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The P/E Ratio: A User's Manual

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In any market system, prices contain information. The problem is, it's not always easy to figure out what that information is. When frost blankets Florida's orange groves in winter, it is clear why the price of orange juice goes up — the frost reduces the orange supply. But when the price of a stock goes up, it is rarely easy to draw such an obvious connection between a specific piece of information and the change in price. We are left to fall back on models about which kinds of information matter to market participants, who ultimately determine the price of a stock through their trading with one another.

In this paper, we are going to address two issues. In Part 1, we will explore the theory behind the most plausible model of what information a stock price contains — the discounted cash flow (DCF) model. Most readers are no doubt familiar with the model, so our purpose is not to offer an initial introduction. Rather, we want to focus on the underappreciated role that return on invested capital (ROIC) plays in the model, through the way it determines how much of a company's profit is available to be distributed to shareholders. We will show that there is an inevitable trade-off between two key variables within the DCF model, and that ROIC is the key to understanding which side wins out in that trade-off. And just as ROIC plays a behind-the-scenes role in determining prices, so it plays the same role in driving price/earnings (P/E) ratios. We will find that the P/E ratio does not tell us what most people think it does, nor does its offshoot, the P/E to growth (PEG) ratio. We will move on in Part 2 to see how we can use what we have learned about the DCF model to *deconstruct* P/E ratios in the real world to better understand what they *do* tell us.

PART 1: THEORY

The Variables That Determine a Company's Worth

In our view, the most sensible way to determine what a business is worth is to perform some variation of a discounted cash flow analysis: estimate what cash flows a company will throw off to its owners over time, and then discount those cash flows back to their present value. Why do we believe this is the best model? For two related reasons: first, if you were going to put up the money to buy a business in full, the DCF approach captures how you would put a price on the business: if I buy this, what are the cash flows it will throw off to me, the owner, over time, and what are those cash flows worth in today's dollars? Indeed, this is how private equity firms generally value a business. Second, for publicly traded businesses there is an arbitrage opportunity if the stock price deviates too far from what a DCF analysis says the company is worth. If the price is well *below* what the DCF model says it should be, an investor (such as a private equity firm) could buy the entire business and capture that undervaluation — like buying a dollar bill for 90 cents. If a stock appears to be well *above* its DCF price, an investor could sell that stock short and take a long position in the stock of a similar business that is trading closer to its fair value (in order to hedge out some of the market and industry risk). Theoretically, this arbitrage opportunity should act to keep stock prices from straying too far from their fair value for too long, making the DCF analysis a good way to estimate the fair price of a stock.

The most well-known DCF model is the "dividend discount model," which uses dividends as the cash flows to be discounted. We will use that framework here as well, while noting that we interpret the word "dividend" more broadly than meaning just cash dividends; we interpret it to mean whatever cash flow the company does not reinvest in its business, and which would therefore end up in the pocket of the owner if the business were privately held. At a public company, this cash flow can be distributed to shareholders either in the form of cash dividends, stock repurchases or debt reduction, all of which are functionally equivalent.

If we denote the dividend that a company pays out in year n as D_n (where n refers to the number of years from today), and use r to denote the discount rate that we use to translate that dividend into today's present value, then the present value of a future dividend would be equal to $D_n/(1 + r)^n$. This just means that a dividend paid in year 6, for example, would be discounted by dividing it by $(1+r)^6$.

In estimating future dividends we need to take some expected growth rate into account. Let's use g to refer to the growth rate, and to simplify matters, let's assume for now that the growth rate will remain steady. That means that we can describe any future dividend in terms of today's dividend; for example, if the dividend over the upcoming year is denoted as D_1, then the dividend in the second year will simply be $D_1(1+g)$, the dividend in the third year will be $D_1(1+g)^2$, and so on. Meanwhile, the present value of that second year dividend will be $(D_1(1+g))/(1+r)^2$. The present value of the third year's dividend will be $(D_1(1+g)^2)/(1+r)^3$, and so on, year by year into the future. The price of a business, P, is the sum of this infinite progression of terms out into the future.

Fortunately, we don't need to perform an infinite number of calculations (who has that kind of time?), because this series of terms reduces mathematically to one deceptively simple term, which has come to be known as the "Gordon Growth Model," named for Professor Myron Gordon, who published a paper about it in 1956. The equation of the Gordon Growth Model shows how the price of a business, P, is determined by the three variables we have been discussing: the dividend in the upcoming year (D_1), the future growth rate of that dividend (g) and the discount rate (r) for determining present value:

$$P = \frac{D_1}{r - g}$$

For example, if a company is expected to pay a dividend of $1 over the next year, that dividend is expected to grow at 4% per year in the future, and the appropriate discount rate is 7%, then the value of that infinite stream of dividends would simply be $1/(7% - 4%), which equals $1/.03, or $33.33.

