before they receive cash flows. For example, the duration of a zero-coupon bond is the same as its maturity. All else being equal, bonds that mature further into the future have longer durations than bonds that mature sooner.

Similarly, the stocks of companies that have opportunities to make value-creating investments in the short run in order to generate higher cash flows in the long run have longer durations than the stocks of companies that lack those opportunities. Research shows that lots of investment opportunity is linked to long duration, and scant investment opportunity is associated with short duration.¹⁰

Duration also provides crucial insight into the sensitivity of the asset price to changes in interest rates, or the discount rate. Long-duration assets are more sensitive to changes in interest rates than are short-duration assets. Keep this in mind: companies that can invest a lot today at high returns on capital will not only grow faster than the average company, their stocks will have valuations that are more sensitive to changes in the discount rate.

The final thought is that low interest rates are commonly associated with slow real earnings growth and below-average business dynamism. This sets up a tug of war where on the one hand low interest rates imply high values for a stream of cash flows, but on the other hand the prospects are dampened by slower expected cash flow growth.

The data suggest that slow growth wins the war. As a result, the P/E multiple for the market has historically followed an inverted "U" (see exhibit 2). Consistent with the Goldilocks principle, low median P/E multiples are associated with very low and very high interest rates (adjusted for inflation), and high median P/E multiples are associated with real interest rates in the middle of the range.¹¹

Exhibit 2: Median P/E Multiples in Various Real Interest Rate Regimes, 1881-2020

Source: Home page of Robert J. Shiller, see: www.econ.yale.edu/~shiller/data.htm and Counterpoint Global.
 Note: CAPE ratio is the cyclically adjusted price/earnings ratio; through March 31, 2020.

There's a part of this story that deserves special scrutiny today. Research shows that low Treasury yields allow industry leaders to generate excess returns and that the magnitude of those returns increases as yields approach zero.¹² While the median P/E may come under pressure as a result of slower growth prospects, a handful of companies may continue to generate strong growth and return on incremental investment.

The Math

We start by calibrating our discounted cash flow model with inputs that yield a P/E multiple in the low 30s. Here are the definitions and the initial assumptions:

- We assume net operating profit after tax (NOPAT) will grow 10 percent per annum. NOPAT represents the cash profits a company would earn if it had no financial leverage.
- We assume a return on incremental invested capital (ROIIC) of 20 percent. ROIIC is defined as the change in NOPAT from this year to next year divided by this year's investment. For example, if NOPAT grows by \$10 next year and the company invests \$50 this year, the ROIIC is 20 percent (10/50). Note that it does not matter if the investment is expensed or capitalized, save for some effect on taxes.
- We assume the cost of equity capital to be 6.7 percent, which was Aswath Damodaran's estimate as of February 1, 2020. The cost of equity measures the return an investor expects to earn given the assumed risk. As such, the figure is the sum of the risk-free rate of 1.5 percent and an estimated equity risk premium of 5.2 percent. We assume the company is financed solely with equity for simplicity. Adding debt makes the calculations slightly more cumbersome but does not change the story.
- The model values explicit cash flows for 15 years after which it uses a perpetuity to estimate the residual value. Specifically, the model takes NOPAT in year 16, which reflects the benefit of the investment made in year 15, and capitalizes it by the cost of equity. That figure is then discounted to a present value.

Here's a summary of the inputs and the output:

NOPAT growth: 10%
 ROIIC: 20% → P/E: 32.3
 Cost of capital: 6.7%

If we increase the growth rate to 15 percent and hold everything else constant, we get this result:

NOPAT growth: 15%
 ROIIC: 20% → P/E: 52.2
 Cost of capital: 6.7%

We will now change these assumptions to see what the impact is on the P/E multiple. Because most investors who use multiples do not contemplate foundational assumptions, the changes are larger than they generally expect.

Growth. Let's start by reducing the growth rate from 10 percent to 7 percent. We'll assume the base year earnings are \$100.

<u>Growth</u>	<u>Next year's earnings</u>		<u>P/E</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
10% → 7%	\$110	\$107	32.3	24.9

Note that the change in growth reduces next year's earnings by only 2.7 percent, but that the warranted P/E multiple drops a more precipitous 22.9 percent. Investors often calculate the P/E multiple using the current price and next year's earnings. As a result, they sometimes believe that the market overreacts to what appear to be modest changes in the near-term earnings. But if expectations for the trajectory of growth really do shift down, the large apparent drop in the P/E multiple is completely justified.

