



This is “Stock Valuation”, chapter 10 from the book [Finance for Managers \(index.html\)](#) (v. 0.1).

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Chapter 10

Stock Valuation

How Much Is a Piece of a Company Worth?

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It is truly amazing that almost anyone can, with minimal difficulty, become an owner of a multi-billion dollar corporation in just a few seconds by purchasing shares of stock using an internet broker. By the end of the day, that investment can change in market value, for better or for worse. But what is the “right” price for that piece of a company?

In this chapter we will compare various fundamental methods for valuing a share of stock. As a fair admission: if we could use these techniques to 100% accurately gauge the value of every stock (or even just a handful), we’d be living on a private island sailing a giant gold-plated yacht. Alas, not even Warren Buffett is right 100% of the time, though his investment strategy has been built from these fundamental principles we will discuss. Rather, the goal of this chapter is to provide a deeper understanding of what drives the value of a company’s equity, and to provide a foundation upon which accurate stock analysis techniques can be built. And, as future managers of corporations, if we understand what drives investors’ valuations, we can better understand how to increase our company’s share price.

10.1 Common and Preferred Stocks

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LEARNING OBJECTIVES

1. Explain the typical features of and differences between preferred stock and common stock.
2. Contrast the key differences between equity and debt.
3. Describe why managers care about a company's stock price.

Equity in a public corporation is divided into shares of stock. Typically, shares of stock have some key features. The first is the right to receive **dividends**¹, which are payouts (usually in cash) to the owners of a company proportional to their ownership of the company. Dividends are typically paid quarterly, though exceptions are not uncommon. The company's board of directors decides when dividends are to be issued and how much they are to be. The board of directors is elected by the shareholders, as determined by the company's corporate charter.

Shares of stock can be divided into different classes, and these can have different features. For example, one class of shares might have more voting power than a second class. Each class of stock will trade separately (or some might not trade at all) and, potentially, have a different price. The most common division of equity is between preferred shares of stock and common stock.

Preferred stock² is equity, but behaves as almost a hybrid between bonds and common stock. In fact, at many investment banks, the fixed income traders handle bonds and preferred stock, and the equity traders only work with common stock. Preferred stock usually doesn't have a maturity date, and, like a bond, has a dividend that is at a fixed. Preferred stock has a nominal par value (typically \$100 per share), and the annualized dividend is quoted as a percentage of this par value. Thus, one share of 5% preferred stock will pay \$5 total in dividends over a year. Like a bond, if these dividends are insufficient to provide the required return to investors, the stock will trade at a price below the nominal par value. Unlike a bond, if the dividend isn't paid, stockholders can't send the company into bankruptcy. If, however, the full dividend isn't paid to the preferred shareholders, than no

1. Payouts (usually in cash) to the owners of a company proportional to their ownership of the company.
2. A type of equity that acts as hybrid of bonds and common stock, with no maturity date and fixed dividend payments.

dividend is allowed to be paid to the owners of the common stock until all missed payments are paid in full. If the company is driven into bankruptcy and liquidation by the bondholders, the preferred shareholders have a superior claim to the assets compared to common shareholders (though both are subordinate to the bondholders). Typically, preferred shareholders get no votes for the board of directors.

Many corporations don't issue preferred stock, so the bulk of equity issues are called **common stock**³. Common stock also has a nominal par value, but it is mostly an accounting/legal relic and has no bearing on the dividends or price of the stock. Since dividends on common stock are determined by the board, their cash flows are the most uncertain of the financial instruments discussed so far. Shareholders have a **residual claim**⁴ on the firm's assets, which is the value leftover after all other claims have been paid. Thus, any earnings remaining after all other obligations are met, are either paid out in dividends or retained by the firm, ostensibly to be used as capital for the firm's growth. These retained earnings increase the residual claim, potentially increasing the value of stock shares.

When a firm is doing poorly, and liabilities are larger than the value of the assets, the residual claim is zero and share prices understandably drop. If the company isn't driven into bankruptcy and can increase the assets to an amount more than liabilities, the residual claim grows and share prices rise. Since liabilities are relatively fixed but asset prices are potentially unbounded, the equity share similarly has unbounded growth potential.