So far we have referred to r as the discount rate that equity investors use to take the present value of future distributions. That may lead you to conclude that r should be equal to a long-term interest rate of some kind. But r in the Gordon Growth Model is more accurately described as the "required return" that investors expect from the investment. You can think of it as the cost of equity capital, because the truth is that the cost of equity capital is its opportunity cost: what an investor could expect to earn on the capital, on average, if she invested it in a similar equity.

Now, the Gordon Growth Model clearly has limitations. As we mentioned above, dividend growth is never really constant, but the model assumes a stable growth rate. Similarly, it assumes a stable capital structure, because if the firm were to significantly increase or decrease its leverage in the future, its cost of equity capital (r) would change. Furthermore, the model can't handle a situation where the growth rate of the dividend is higher than the discount rate, because that produces a negative number in the denominator. As noted, the model assumes that g refers to the long-term growth of the dividend once the firm has reached some kind of stable state; to deal with the fact that firms sometimes grow faster than that rate in their early years (such that g can be higher than r in those years), there are "multistage" versions of the model, which allow for multiple periods of faster, but decelerating, growth before a company reaches its mature rate of growth.

Our purpose here, though, is not to get into the finer points of dividend discount models. Rather, we went through this explanation simply to lay out the basic logic behind the concept of a discounted cash flow model, and to identify the variables that drive the price of a stock within the model. That may strike you as unnecessary, but we would suggest that while many investors (and readers) are already familiar with this logic, they tend to focus too much on the two variables in the denominator, r and g, and not enough on the variable in the numerator, D_1. Our impression is that people view D_1 almost as a bystander in this story. They take it as a given, a relatively boring number without much of a story behind it.

But we need to ask a crucial question: *why* is D_1 what it is for a particular company, and not some higher or lower number? Two companies with the same amount of revenue and the same amount of net income may well pay out very different dividends. Why is that? An important part of the answer is that different companies require different amounts of *reinvestment* in their business in order to make it grow. (Note that we are only talking about the investment necessary for growth; for purposes of simplification, we are not including so-called "maintenance capex," which is the money a firm needs to spend simply to keep its existing plant and equipment in shape so as to maintain the current level of earnings.) The more you need to reinvest to achieve growth, the less you have left to pay out to shareholders, and vice versa. And *that* variation is driven primarily by differences in the return on invested capital (ROIC) that companies earn.

The Role of ROIC

Consider two hypothetical companies. ABC Corporation and XYZ Industries both have earnings of $1 per share. (We have switched the discussion here from dividends to earnings, because ultimately we want to talk about price/earnings ratios, but in the simplified world of this discussion, each company's dividend will grow at the same rate as its earnings.) Suppose that both companies would like to grow their earnings by 6% over the next year. What would it take for each company to do that? Growing your earnings requires that you invest some capital to expand your business. How much capital would each company have to invest in order to achieve a 6% increase in earnings?

The answer clearly depends on what kind of return each company can earn when it invests capital in its business — in other words, how much additional profit is created for each dollar of capital it invests. Suppose that ABC is able to earn an ROIC of 20%, meaning that for every dollar it reinvests in its business, it earns 20% of that dollar back in additional profit. In order to grow its overall profits by 6%, it would need to reinvest 30% of this year's profit, since a 20% return on 30% of the existing profit will create 6% more profit. That means that ABC is free to distribute 70% of this year's profit — or 70 cents per share — to shareholders, either as cash dividends, stock repurchases or debt reductions.

Meanwhile, XYZ is not as fortunate as ABC. It only earns a 10% ROIC on capital it invests in its business. If it reinvested the same 30% of its profit as ABC, it would only generate 3% in additional profit (10% times 30% = 3%). So in order to grow at the same 6% as ABC, it needs to reinvest 60% of its earnings, leaving just 40 cents of the $1 in profit per share to distribute to shareholders, compared to ABC's 70 cents.

As these examples illustrate, there is a simple equation that describes the relationship between profit growth and ROIC. The key figure that ties the two together is the reinvestment rate:

$$\text{Reinvestment Rate} \times \text{ROIC} = \text{Profit Growth}$$

When one company has an ROIC that is twice as high as another's, then in order to achieve equal rates of profit growth the one with the lower ROIC will have to reinvest twice the proportion of its profit as the company with the higher ROIC. But that means that the company with the lower ROIC also has less money left to distribute to shareholders. Let's see how that matters in determining the prices and the P/E ratios of ABC and XYZ. We noted that ABC would need to reinvest 30% of its profit if it wanted to grow at 6%, and that the company would therefore have 70% of its profit available to distribute to shareholders. Since we started with the assumption that both companies have a dollar per share in earnings, that means that D_1 for ABC is 70 cents. XYZ Industries, with its lower ROIC, needs to reinvest 60% of its profit in order to achieve 6% growth, leaving just 40% — or 40 cents per share — to distribute. So now we have the values of D_1 for both companies, as well as the value of g, which is 6%. That just leaves one variable in the Gordon Growth Model: r.