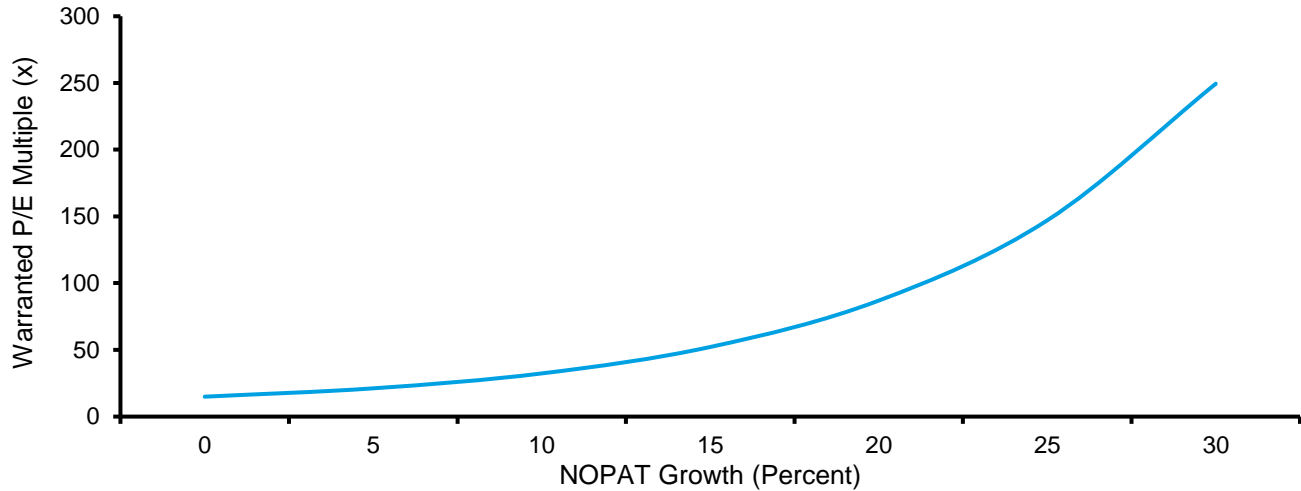
Now let's look at how a 300 basis point reduction in expected growth affects the business that is expected to grow 15 percent:

<u>Growth</u>	<u>Next year's earnings</u>		<u>P/E</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
15% → 12%	\$115	\$112	52.2	39.0

Here, next year's earnings are revised down by just 2.6 percent, but the warranted P/E multiple is 25.3 percent lower. When ROIIC's are well above the cost of capital, the value of the business is highly sensitive to changes in the growth rate of NOPAT.

Exhibit 3 shows that the relationship between growth and the P/E is convex. Small changes in growth expectations can lead to large changes in the P/E, especially when growth rates are high.

Exhibit 3: Warranted P/E Multiples with Different Growth Rates



Source: Counterpoint Global.

