What accounting students should know about the price-earnings ratio

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ABSTRACT

The price-earnings ratio (P/E ratio) is a valuation multiple that can be calculated for a share of stock or the equity of a business as a whole. P/E ratios for publicly traded common stocks are widely reported online and in print. This paper explains how the P/E ratio is used, interpreted, and calculated. It discusses factors that help explain differences in P/E ratios over time and between different companies. It discusses the discount for lack of marketability (DLOM) adjustment that applies to companies that are not publicly traded and demonstrates the affect of earnings growth rates on P/E ratios. In addition, an overview of the relationship between the P/E ratio, return on investment (ROI) and valuation methods using discounted cash flows is provided. The paper also identifies and explains measures related to the P/E ratio including the PEG ratio, price-earnings relative ratio and the net rent multiple.

Keywords: price-earnings ratio, price/earnings ratio, valuation multiple, PEG, price-earnings relative, capitalized earnings, discounted cash flows, rent multiple

INTRODUCTION

Students taking advanced accounting learn to account for the acquisition of a target company's common stock or its net assets (i.e. assets - liabilities = net assets). In most cases, the target's purchase price is provided in the problem. In real life, the acquisition price needs to be calculated and should be based on a valuation method.

The price-earnings ratio (P/E ratio) is a valuation multiple that can be calculated for a share of stock or the equity of a business as a whole. P/E ratios for publicly traded common stocks are widely reported online and in print. This paper explains how the P/E ratio is used, interpreted, and calculated. It discusses factors that help explain differences in P/E ratios over time and between different companies. It discusses the discount for lack of marketability (DLOM) adjustment that applies to companies that are not publicly traded and demonstrates the affect of earnings growth rates on P/E ratios. In addition, an overview of the relationship between the P/E ratio, return on investment (ROI) and valuation methods using discounted cash flows is provided. The paper also identifies and explains measures related to the P/E ratio including the PEG ratio, price-earnings relative ratio and the net rent multiple.

The Price/Earnings (P/E) ratio is an application of the market approach to business valuation, which is also known as the comparable sales approach or relative value approach (Pratt & Niculita, 2008; Hooke, 2010). The market approach is based on the idea that perfect substitutes should have the same price and that similar assets should sell for similar prices. For example, if most of the companies in a specific industry have a P/E ratio of approximately 20, then it would be reasonable to expect that a target company in that industry would also have a P/E ratio of approximately 20. A P/E ratio is referred to as a valuation multiple because, assuming a company's price/earnings ratio = 20, both sides of the equation can be multiplied by earnings and the terms rearranged to: Price = 20 x Earnings.

Investors can use the P/E ratio to compare to the stock of different size companies having different numbers of outstanding shares. The P/E ratio is interpreted in the same manner as a regression coefficient. So, if a company has a P/E ratio of 20 and earnings per share of $3, then the stock price should be $60. Further, if earnings per share increase or decrease by a $1, then stock price would be expected to increase or decrease by $20, respectively. The P/E ratio also helps explain why management may be tempted to overstate a company's earnings. Higher earnings per share usually results in higher stock prices and lower earnings per share usually results in lower stock prices.

PRICE AND EARNINGS DEFINED

For publicly-traded companies, the price used to calculate the P/E ratio is usually the ending market price per share of common stock at the date at which the P/E ratio is calculated.

If a company has positive earnings, then the earnings per share (EPS) amount for the trailing-twelve-months (ttm) is usually used to calculated the P/E ratio (Lan, 2014). However, the earnings per share amount should not include the effect of discontinued operations or extraordinary items as that income or expense is not expected to reoccur in the future.

Some resources also publish P/E ratios based on the forward year-end estimated earnings per share. In addition, investment bankers often quote deal prices based on multiples of earnings before interest, taxes, depreciation and amortization (EBITDA) because it allows firms with

different capital structures to be compared and generally results in higher valuations (Rosenbaum & Pearl, 2009). For analysis purposes, almost any earnings, sales or cash flow multiple can be used to value a company. The main consideration is to be consistent and use the same measures when comparing different companies or industries and realize that calculated multiples will usually differ based on what earnings measure or surrogate is used.