Remember, r represents the return that equity investors require (i.e., the cost of equity capital). So, it seems sensible to use the long-term total return on a broad equity market index. Over the almost 50 years since the inception of the MSCI indices at the end of 1969, the MSCI World Index has earned an annualized return of 9.5%, so let's use that as our value for r. (We will revisit this assumption later.)

Now we have all the data we need to calculate the price of each company in the model. For ABC, the price will be $0.70/(9.5% - 6%), which equals $0.70/3.5%, or $20.00. For XYZ, the denominator will be the same, but the numerator will be 40 cents rather than 70 cents, leading to a value of $0.40/3.5%, which equals $11.43. And those prices imply that ABC's P/E ratio should be 20, while XYZ's should be 11.43, since both have earnings of $1 per share.

This is an important result. Both companies have the same earnings per share, and the same growth rate. Yet they are not worth the same in the Gordon Growth Model, which means that they should not trade at the same P/E multiple. Why? *Because they have different levels of ROIC.*

If you think of the complement of the reinvestment rate as the "distribution rate" (i.e., how much of your profit remains as free cash flow that you can distribute to shareholders), then you will see why this matters so much: *Companies with higher ROIC will have a higher distribution rate for any given level of expected growth, and it is the distribution rate that drives the value of* D_1 *in the Gordon Growth Model.*

(At the outset of this section, we said in the world of this discussion the dividend would grow at the same rate as the earnings. Now you can see that this is true as long as the ROIC remains steady; if it rises or falls, the distribution rate would rise or fall as well, and under those circumstances the dividend would grow at a different rate than the earnings during the period that ROIC was changing. For our purposes, let's continue to assume a world where each company's ROIC does not change over time, and so dividends grow at the same rate as earnings.)

Interpreting P/E and PEG Ratios Properly

Now imagine a large group of hypothetical companies like ABC and XYZ, each with the same $1 per share in earnings, but each with a different combination of growth (the g in the denominator) and ROIC (which will determine the level of D_1 in the numerator). We will continue to assume for the moment that the value of r is 9.5%. We could calculate a price for each company just like we did for ABC and XYZ, and since each stock has $1 per share in earnings, its P/E will be the same as its price (since we are just dividing the price by 1 in each case to get the P/E).

Table 1 on the next page shows the P/E ratios that we would see for all those companies, with their various combinations of growth rate and ROIC. We have recast ROIC in this table; rather than showing ROIC itself, we are showing it as the spread over the 9.5% cost of capital. Framing it this way will make it easier for us to see later what happens as ROIC moves above or below the cost of capital.

The most important thing we learn from Table 1 is that P/E ratios, on their own, do *not* tell us whether one company is "cheaper" than another. Just look at the

Table 1: Fair Value P/E ratios (if $r = 9.5\%$)

Earnings Growth	ROIC-Cost of Capital Spread											
	-1%	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
8%	3.9	10.5	15.9	20.3	24.0	27.2	29.9	32.3	34.3	36.2	37.8	39.3
7%	7.1	10.5	13.3	15.7	17.6	19.3	20.7	21.9	23.0	24.0	24.9	25.6
6%	8.4	10.5	12.2	13.7	14.9	15.9	16.7	17.5	18.2	18.8	19.3	19.8
5%	9.2	10.5	11.6	12.6	13.3	14.0	14.6	15.1	15.5	15.9	16.2	16.5
4%	9.6	10.5	11.3	11.9	12.4	12.8	13.2	13.5	13.8	14.0	14.3	14.5
3%	10.0	10.5	11.0	11.4	11.7	12.0	12.2	12.4	12.6	12.7	12.9	13.0
2%	10.2	10.5	10.8	11.0	11.2	11.4	11.5	11.6	11.7	11.8	11.9	12.0
1%	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.0	11.1	11.1	11.1	11.2
0%	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5

Source: Epoch Investment Partners

wide range of results in the table — from 3.9 to 39.3 — and then remember that *every one of these companies is trading at its "correct" price*, according to the Gordon Growth Model. A stock trading at 20 times earnings can be just as correctly priced as a stock trading at 10 times earnings.

Many investors think they can address this problem by looking not only at the simple P/E ratio but at the ratio of a company's P/E to its growth rate — the PEG ratio. PEG ratios are not completely without a logical basis; higher growth rates lower the denominator in the Gordon Growth Model equation, and thus would seem to raise the value of *P*, meaning a higher P/E ratio as well. (We will explain the reason for the "would seem to" in the next section.) In the world of PEG ratios, a company trading at 20 times earnings, and whose earnings are expected to grow by 10%, would be no more or less attractive than a company trading at 10 times earnings and whose earnings are expected to grow by 5%. Both would have a PEG ratio of 2. (Note the implicit assumption behind the use of PEG ratios that the correct relationship between P/E and growth is linear.) But if the first company's earnings were instead expected to grow by 12% — meaning the PEG ratio would be 1.67 — then many investors might deem that company to be more attractively priced than the second company, despite the first company's much higher P/E ratio.