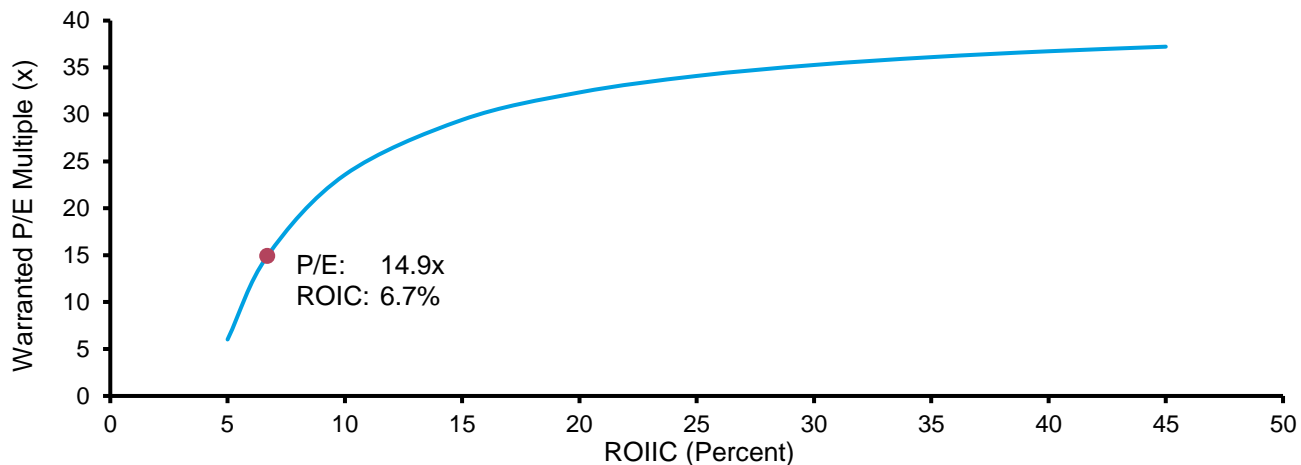
Note: Assumes an ROIC of 20 percent, a cost of capital of 6.7 percent, a 15-year forecast period, all equity financing, and a residual value using the perpetuity method.

This calculation substantiates Buffett’s point that, “Growth is always a component in the calculation of value, constituting a variable whose importance can range from negligible to enormous.” Growth makes little difference for businesses that earn a return close to the cost of capital but is a huge amplifier of value for high-return businesses.

ROIC. We now turn to seeing the impact of changing assumptions about ROIC. We’ll revert back to our 10 percent baseline NOPAT growth and consider the warranted P/E multiples assuming different ROICs.

Exhibit 4 shows the results. Recall that the commodity P/E is 14.9. Here’s the way to think about it: ROIC tells you how much you have to invest to achieve an assumed growth rate. A high ROIC means you don’t need to invest much to grow, which means there’s more cash left over for shareholders. A low ROIC means you have to invest a lot of capital to grow, leaving little for the owners.

Exhibit 4: Warranted P/E Multiples with Different ROICs



Source: Counterpoint Global.

Note: Assumes NOPAT growth of 10 percent, a cost of capital of 6.7 percent, a 15-year forecast period, all equity financing, and a residual value using the perpetuity method.

Buffett added that the impact of growth “can be negative as well as positive.” Growth is a negative when the ROIIC is below the cost of capital. In that case, a company is spending \$1 worth of capital to attain less than \$1 of value. The faster the company grows the more wealth it destroys.

The exhibit shows that an ROIIC below the cost of capital of 6.7 percent yields a P/E multiple below the commodity multiple. Acquisitions are again a case in point. For buyers, M&A deals commonly add to earnings growth but subtract from value. You can think of low-ROIIC investments as pushing down the P/E multiple of a company’s stock toward the commodity multiple.

Discount rate. As of June 1, 2020, Aswath Damodaran’s estimate of the cost of equity dropped to 6.0 percent as the result of the market rally in April and May. Investors need to consider the discount rate carefully for a few reasons.

First, the composition of expected returns is markedly different than it was as recently as late 2019. Specifically, the yield on the 10-year Treasury note, a proxy for the risk-free rate, has declined from 1.9 percent at year-end 2019 to about 0.7 percent on June 1, 2020. The equity risk premium, on the other hand, is roughly at the same level as year-end after having gone up when the market fell and down when the market rose. Nearly 90 percent of the expected return from equities now comes from the risk premium, up from about 75 percent at the beginning of the year.

Second, this mix shift has implications for asset allocation. Returns for an asset class over a particular period are sensitive to the starting and ending valuations. The yield on the 10-year Treasury note today suggests that future returns for the risk-free rate will be less than those of the past.

Finally, and most important to our discussion, long-duration assets are very sensitive to changes in the discount rate. Those companies that can invest a lot while earning high ROIICs will achieve above-average growth. In today’s environment of low expected returns, the stocks of these companies are worth substantially more than they were in an environment of higher expected returns.

No one knows where interest rates or the ERP are headed, but everyone should take a moment to appreciate the relationship between the discount rate and long-duration assets. The connection is not intuitive to those who do not deal with the ideas all of the time.