From the company's perspective, it is important to note that equity only directly raises cash when the shares are issued. After the initial issue, trading occurs in the secondary markets, so any increase in value of the shares will be captured by the owners of the stock. If the company has positive earnings but chooses not to pay out all of those earnings as dividends, then the company is able to retain those earnings for use as capital. This is an indirect way of raising equity capital, though it does not come without a cost: the retained earnings should lead to an expectation of increased earnings in the future, allowing for an eventual increase in dividends. If this is the case, the share price should rise in anticipation of the expected higher future dividends.

3. The bulk of equity issues, representing a residual claim on firm assets.

4. The value of assets leftover after all other claims have been paid.

Increasing the value of those outstanding shares is one of the primary goals of management, for a few key reasons. First, shareholders have voting power, and if they aren't receiving the returns they desire, they might replace the board with the intention of replacing senior management. Second, any additional offerings of equity will benefit from the increased share price, so the company will have access to a larger source of capital, if necessary. As an additional incentive, senior

management will often receive a portion of their compensation tied to the value of equity, through stock grants, restricted shares, or stock options.

KEY TAKEAWAYS

- Fundamentally, the value of stock is dependent on the value of the residual claim of the firm's assets.
- Preferred stock dividends are quoted as a percentage of their \$100 par value. Common stock dividends are decided by the board and thus tend to fluctuate more.
- Managers care about stock prices because they can be replaced if shareholders are displeased, the company may need to raise equity financing in the future, and they may have been given shares themselves as compensation.

EXERCISES

1. What is the annual dividend on 6% preferred stock?
2. If a company is doing extremely well, would you rather own preferred stock or common stock in the company?

10.2 Dividend Discount Model

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LEARNING OBJECTIVES

1. Explain where the value of a stock is ultimately derived.
2. Calculate a stock valuation given a dividend growth rate or a stream of dividends.

The financial value of anything is the present value of all future cash flows. If we knew with certainty what the future dividends of a stock will be, we should be able to determine the value of a share of stock. Hence the dividend discount model (DDM). It is useful for us to consider this method of valuing securities, since, ultimately, this is the driver of value in stock ownership. In practice, however, the uncertainty of future dividend payments, especially with common stock, limits the usefulness of using this method. For preferred stock, where the dividend is fixed when it is paid, this method has a bit more accuracy.

Constant Dividend Stream

If our dividend stream is constant, we can use the perpetuity formula from chapter 7 to arrive at the financial value:

Figure 10.1 Constant Dividend Timeline

Equation 10.1 Perpetuity Equation

$$PV = \frac{PMT}{r}$$

Since the dividend payments are constant, the value of a share of preferred stock should be inversely proportional to our required rate of return.

Equation 10.2 Preferred Stock Price

$$P_{pref} = \frac{D}{r}$$

D and r should be in matching time units, so if dividends are quarterly, a quarterly rate of return needs to be used. Note that if the required rate of return doesn't change, then this implies that the stock price should likewise never change. The corollary to this is: if the dividends are a known constant, then any changes in the stock price must be due to changes in the required rate of return!

Suppose we have a 5% preferred stock and investors require a 6% rate of return. Since par is assumed to be \$100, our stock pays \$5 in dividends per year. Our expected price would be $(.05 \times \$100) / .06 = \83.33 .

Dividend Stream with Constant Growth

If our dividend stream isn't constant, as is more likely with common stocks, but is growing steadily with a constant growth rate, then we can use another formula from chapter 7:

*Figure 10.2 Constant Dividend Growth Timeline**Equation 10.3 Perpetuity with Constant Growth*

$$PV_n = \frac{PMT_{n+1}}{(r - g)} = \frac{PMT_n(1 + g)}{(r - g)} \left\{ \text{for } g < r \right\}$$

Equation 10.4 Stock Price with Constant Dividend Growth

$$P_n = \frac{D_{n+1}}{(r - g)} = \frac{D_n(1 + g)}{(r - g)} \left\{ \text{for } g < r \right\}$$

Again, D , r , and g should all be in matching time units. Typically we are interested in the price now (that is, at time 0), but this equation could be used to find our expected stock price in a future year by calculating the expected dividend for that year. Also note that D_0 is the dividend that was just paid, and thus is no longer factored into the stock price.