Does the variability in the growth rates fully account for the differences in P/E ratios? In other words, do PEG ratios fully correct for the variability in growth from one company to another? It should be intuitively clear that this is not the case, because even reading across any single row in Table 1 — meaning if we hold the growth rate constant — we still see significant variation in the P/E ratios.

Table 2 confirms this intuition. Here, we have taken the P/E ratio in each cell in Table 1 and divided it by the growth rate associated with that cell on the left side of the table. This gives us the PEG ratio that each company would trade at if it were priced correctly. As you can see, there is still a high level of variation in the PEG ratios; they range from 0.5 to 11.2, yet all are based on stocks trading at their fair value. There is clearly no such thing then as a "good" PEG ratio in an absolute sense. In addition, it is clear that there is not in fact a linear relationship between P/E ratios and growth, the implicit assumption behind the use of PEG ratios that we alluded to earlier. The fact that one company trades at a PEG ratio of 4 while another trades at a PEG ratio of 2, in and of itself, tells us nothing about which company is priced more attractively.

In fact, P/E and PEG ratios are quite capable of leading unwary investors to *erroneous* conclusions. Earlier we used the example of ABC Corporation versus XYZ Industries. ABC had an ROIC of 20%, while XYZ's ROIC was only 10%. Relative to a required return of 9.5%, that means ABC's ROIC spread is 10.5%, and XYZ's ROIC spread is only 0.5%. We found that ABC's higher spread made it worth more than XYZ: $20.00 per share versus $11.43, meaning that the proper P/E ratios were also 20 and 11.43. Given that both were growing at 6%, this means that the proper PEG ratio for ABC would be 20/6, or 3.33, and the proper PEG ratio for XYZ would be 11.43/6, or 1.90. But what if ABC was in fact trading at a multiple of 18, yielding a PEG ratio of 3, and XYZ was trading at a multiple of 15, for a PEG ratio of 2.5? In that case, ABC would be *undervalued*, and XYZ would be *overvalued*. Yet many investors might look at those P/E and PEG ratios and conclude that XYZ was "cheaper" than ABC, given both its lower P/E and lower PEG ratios. They would be wrong.

The Relationship Between Growth and Free Cash Flow

There is another valuable insight that we can glean from studying the numbers in Table 1, and it has to do with the way in which D_1 and g interact. Every company, regardless of where it falls in Table 1, faces the same dilemma: the faster you want to grow, the more of this year's earnings you need to reinvest. But the more you reinvest (to generate higher g), the less free cash flow that leaves for you to distribute to shareholders (i.e., lower D_1).

Table 2: Fair Value PEG ratios (if $r = 9.5\%$)

Earnings Growth	ROIC-Cost of Capital Spread											
	-1%	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
8%	0.5	1.3	2.0	2.5	3.0	3.4	3.7	4.0	4.3	4.5	4.7	4.9
7%	1.0	1.5	1.9	2.2	2.5	2.8	3.0	3.1	3.3	3.4	3.6	3.7
6%	1.4	1.8	2.0	2.3	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.3
5%	1.8	2.1	2.3	2.5	2.7	2.8	2.9	3.0	3.1	3.2	3.2	3.3
4%	2.4	2.6	2.8	3.0	3.1	3.2	3.3	3.4	3.4	3.5	3.6	3.6
3%	3.3	3.5	3.7	3.8	3.9	4.0	4.1	4.1	4.2	4.2	4.3	4.3
2%	5.1	5.3	5.4	5.5	5.6	5.7	5.7	5.8	5.9	5.9	5.9	6.0
1%	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.0	11.1	11.1	11.1	11.2
0%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Source: Epoch Investment Partners

In other words, D_1 and g are not independent of each other. There is always a trade-off between the positive effect on P that comes from a higher g (which turns the denominator, $r - g$, into a lower number) and the negative effect on P that arises because that same higher level of g requires a lower D_1 in the numerator. (Now you see why we said that higher growth would only "seem to" lead to higher prices in the previous section.) Conversely, a higher distribution to shareholders will, on its own, tend to raise the price, but it means sacrificing some reinvestment and settling for a lower growth rate. In this case, the positive effect of the higher D_1 in the numerator is offset by the fact that the lower g raises the value of $r - g$ in the denominator, and hence pushes the price lower. What determines which effect wins out? Let's examine Table 1 more closely to find the answer.

We can dispense with the bottom row of the table, where the company is not attempting to grow its earnings. If there is no growth being sought, then no reinvestment is required, and the distribution rate remains constant (at 100%) as we move from left to right. Note that the resulting P/E of 10.5 in that row is simply the inverse of the required return of 9.5%. A growth rate of zero means that all future dividends will be equal to D_1; therefore in this scenario, the stock is simply providing a perpetuity to investors, and it is priced to generate a return of 9.5%.