If a company had a net loss for the year, a P/E ratio using the loss per share amount for the trailing twelve months (ttm) would not make sense. The value of the stock cannot be negative and it is unlikely a seller would pay a buyer to take the stock off the seller's hands. Instead, an average of prior year earnings, an alternative measure such as earnings before interest and taxes (EBIT), or an expected future earnings per share could be calculated (Hooke, 2010). If it is not possible to calculate an average, alternative, or expected earnings amount, then it may make more sense to calculate a Price/Sales ratio (P/S). The P/S ratio or valuation multiple is also an application of the market approach and works the same way as the P/E multiple. For example, if the P/S ratio is 3, then the terms can be arranged to Price = 3 x Sales.

FACTORS THAT AFFECT P/E RATIOS

P/E ratios and multiples can vary over time, by industry, and by company. For example, based on information presented by Robert Shiller in Irrational Exuberance in 2006 and found online (http://www.multpl.com/table), since January1, 1965 to 2014, the average P/E ratio for the S&P 500 was approximately 18.7. However, the January 1st P/E ratios for those years has varied from a low of 7.39 in 1980 to an extreme high of 70.89 in 2009. In general, during periods of economic recession and depression, stock prices and P/E ratios decline, and during periods of economic growth and expansion, stock prices and P/E ratios increase. During bad times, investors are often fearful and lose confidence in the future earnings power of their investments and the likelihood of stock price appreciation. As a result, investors may become unwilling to pay high P/E multiples to acquire common stock. During good times, investors are often optimistic about earnings growth and price appreciation and become willing to buy common stock at higher P/E ratios.

Just as P/E ratios can vary over time, they can vary by industry during the same time period. Industries that are rapidly and steadily growing sales and profits typically command higher P/E ratios than industries that are cyclical or in decline. Further, companies within an industry that have favorable business models and cost structures, as evidenced by above-average earnings levels and growth rates, usually have higher P/E ratios than the industry average. The reverse is also true for below-average performing companies.

PUBLICLY TRADED VS. PRIVATELY HELD COMPANIES

When the P/E ratios of two publicly traded companies in the same industry are different it is usually due to differences in company attributes, such as the earnings growth rate which is discussed later in the paper.

P/E ratios for privately held businesses are generally not publicly available. To estimate the P/E ratio of a privately held company, "comparable" publicly traded companies are identified and their P/E ratios are used as a surrogate for the private company. The P/E ratios for the "comparable" companies can be based on either published daily price information (guideline

public company method) or prices paid in actual merger and acquisition transactions (guideline transaction method). The valuation of the privately held company, based on using the P/E ratios of publicly traded companies, is then reduced by a discount for lack of marketability (DLOM) (Hooke, 2010; Pratt & Niculita, 2008; Rosenbaum & Pearl, 2009).

Stock in publicly traded companies can be quickly sold online with very low transaction costs. In contrast, stock in a privately held business can take months or even years to sell and involve substantial transaction costs. If the stock is a noncontrolling interest (NCI) in a privately held business, it will usually be even more difficult to sell. To address liquidity and marketability issues, valuations for private companies are usually reduced by a discount for lack of marketability (DLOM). The DLOM can be very significant and can often be justified in the range of 30-55% of the value that would have been estimated if the company was publicly held (Dorrell, Gadawski & Brown, 2008; Anonymous, 2009). The DLOM can in effect dramatically reduce the valuation multiple represented by the P/E ratio of "comparable firms." Further, if it is assumed that it would take a year to sell a privately held business, the above DLOM rates are generally consistent with the private cost of capital data presented by Paglia & Slee (2011).

THE AFFECT OF EARNINGS GROWTH RATES ON P/E RATIOS

When two companies in the same industry have very different P/E ratios, it may be because the companies have very different earnings growth rates. The rule of 72 can provide quick insight into the importance of growth. The rule provides a close approximation for how long it would take an amount, such as earnings, to double assuming it grows at a given rate. For example, if earnings is expected to grow at 10% per year, then it would take 7.2 years to double (72/10= 7.2). If earnings are expected to grow at 20, 30, or 40 percent, then it would only take 3.6 years, 2.4, or 1.8 years to double, respectively. If a company has a high earnings growth rate, a P/E ratio that initially seemed high, could soon seem very reasonable based on the original price paid.