If a company's most recent dividend (D_0) was \$0.60, dividend growth is expected to be 4% per year, and investors require 10%, we can find the expected current stock price (P_0). $\$0.60 \times (1 + .04) / (.10 - .04) = \10.40 .

If we use the current price (P_0) and rearrange our equation to solve for returns, we find an interesting result:

Equation 10.5 Components of Stock Returns

$$P_0 = \frac{D_1}{(r - g)} \left\{ \text{for } g < r \right\}$$

$$(r - g) = \frac{D_1}{P_0}$$

$$r = \frac{D_1}{P_0} + g$$

$$r = \text{dividend yield} + \text{capital gains yield}$$

With this result, we can clearly see the tradeoff between dividends now and growth (which should lead to future dividends). If expected return is steady over time, then a constant capital gains yield (g) implies a constant dividend yield. A constant dividend yield means that the stock price must grow proportionally to the dividends; that is, both should grow by g .

Dividend Stream with Varied Dividends

Without constant growth, determining the present value of the stock requires finding the present value of each of the future cash flows. While the most flexible and realistic, this also is the most difficult to execute properly. The best way to think about this method is to imagine holding the stock for a specific number of years, with the intention of selling the stock at the end of the period.

Figure 10.3 Varied Dividends Timeline

If we know the dividends and have an expectation for the future stock's price, we can discount everything to find the price today. The difficulty, of course, is in getting an accurate expectation for the future stock price. The traditional solution

is to assume that, at some point in the future, dividend growth will be steady, and to use the constant dividend growth formula to calculate an expected future price.

Equation 10.6 Stock Price with Constant Dividend Growth

$$P_0 = PV \text{ of Future Dividends} + PV \text{ of Future Price of Stock}$$

$$P_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \dots + \frac{D_n}{(1+r)^n} + \frac{P_n}{(1+r)^n}$$

A common mistake is to neglect the discounting on the future price of the stock. Once the cash flows are found, the discounting can also be accomplished using NPV functions on a calculator or spreadsheet, as discussed in chapter 7.

Suppose our stock will pay out \$0.50 flat per year for 4 years, and then dividends are expected to grow at 5% afterwards. If investors expect a 9% return, we can find the expected price of the stock:

Figure 10.4 Varied Dividends Example Timeline

Our terminal value (P_4) should be $\$0.50 \times (1 + .05) / (.09 - .05) = \13.13 . Once we add this to the above cash flows and discount appropriately, we arrive at a stock value of \$10.92.

We can use this to method value a corporation that is not a going concern (that is, going out of business) or expected to be acquired. In this case, we should use the liquidation value of the shares or the acquisition price as our P_n .

Stocks Not Currently Paying a Dividend

How do we handle stocks that aren't currently paying a dividend, like many growth stocks? The assumption is that some point in the future they will need to start paying dividends, so we figure out the price of the stock at that time, and discount it back to today. Note that this is the same as the above equation, using 0 for each dividend until the company begins to pay them.

Because of the extra uncertainty of when to expect a company to begin paying dividends, such companies are typically valued using another approach. Two of the

most popular are the market multiples approach and the free cash flow approach, which will be covered in the upcoming sections.

KEY TAKEAWAYS

- Every stock must be fundamentally worth the present value of the future cash flows.
- Since many stocks pay in perpetuity, the perpetuity formulas are useful for dividends growing at a constant rate. This formula will only work accurately with a constant rate.
- For stocks with dividends not currently growing at a constant rate, the individual dividends need to be accounted for first, then a future value for the stock can be used for when the dividends are in the constant growth period.