Now consider the rows where the growth rate is greater than zero. What happens as we increase the ROIC spread over the cost of capital (i.e., as we move from left to right in a given row)? The answer is that the value of the firm, and its associated P/E, always increases. This is because as ROIC increases, the reinvestment rate needed to achieve any given growth rate declines, and the distribution rate rises (i.e., higher D_1 in the numerator). And since we are holding g constant as we move across the row, there is no offsetting negative impact in the denominator. This is a key point that many investors miss: *the fact that two companies have the same growth rate does not mean they should sell at the same P/E multiple*. Higher ROIC is always better than lower ROIC, even for companies with the same growth rate.

What about if we hold ROIC constant and vary the growth rate instead (i.e., move up and down within a given column in the table)? Here the results vary, and it turns out that the key distinguishing criterion is whether the ROIC spread over the cost of capital is positive, negative or zero. Looking at Table 1, we see that when the ROIC spread is positive (starting with the third column, and all the columns to the right of that), growing faster increases the value of the business, and hence the P/E. (Note also that as the ROIC spread widens, the P/E becomes more sensitive to changes in g. When the spread is 1%, for example, an increase in g from 3% to 6% raises the P/E from 11.0 to 12.2; when the spread is 8%, the same change in g raises the P/E from 12.7 to 18.8.)

But the results in the two leftmost columns are different. When a firm's ROIC spread is *negative* (the column on the far left), then trying to grow faster actually *reduces* the value of the business, leading to *lower* P/E ratios as growth increases. This may seem odd at first; how can growing *faster* make a firm worth *less* than before? Equally bizarrely, the results in the second column show that when a company's ROIC is exactly *equal* to its cost of capital (a spread of zero), it doesn't matter how fast or how slow the company tries to grow: the value of the business doesn't change at all even as growth increases! What accounts for these seemingly strange results? The answer has to do with an essential point that we at Epoch frequently make about the difference between earnings and free cash flow. The lesson of the Gordon Growth Model is that what drives the value of a business is not its earnings, but how much of those earnings ends up in the hands of the shareholders (versus how much has to be reinvested in the business).

Let's make this more concrete with some numerical examples, and then we can pull back and see the broader concept at work. The firm in the first column earns an ROIC that is 1% less than its cost of capital; given our assumption of a 9.5% cost of capital, that means an ROIC of 8.5%. If the firm does not reinvest at all and has a growth rate of 0% (the bottom row of the table), it is worth \$10.53 per share based on the Gordon Growth Model. In this scenario, the firm distributes the entire earnings of \$1 per share as D_1, and the denominator is 9.5% - 0%, or 9.5%, giving us a value of \$1.00/0.095, or \$10.53.

What would the company need to do to raise its earnings by 1%? Earlier we showed that:

$$\text{Reinvestment Rate} \times \text{ROIC} = \text{Profit Growth}$$

The firm has an ROIC of 8.5% and is seeking 1% profit growth, so we can plug these two numbers into the equation:

$$\text{Reinvestment Rate} \times 8.5\% = 1\%$$

This means that the reinvestment rate = 1%/8.5%, or 11.76%. The firm will need to reinvest 11.76% of its profits, which were \$1 per share. This will leave 88.24 cents per share to distribute to shareholders. So the Gordon Growth Model equation for the value of the company under these circumstances will look like this:

$$P = \frac{D_1}{r - g} = \frac{\$0.8824}{(9.5\% - 1\%)} = \frac{\$0.8824}{0.085} = \$10.38$$

Compare the numbers in this calculation — \$0.8824/0.085 — to the numbers we saw earlier, when growth was zero: \$1.00/0.095. When growth increased, the denominator went down, which on its own would push the price up. But the cost of achieving even that 1% growth was an almost 12% fall in the value of D_1 in the numerator. That was more than enough to offset the impact of the lower denominator. Increasing the *earnings* reduced the value of the company's shares from \$10.53 to \$10.38, because the reinvestment needed to generate that earnings growth reduced the *free cash flow* that could be distributed to the shareholders by too much.

We can modify the numbers in this example quickly to see what happens when ROIC is equal to the cost of capital. That would mean the company's ROIC was 9.5%, so the reinvestment rate required to generate 1% in growth would be 1%/9.5%, or 10.53% (compared to 11.76% when the ROIC was only 8.5%). This would leave 89.47% of the earnings to be distributed, and the fair price of the shares would now be \$0.8947/0.085, which is equal to — drumroll please — \$10.53. Thus, there is no change from what the company was worth when there was no earnings growth and no reinvestment.

And finally, as we move to the third column, the company's ROIC spread turns positive, at 1%. This means ROIC is 10.5%, and the required reinvestment rate to achieve 1% growth has fallen further, to 1%/10.5%, or 9.52%. That leaves 90.48% of the profits to be distributed, and the price rises to \$0.9048/0.085, which is \$10.64. When the ROIC is greater than the cost of the capital, increasing the growth rate raises the value of the business.