Conclusion

Most investors value stocks using multiples, which tend to obscure the underlying drivers of value. Many investors also seek to distinguish between value and growth stocks, which are commonly sorted based on multiples of earnings or book value. The important drivers of value are opaque with these practices, and very few investors have a clear sense of how revisions in expectations for those drivers change multiples.

In particular, we focused on how changes in growth rates can affect P/E multiples, the idea that companies with substantial current investment opportunities that are attractive lengthen their duration, and why the distinction between growth and value is muddled.

While our core hypothetical examples assumed a business with very attractive economics, it is important to bear in mind that ROIICs eventually drift lower as a consequence of factors such as competition, maturation, obsolescence, and disruption.

Bruce Greenwald uses the example of an imaginary company called Top Toaster. Top Toaster's high initial returns gradually drop as competitors come along and drive incremental returns toward the cost of capital. Once ROIIC is equal to the cost of capital, Top Toaster will trade at the commodity multiple and an enterprise value equivalent to its invested capital. This is in the future of almost all companies. Sometimes this reality is near and sometimes it's distant. To bring the point home, Greenwald says, "In the long run, everything is a toaster."¹³

Please see Important Disclosures on pages 11-13

Endnotes

¹ Michael J. Mauboussin and Dan Callahan, "Total Addressable Market: Methods to Estimate a Company's Potential Sales," *Credit Suisse Global Financial Strategies*, September 1, 2015.

² Bruce Greenwald and Judd Kahn, "All Strategy Is Local," *Harvard Business Review*, September 2005.

³ Luminita Enache and Anup Srivastava, "Should Intangible Investments Be Reported Separately or Commingled with Operating Expenses? New Evidence," *Management Science*, Vol. 64, No. 7, July 2018, 2973-3468.

⁴ Frank J. Fabozzi, Sergio M. Focardi, and Caroline Jonas, "Equity Valuation: Science, Art, or Craft?" *CFA Institute Research Foundation*, 2017.

⁵ Michael J. Mauboussin and Dan Callahan, "What Does a Price-Earnings Multiple Mean? An Analytical Bridge between P/Es and Solid Economics," *Credit Suisse Global Financial Strategies*, January 29, 2014 and Michael J. Mauboussin, "What Does an EV/EBITDA Multiple Mean?" *BlueMountain Capital Investment Research*, September 13, 2018.

⁶ On June 1, 2020, the yield on the 10-year Treasury note, a proxy for the risk-free rate, was 0.65 percent and Aswath Damodaran estimated the equity risk premium to be 5.35 percent, summing to a cost of equity of 6.0 percent. The multiple is simply 1 divided by the cost of equity (1/.06) which produces a multiple of 16.7. See <http://pages.stern.nyu.edu/~adamodar/>.

⁷ Warren E. Buffett, "Chairman's Letter to the Shareholders," *Berkshire Hathaway*, 1992.

⁸ Eugene F. Fama and Kenneth R. French, "The Cross Section of Expected Returns," *Journal of Finance*, Vol. 47, No. 2, June 1992, 427-465.

⁹ They actually use the inverse of P/E and price/book, so in the Fama-French model it's earnings/price and book/price. This makes the charts look better.

¹⁰ Hannes Mohrschladt and Sven Nolte, "A New Risk Factor Based on Equity Duration," *Journal of Banking and Finance*, Vol. 96, November 2018, 126-135.

¹¹ These are Cyclically Adjusted P/E (CAPE) ratios based on the work of Robert Shiller. Also, see Robert D. Arnott, Denis B. Chaves, and Tzee-man Chow, "King of the Mountain: The Shiller P/E and Macroeconomic Conditions," *Journal of Portfolio Management*, Vol. 44, No. 1, Fall 2017, 55-68.

¹² Ernest Liu, Atif Mian, and Amir Sufi, "Low Interest Rates, Market Power, and Productivity Growth," *NBER Working Paper No. 25505*, August 2019.

¹³ Bruce C. N. Greenwald, Judd Kahn, Paul D. Sonkin, and Michael van Biema, *Value Investing: From Graham to Buffett and Beyond* (New York: John Wiley & Sons, 2001), 71-74. For the toaster quotation, see Robin Moroney, "What the Toaster Teaches Us About Business," *WSJ Blogs: the Informed Reader*, January 10, 2007.

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