Further insight into the importance of earnings growth can be provided by the capitalized earnings valuation method as described by Pratt (1998). It is based on the equation: Investment x Desired rate of return = Income. In its simplest form, if both sides of the equation are divided by the desired rate of return, the equation becomes: Investment = Income/Desired rate of return. The value of the investment is the price, income is equivalent to earnings, and the desired rate of return is referred to as the capitalization rate. The capitalization rate is expressed in decimal form and equals the discount rate used in the discounted cash flows method, minus the earnings growth rate. The earnings growth rate can be positive, zero, or negative. For example, assume a business has $100,000 in earnings and the investor expects a 25% desired rate of return. If the growth rate is zero, then the most the investor should pay for the investment would be $400,000 (i.e. $100,000/.25 = $400,000). If earnings were assumed to be growing at 15%, then the maximum price would increase to $1,000,000 (i.e. $100,000/(.25 - .15) = $1,000,000). The model implicitly assumes that the earnings will be received in perpetuity and that risk is in reflected in the denominator by the capitalization rate used.

In addition, a capitalization rate can easily be converted to a valuation multiple. The equation, Price = Earnings/Capitalization rate can be expanded to Price = Earnings x 1/Capitalization rate. In the above examples, dividing 1 by .25 or .10 is equivalent to a valuation multiple of 4 or 10, respectively.

RELATIONSHIP BETWEEN THE P/E RATIO AND RETURN ON INVESTMENT (ROI)

Return on investment (ROI) can be defined as earnings divided by the price of the investment. Thus, ROI is equivalent to the reciprocal of the P/E ratio. For example, the reciprocal of a P/E = 20/1=20, would be E/P=1/20=.05.

Value investors want to buy low and sell high. In their eyes, the lower the P/E ratio the cheaper the stock and the higher apparent return on investment (ROI). Alternatively, the higher the P/E ratio the more expensive the stock and the lower apparent return on investment. This view implies that value investors only want to pay for earnings that are already proven and that any future earnings growth is a bonus. In contrast, growth investors usually view low P/E stocks as indicative of companies that are slow growing, in cyclical industries, or facing a declining future. Growth investors tend to buy companies that are rapidly growing sales and earnings. The higher a company's future earnings growth prospects, the more growth investors are willing to pay for the stock (i.e. the higher the P/E ratio they will be willing to buy at). As previously demonstrated, if a company has a high earnings growth rate, then it doesn't take long for a P/E that initially seemed high to become quite reasonable based on the original purchase price.

RELATIONSHIP BETWEEN VALUATION MULTIPLES AND DISCOUNTING CASH FLOWS

Stocks can be valued based on valuation multiples such as the P/E ratio, Price/Sales ratio, and Price/Cash flows. When valuation multiples are used, there is an implicit assumption that the variable being measured (earnings, sales, cash flows, etc.) will be received in perpetuity (Pratt, 1998).

Businesses can also be valued based on discounted cash flows. To apply the discounted cash flows method to a business valuation, it is typical to predict cash flows each year for a five year period, and then calculate the present value of the cash flows using a discount rate that reflects the risk of the investment. It is usually assumed the business will continue as a going concern and that cash flows will continue after year 5. However, due to the difficulty of predicting cash flows into the distant future, it is usually assumed that after five years the company's growth rate will stabilize at a lower rate and a selling price (terminal value) is calculated at the end of the fifth year and then discounted back to the present value. The present value of the five years of individually calculated cash flows plus the present value of the terminal value at the end of year 5 would equal the present value of either the equity or the company as a whole, depending on which cash flow measures were used (Hooke, 2010; Pratt & Niculita, 2008; Rosenbaum & Pearl, 2009).

It should be noted that the discounted terminal value can represent a large percentage of the total present value of the company. The terminal value before discounting is often based on the capitalized earnings method which was discussed earlier. Alternatively, the terminal value before discounting can be estimated by multiplying an estimated P/E ratio times the estimated earnings for year 5. In practice, both calculations are usually performed to determine the reasonableness of the terminal value calculated using net cash flows (Pratt, 1998). The terminal value is further discussed in a later section of the paper.