So what is the conceptual explanation for what is going on here? It's really quite simple. If you can earn more on your investments than the cost of the capital that you invested, you're creating value, so the more you invest, the more value you create. If you earn less on your investments than the cost of the capital, you lose money on every dollar you invest, and unlike the old joke, you can't make up for it in volume. The more you invest, the more you lose. And if your investments earn just enough to pay off the cost of the capital, it's a wash. You don't make any money, but you don't lose any money. You could invest more, but it won't make any difference; you'll still just come out even.

As we noted above, there is always a trade-off between the positive impact of higher *g* and the negative impact of the corresponding reduction in D_1. What Table 1 shows us is that the factor that determines which impact is greater is the company's ROIC spread. When that spread is negative, the negative impact of the smaller D_1 (i.e., the smaller numerator) wins out. When the ROIC spread is positive, the positive impact of the higher *g* (i.e., the smaller denominator) prevails. And for companies where ROIC = *r*, the two effects exactly offset each other, resulting in the same value of *P* regardless of how much the company increases the growth rate of its earnings. The company is essentially treading water.

Before we move on, let's summarize the two important lessons of Part 1:

1) Current free cash flow and future growth both drive the value of a business. But there is an inherent trade-off between the two, and the variable that ultimately triangulates the outcome of that trade-off is ROIC.

2) Absent an analysis that incorporates ROIC, P/E and PEG ratios are completely inadequate and misleading metrics. There is no absolute standard for saying that any particular P/E ratio or PEG ratio is "cheap" or "expensive," and even on a relative basis, a company with a lower P/E or PEG ratio is not necessarily cheaper than a company with higher ratios.

Let's see how we can apply these insights in the real world.

PART 2: PRACTICE

We have seen that a company's fair value in the Gordon Growth Model depends on three things: the current free cash flow to shareholders (which is a function of the firm's ROIC), the growth rate of that free cash flow and the return that investors require from investing in the company. And because these things influence the price, they also influence the P/E ratio. It would seem only sensible, then, that when trying to figure out whether a company's price, and its P/E ratio, are "fair," an investor should try to figure out what assumptions about ROIC, growth and return are reflected in the price.

Often, though, investors follow a different path. Rather than treating the P/E ratio as a derivative of the fundamental characteristics that drive the DCF model, they treat it as a characteristic unto itself, capable of being evaluated on its own terms. For example, you might hear someone say that a stock is trading below its 20-year average P/E, and that therefore it is cheap. Or they might compare one stock's P/E to another; for example, "This stock has historically traded at a 20% higher P/E than that stock, but today it is trading at a 30% higher multiple, so it is expensive." These sorts of statements implicitly assume that P/E ratios have a kind of life of their own, and obey some set of predictable rules. Saying that a stock is cheap because it is trading below its

Table 3

	P/E on 3/31/2019
Consumer Discretionary	23.1
Information Technology	20.7
Health Care	20.3
Consumer Staples	19.8
Utilities	19.6
Energy	17.2
Industrials	17.0
Materials	15.7
Financials	12.4
S&P 500	19.7

Source: Bloomberg

historical average P/E multiple is essentially a shorthand way of saying, "Nothing significant has changed at the company, but the market has for some crazy reason just decided to price it differently, and will eventually realize its mistake."

But this kind of thinking is ultimately just a way to avoid having to do the harder work of understanding whether something *has* changed at the company, specifically whether there have been changes to the three things that drive the stock price: ROIC, growth and required return. Now that we know how these three elements come together to construct a P/E ratio, though, we can *deconstruct* the P/E ratios that we see in the real world and get a sense of what assumptions are built into today's prices. Then we can make a judgement about whether those assumptions are sensible. In this way, we are not making judgements about P/E ratios themselves, but about growth expectations or ROIC or required returns — in other words, the true fundamental characteristics of the company.

What Is the Market Price Telling Us?

Let's look at some real-life examples. **Table 3** shows the P/E ratios for various sectors within the S&P 500 as of 3/31/19, sorted from high to low.

The consumer discretionary sector traded at the highest P/E, 23.1 times its latest 12-month earnings, while financials, at 12.4 times earnings, had the lowest P/E. By now you know that these numbers alone tell us nothing about whether financial stocks are a bargain compared to consumer discretionary stocks.

One common way of dealing with this, which we alluded to earlier, is to look at relative P/E ratios instead of absolute levels. As of March 31, the P/E for financials was roughly 54% of the P/E for the consumer discretionary sector. If we look back over the last 30 years, we find that the median for this relationship has been closer to 70%. Some investors would look at this data and conclude that financials are cheap relative to consumer discretionary stocks– they "should" trade at a P/E that is 70% of the P/E for consumer discretionary stocks, not 54%.

But this completely ignores the obvious question: *why* have financials historically traded at lower P/E multiples than consumer discretionary stocks in the first place? What are the P/E ratios telling us about the differences in ROIC, growth and required returns in the two sectors? *Those differences can change over time*, so there is no reason not to believe that the relationship between the fair P/E ratios for the two sectors changes over time, too.