EXERCISES

1. Investors only require an 8% annual return on a 9% preferred stock. What should the stock's price be?
2. A company's most recent quarterly dividend was \$0.25. This dividend is expected to grow by 3% a year. If investors require an 11% annual return on the stock, what should the stock's price be?
3. A stock is currently not paying dividends. Three years from now, it is expected to start paying a quarterly dividend of \$0.10 per share, with growth of 5% per year thereafter. If investors require a 10% annual return, what should the stock's price be?
4. A stock will pay a \$1 dividend next year, a \$2 dividend the year following, and a \$3 dividend in year 3, at which time it will be acquired for \$12 per share. If investors require a 12% return, what is the current value of the stock?

10.3 Market Multiples Approach

PLEASE NOTE: This book is currently in draft form; material is not final.

LEARNING OBJECTIVES

1. Explain how to use a market multiple to evaluate a stock price.
2. Calculate a stock valuation given the necessary data using a market multiple.

If we try to compare two companies that are in the same line of business and approximately the same size, we would expect them to have certain features in common and, perhaps, behave in similar ways. This is the basis for a popular approach to stock valuation based called the market multiples approach.

“Market multiples” is a generic term for a class of many different indicators that can be used to value a stock. Probably the most familiar is using the price to earnings (P/E) ratio (first discussed in chapter 4), and it is used in the following manner: if we know that the average P/E ratio for companies in our sector is 25, and we know the expected earnings (that is, net income) per share of our company is \$2 per year, then an appropriate valuation for our stock should be $\$2 \times 25 = \50 .

Of course, we can use a competitor’s P/E ratio, if we think it more appropriate than an industry average. Or we can use our company’s historic P/E ratio. Or a trending average over years. This approach is both versatile and simple to use, which might explain its popularity with the financial press.

But what do we do if earnings are expected to be negative? Does this imply that our stock price is also negative? Of course not! Many companies have emerged from negative earnings (perhaps due to a slumping economy) only to skyrocket in value. The simplicity of ratio analysis is its major weakness, as it is impossible to capture everything about a company in one ratio. Other ratios and metrics can be used, if we believe them to be a good indicator of the company’s value. Common ratios (many are mentioned in chapter 5) are price to book, price to EBIT, price to EBITDA, price to sales, etc. but virtually anything can be used if it is justifiable (price to

headcount, price to watermelons...). It is important, however, that we don't attempt to use ratios solely because they are convenient or only because they support the result we desire; we should try to use reason to explain why a given metric is useful, and examine the data to determine if a meaningful relationship exists to aid in our valuation efforts.

KEY TAKEAWAYS

- Though using P/E ratios to value a stock is the most common approach, any key metric can be chosen (though some will be more appropriate than others!).
- Comparing to the industry, a competitor, or the same company over time can all yield valuable information about the stock's value.
- Garbage in, garbage out. The accuracy of this method will depend upon the usefulness of the metric used, and no one measure can fully capture the complexity of a company.

EXERCISES

1. A competitor has 25 million shares outstanding at a stock price of \$36 and expected annual net income of \$50 million dollars. What is the competitor's P/E ratio? If our company's expected annual net income is \$100 million and our shares outstanding total 20 million, what is an appropriate valuation for our stock?
2. Why might a company's P/E ratio change over time?
3. A company has rapid sales growth, but has yet to turn a profit. Why would the price to sales (P/S) ratio be a superior metric to the P/E ratio for arriving at a stock price?

10.4 Free Cash Flow Approach

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LEARNING OBJECTIVES

1. Calculate the valuation of a company based on FCFs and WACC.
2. Calculate the value of a share of stock using the FCF method.

The free cash flow (FCF) approach for valuing a company is very much related to the dividend discount model explained in section 2. The key difference is that we look at all of the cash flows available for distribution to the investors and use them to arrive at a value for the entire company. Since we are using the cash flows for all investors, we need to discount them not using just our expected return on equity, but on the **weighted average cost of capital (WACC)**⁵. As the name implies, this is an average of the returns required by equity holders and debt holders weighted by the company's relative usage of each. Arriving at the WACC will be the topic of a later chapter.