When comparing valuation multiples with present value factors it is useful to keep some basic relationships in mind. If annual cash flows over a 5 year period are growing at the discount rate, then the present value will be 5 times the year -0- (i.e. period prior to start of the 5 year measurement period) cash flows. If annual cash flows are growing at less than the discount rate, the present value will be less than 5 times the year -0- cash flows. If annual cash flows are growing at more than the discount rate, the present value will be more than 5 times the year -0- cash flows. Further, the larger the difference between the growth rate and the discount rate, the larger the difference from 5 times the year -0- cash flows the present value will be. If cash flows in year -0- are assumed to be 1, then sensitivity analysis for the relationship of cash flow (or earnings) growth rates and discount rates can easily be performed in Excel. If annual cash flows do not grow at the same rate, the present value will usually differ as compared to scenarios where the annual growth rate is assumed constant.

VALUATION USING DISCOUNTED CASH FLOWS: TERMINAL VALUE

It is useful to be aware of the relative importance of the terminal value compared to the discounted cash flows (or earnings) for years 1 through 5. As previously discussed, the terminal value before discounting can be estimated by multiplying an estimated P/E ratio times the estimated earnings for year 5.

If cash flows are assumed to equal earnings and if constant growth is assumed, a table can be created to estimate earnings in year 5 by multiplying prior year earnings (year -0-) by the future value lump sum factor (5 years, specified growth rate) for a range of possible growth rates. The range of earnings in year 5 can then be multiplied by a range of expected P/E ratios to create a table of potential stock prices at the end of year 5. If desired, the estimated year 5 stock prices can be discounted by being multiplied by a present value lump sum factor (5 years, specified discount rate).

In general, the higher the 5-year earnings growth rate, the higher the year 5 earnings and the more important the terminal value is to the valuation calculation. Similarly, the higher the expected year 5 P/E ratio, the higher the expected stock price and the more important the terminal value is to the valuation calculation. Also, the higher the discount rate used, the lower the present value of the terminal value. For example, the present value factor for a lump sum (5 years, 5%) is .78353 as compared .32768 for the present value factor for a lump sum (5 years, 25%).

If prior year earnings of $1 are expected to grow at 5% per year, it should equal almost $1.28 in year 5. If the expected P/E ratio at the end of year 5 is 20, then the stock price at the end of year 5 would be $25.60. If the discount rate is 10%, the present value lump sum factor (5 years, 10%) would be .62092 and the present value of the terminal value would be approximately $15.90 or 15.90 times year -0- earnings. In this case, the terminal value is approximately 3.6 times the amount of the present value of year 1 through year 5 earnings, which would have been less than 5 because the earnings growth rate was less than the discount rate (approximately 4.36 if assumed a constant growth rate). The terminal value represents approximately 78% of the total value and the total year -0- earnings multiple would equal approximately 20. For comparative purposes, the earnings capitalization formula would have also estimated an undiscounted stock price at the end of year 5 of $25.60 (i.e. $1.28/(.10-.05)).

In contrast, if prior year earnings of $1 are expected to grow at 25% per year, then

earnings at the end of year 5 would equal more than $3.05. If after 5 years, the earnings growth rate was assumed to drop to 5% and the expected P/E ratio at the end of year 5 is 20, then the stock price at the end of year 5 would be $61.00. If the discount rate is 10%, the present value lump sum factor (5 years, 10%) would be .62092 and the present value of the terminal value would be approximately $37.88 or 37.88 times year -0- earnings. In this case, the terminal value is approximately 5 times the amount of the present value of year 1 through year 5 earnings, which would have been more than 5 because the earnings growth rate was more than the discount rate (approximately 7.46 if assumed constant growth). The terminal value represents approximately 83% of the total value and the total year -0- earnings multiple would equal approximately 45. For comparative purposes, the earnings capitalization formula would have also estimated an undiscounted stock price at the end of year 5 of $61.00 (i.e. $3.05/(.10-.05)).

RELATED MEASURES

Several measures are related to the P/E ratio. The PEG ratio and price-earnings relative ratio are intended to put a company's P/E ratio in context to its earnings growth rate and a comparison group, respectively. The net rent multiple is used to value rental real estate.