So how can we figure out whether one sector looks more attractive than another? We need to try to figure out what the market is thinking about the three drivers of the P/E ratio — ROIC, *g* and *r* — for each sector. How might we do that?

A good place to start would be to see what these variables have actually looked like over some trailing time period, plug them in to the Gordon Growth Model and see what P/E ratio would result. Then we can compare those projected P/E ratios to the actual P/E ratios and figure out where the market thinks things are most likely to look different in the future.

Table 4 does just that. We start with the actual P/E ratios from Table 3, and then add the historical values of ROIC, *g* and *r* for each sector. For ROIC, we used the cap-weighted median result for each sector over the last year: the level at which half of the sector's market capitalization is higher and half is lower. For *g*, we used the annualized earnings growth rate for the longest period available in the published data, which goes back just over 28 years, to the end of 1990. But what about *r*, the required return?

Table 4

	P/E on 3/31/2019	Current ROIC	Annualized EPS Growth since 1990	Annualized Return Since 12/31/1990	Projected P/E
Consumer Discretionary	23.1	15.3%	10.3%	11.6%	24.6
Information Technology	20.7	14.6%	9.7%	12.2%	13.0
Health Care	20.3	14.3%	9.1%	11.5%	15.1
Consumer Staples	19.8	16.8%	7.2%	10.4%	17.5
Utilities	19.6	6.5%	2.5%	8.7%	10.0
Energy	17.2	7.0%	5.5%	9.1%	5.9
Industrials	17.0	15.9%	7.3%	10.5%	16.9
Materials	15.7	10.2%	4.9%	8.4%	14.9
Financials	12.4	7.3%	6.9%	9.8%	1.8
S&P 500	19.7	12.6%	7.2%	10.2%	14.5

Source: Bloomberg; FactSet

Earlier we used 9.5% as the required return, and assumed that it was appropriate for all stocks. But we also mentioned that we would revisit that assumption. If you look at the earnings growth figures in Table 4, you will see that a couple of sectors have experienced earnings growth faster than 9.5%, and as we noted in Part 1, the Gordon Growth Model doesn't work if *g* is greater than *r*, since the denominator turns negative. So instead of using the same number for all sectors, let's see what happens if instead we use the actual return that each sector has earned over the same period that we used to measure earnings growth. Those numbers have ranged from 12.2% for the information technology sector to 8.4% for materials. To start things off, we will assume that investors simply expect (or "require") that future returns be equal to past returns.

Before we examine the results, we need to remind ourselves of the limitations of the Gordon Growth Model that we discussed earlier. The model relies on various simplifying assumptions, so its predictions should not be interpreted as absolute truth. They are simply rough estimates. But they can still be useful.

So, how do the projected P/E ratios compare to the actual ones? For consumer discretionary, industrials and materials the numbers are quite close. In these sectors it seems that our initial assumption — that the market expects the future to look like the past—is at least reasonable. There are, of course, other combinations of ROIC, *g* and *r* that would also produce the same projected P/E ratios, so this is not to say that it is necessarily correct that the market is simply extrapolating the past. But for these sectors it is at least plausible.

By contrast, that assumption is definitely *not* plausible for some other sectors. Consider financials, the sector with the lowest P/E. If the market expected the financial sector's historical results to persist, the sector would trade at an even lower P/E, just 1.8 times earnings! If that seems crazy, take another look at the numbers in Table 4. The ROIC for the financials sector, 7.3%, is lower than its historical return of 9.8%, and we are using that historical return as the cost of capital (required return). So in Table 4, Financials have an ROIC that is lower than their cost of capital. Now go back to the lesson we learned from Table 1: when a company's ROIC is lower than its cost of capital, growing faster reduces the value of the company, and the way to maximize the firm's price is to stop reinvesting for growth at all and distribute 100% of the profits each year. That's why the sector would only trade at 1.8 times earnings if the market really thought it was going to grow at 6.9% while earning an ROIC below its cost of capital. (Another way to see why the P/E would be so low: with an ROIC of 7.3%, growing by 6.9% would require reinvesting about 95% of the earnings, leaving just 5% to be distributed to shareholders. In other words, D_1 in the numerator of the Gordon Growth Model would be very small.)

Clearly, the fact that the financials sector trades at 12.4 times earnings means that the market is assuming that the figures in Table 4 are going to look different in the future. What combinations of ROIC, *g* and *r* would get us to a P/E of 12.4? **Table 5** shows a variety of scenarios that would get us to the observed P/E. The scenarios at the top of the table require a significant pickup in ROIC compared to the current 7.3%; those toward the bottom require that investors accept a lower return than the historical return of 9.8%. But note the one thing all these scenarios have in common: the ROIC is greater than the required return. Without that assumption, there would be no way to get to the existing multiple.

The point here is not to try to figure out which of these scenarios (or any others that would also produce the same multiple) the market is most likely to be discounting. We started out by highlighting the difference in the P/E multiples for the two sectors at the top and bottom of Table 3: consumer discretionary and financials. Not only are financials trading at a much lower absolute P/E multiple, but even their relative P/E compared to the consumer discretionary sector is below its historical average. Stated that way, it sounds like the financials sector would get the benefit of the doubt as being relatively attractive. But when we dig into the P/E ratios and look at what scenarios they might reflect about ROIC, earnings growth and the cost of capital for each sector, we find that if anything, the burden of proof is on the financials sector to justify why it should currently be trading at such a *high* P/E multiple. For the consumer discretionary sector, the current P/E is consistent with the continuation of past trends, with no improvement necessary, whereas for the financials sector, the current P/E requires an improvement in ROIC, or, barring that, the willingness of investors to accept lower returns than they have received in the past. This means that if the future really is going to be like the past — which is the implicit assumption behind saying that the relative P/E ratio should return to its historical average — then the Financials sector would not be trading anywhere near its current multiple.

Table 5

ROIC	Growth	Required Return
11.0%	9.1%	10.5%
11.0%	7.3%	10.0%
10.0%	7.4%	9.5%
10.0%	4.8%	9.0%
9.0%	4.2%	8.5%

Source: Epoch Investment Partners

So the real point here is that the analysis of the P/E ratios shows that the market *must* believe that *something* has changed — it expects higher ROIC, a lower cost of capital, better growth or some combination thereof in the financials sector. And *that* means it makes no sense to simply expect the relative P/E ratio of the two sectors to mean revert. Properly understood, the P/E ratio for the financials sector is telling us where to concentrate our research: Has the cost of capital for the sector fallen? Is ROIC likely to rise? And if so (in both cases), why, and how much? Is the market too optimistic or pessimistic about where these fundamental characteristics are heading? These are the questions an investor needs to be asking about the sector before forming an opinion about its attractiveness.

You can apply this same kind of analysis to any sector in Table 4. Take utilities, for example. Here too, the sector currently earns an ROIC that is lower than its historical total return, resulting in a projected P/E multiple well below the actual figure. As with the financials sector, the main message that the current P/E ratio for utilities is telling us is that either ROIC is expected to rise or the cost of capital to the sector has fallen, or both. Otherwise, there is no way that the current P/E makes sense. The same holds true for the energy sector.

With information technology and health care, the story is different. They, too, trade at higher multiples than the model projects, but in their case, they are at least earning levels of ROIC that are above their historical cost of capital, so it is actually possible (in a way that it was not in the case of financials) to get to the current P/E by raising the assumed growth rate. For example, given its historical return and its current ROIC, the technology sector would have a projected P/E equal to its actual P/E if the earnings growth assumption was raised from 9.7% (the historical rate) to 11.1%. If that seems too heroic an increase, you could also get to the current P/E with a smaller (or even zero) increase in earnings growth paired with a modest improvement in ROIC and/or a small reduction in the required return. Keep in mind, too, that given the limitations of the Gordon Growth Model that we have cited, you could view the smaller disparities that we see in sectors such as health care and technology as falling within the inherent margin of error that those limitations create.

Conclusion

The job of an active manager is to identify alpha opportunities — situations where the manager believes the market price of a stock is incorrect. But it is not enough to simply decide what you think a stock is worth and then compare it to the market price, as if that price is just an exogenous number. The market price contains information. Part of the process of deciding that the market price is incorrect has to involve figuring out what assumptions the market is making about the three key variables — the company's free cash flow, its growth rate and its cost of capital — that drive the fundamental value of the business. Without that analysis, you are not making an informed judgement.

Too often, investors do not perform this kind of analysis. Rather, they rely on valuation metrics like the P/E ratio or the PEG ratio, treating them as if they are fundamental characteristics of a stock in their own right. But as we have shown, without an understanding of how a company's ROIC is driving the trade-off between its free cash flow and its growth rate, those ratios can be worse than useless. They are simply not a reliable guide to valuation on their own. In many situations, investors use P/E or PEG ratios in a way that implicitly assumes a static world, where past relationships are a reliable guide to the future. But the world is dynamic; relationships change constantly. P/E ratios can be the harbingers of that change, if we are alert to the information they carry.

Rather than making assumptions about how the P/E will change based on historical averages, the job of an investor is to figure out what assumptions the current P/E is signaling, and then to make a judgement about whether those assumptions are likely to prove true. Put another way, the more convincing investment thesis is not "Company X is attractive because its P/E is below its long-term average," but rather (for example) "Company X is attractive because the current P/E underestimates the improvement in ROIC that the company will achieve."

P/E ratios are the most widely used valuation metric in the investment world, but they are also the most widely misused. In truth, most people use them in a way that renders them meaningless. Properly understood and properly used, though, the P/E ratio can be a valuable tool for deciphering the coded information that every stock price contains.