PEG Ratio

The PEG ratio is intended to help investors factor earnings growth rates into their analysis of stocks with different P/E ratios. The PEG ratio is equal to a company's P/E ratio divided by the growth rate of its earnings per share, expressed as whole number (Thorpe, 2004). Thus PEG = P/E/G. For example, assuming a company has a P/E ratio of 15 and is growing earnings at 15%, then the PEG ratio = 15/15 = 1. A typical rule of thumb interpretation is based on the idea that a company's P/E ratio shouldn't be higher than its earnings grow rate. A stock with a PEG ratio greater than 1 can be considered to be relatively expensive or overpriced based on its earnings growth rate, while a PEG ratio less than 1 could be considered relatively inexpensive or underpriced based on its earnings growth rate.

Rules of thumb should not be blindly accepted. The idea that stocks with relatively high P/E ratios should have relatively high earnings growth rates makes intuitive sense. The mathematics of the PEG ratio only makes sense under certain circumstances. For example, if a stock has a price of $5, earnings of $1, and an earnings growth rate of 5%, then it has a P/E ratio of 5 and a PEG of 1 (5/5 = 1). Similarly, if a stock has a price of $5, earnings of $.50, and an earnings growth rate of 10%, then it would have a P/E ratio of 10 and a PEG of 1 (10/10 = 1), and the investor would be indifferent to which stock they owned. If the above information was used in a capitalized earnings model and solved for the discount rate ($1/(discount rate - .05) = $5; and $.50/(discount rate - .10) = $5. The discount rates would need to be 25% (.25) and 20% (.20), respectively. This would indicate that the investments had different perceived risk. Further, if the earnings, earnings growth rates, and discount rate were used in a table calculating the present value of the cash flows, then it would take almost 18 years (for the 5% growth scenario) and 28 years (for the 10% growth scenario) for the present value of the cash flows to reach $5 (the current price of the investment).

If the capitalized earnings equations used above were set equal to each other, ($1/(discount rate - .05) = $.50/(discount rate - .10)), then a single discount rate of 15% (.15)

could be calculated. However, the resulting valuations of $10 would not agree to the actual price of $5. Further, different scenarios with the same PEG ratio would result in different discount rates.

Price-Earnings Relative Ratio

The price-earnings relative ratio allows investors to put a company's P/E ratio in context with a comparison group. The price-earnings relative ratio is calculated by dividing a company's P/E ratio by the P/E ratio of either the market as a whole, or the relevant industry (Thorpe, 2006). Thus the Price-earnings relative = (P/E of the stock)/(P/E ratio of the market or industry). For example, if a company has a P/E ratio of 18 and the related industry has a P/E of 15, then the price-earnings relative ratio equals 1.2. Depending on the investor's perspective (value or growth), they could interpret a price-earnings relative ratio greater than 1 as either indicating that the stock is relatively more expensive than the comparison group or that the company has higher future growth expectations than the comparison group. A price-earnings relative ratio that is less than 1 could be interpreted as either indicating that the stock is relatively less expensive than the comparison group or that the company has lower future growth expectations than the comparison group (Thorpe, 2006).

Net Rent Multiple

A version of the P/E ratio is often used to value real estate. One rule of thumb is to value rental properties at 100 times the net monthly rent (i.e. Price = 100 x net monthly rents). As monthly income is used, the multiple could be divided by 12 to get an annual multiple. For example, a net monthly rent multiple of 100 divided by 12 would in effect equal a P/E of 8 1/3. The reciprocal would equal .12 (a 12% rate of return). A property acquired at 150 times net monthly rents would have a P/E of 12.5 (150/12 = 12.5) and an implied rate of return of 8% (1/12.5 = .08 = 8%). The implied rate of return can also be quickly calculated by dividing 12 by the multiple used. For example, 12/100 = .12 = 12% and 12/150 = .08 = 8%. It should also be noted that the calculated return is based solely on the net rental income and does not consider any possible future price appreciation of the property.

CONCLUSION

This paper explains how the P/E ratio is used, interpreted, and calculated. It discusses how the condition of the economy, industry, and earnings growth rates can affect P/E ratios over time and between different companies. The paper explains the discount for lack of marketability (DLOM) that applies to companies that are not publicly traded. In addition, an overview of the relationship between the P/E ratio, return on investment (ROI) and valuation methods using discounted cash flows is provided. The paper also identifies and explains measures related to the P/E ratio including the PEG ratio, price-earnings relative ratio and the net rent multiple.

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