Equation 10.7 Value of Company Using Discounted FCF

$V_C = PV \text{ of Future FCFs} + PV \text{ of Terminal Value of Company}$

$$V_C = \frac{FCF_1}{(1 + WACC)^1} + \frac{FCF_2}{(1 + WACC)^2} + \dots + \frac{FCF_n}{(1 + WACC)^n} + \frac{V_T}{(1 + WACC)^n}$$

Finding the terminal value for a company has some of the same headaches as finding the future expected stock price. A common method is to assume a long-term growth rate for FCF, and use a variation of the perpetuity with growth formula:

Equation 10.8 Terminal Value of Company Using Discounted FCF

$$V_{Terminal} = \frac{FCF_{n+1}}{WACC - g} = \frac{FCF_n (1 + g)}{WACC - g} \left\{ \text{for } g < WACC \right\}$$

5. An average of the returns required by equity holders and debt holders weighted by the company's relative usage of each.

This method can be extremely sensitive to the assumption used for the long-term growth rate. Once the value of the entire company is determined, we need to subtract the market values of our debt and preferred stock to arrive at the value of the residual due to common shareholders:

Equation 10.9 Value of Stock

Value of Company = Value of Debt + Value of Equity

= Value of Debt + (Value of Pref. Stock + Value of Common Stock)

$$V_C = V_D + V_E = V_D + (V_{ps} + V_s)$$

therefore $V_C - V_D - V_{ps} = V_s$

Once the value of the common stock is obtained, dividing by the number of shares outstanding should lead to an appropriate price per share.

Of course, a company might have a negative FCF currently but still be a good investment, if FCF is expected to turn positive in the future. This can happen particularly with corporations that are experiencing rapid growth, necessitating a large investment in capital to support future revenues. Since FCF for such companies tends to turn positive well before dividends are paid, this approach typically provides a superior estimate for stock value over the DDM.

KEY TAKEAWAYS

- Calculating the value of a company using the FCF method tends to be more accurate, so it is used in practice much more than the DDM.
- The FCF method can be very sensitive to assumed long-term growth rates.

EXERCISES

1. Our company projects the following FCFs for the next 3 years: \$5 million, \$5.5 million, \$6 million. Future growth is expected to slow to 5% beyond year 3. What is the terminal value of the company in year 3 if the WACC is 8%? What is the value of the company today? What is the company worth if the projected growth rate is only 3% beyond year 3?
2. If a company's value is \$250 million, and the company has \$100 million market value of debt outstanding and no preferred stock, what is the value of its common stock? If there are ten million shares of stock outstanding, what should be the price of one share of stock?

10.5 The Bigger Picture

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LEARNING OBJECTIVES

1. Describe how stock fits into the larger picture of finance.
2. Explain ethical considerations regarding stock.

Like bonds, selling stock allows the issuer to raise capital for new or ongoing projects. Unlike bonds, selling shares of common stock is effectively selling a “piece” of the company. Equity financing tends to command a higher risk premium, so the expected returns by investors is higher. If a company is considered risky, particularly in its early stages, equity financing might be the only reasonable way to raise the necessary funds, even if it entails possibly losing voting control over the board.

Through the election of board members, shareholders can exercise their power to approve or disapprove of the company’s actions. This exercise of corporate governance, combined with the effect of the cost of financing, causes managers to have multiple reasons to consider the desires of shareholders when taking action.

Investors must understand what drives stock prices if they are to properly assess the risk and return of adding stocks to their portfolios.

Ethical Considerations

Since the board of directors is elected by the shareholders, owners of stock must feel some responsibility for the companies in which they have invested. Activist shareholders have become more commonplace, introducing ballot measures and contesting board elections to push corporations for or against various agendas. Of course, a dissatisfied shareholder can always choose to sell the stock and invest elsewhere, but through their ballot they have an extra means of influence over the direction of the company. Some companies make provisions to discourage too much shareholder intervention, for example, by making it more difficult to replace the

entire board at once. Since many senior managers are board members at other companies, there can be a level of “cronyism” between companies as board members support their management friends.

Another area of concern is that many managers believe that stock prices are particularly sensitive to short-term news like quarterly earnings, and this can influence them to try to manipulate the numbers to their perceived advantage, either legally or, in some cases, fraudulently. In an extreme case, managers can buy or sell stock based upon their knowledge of information not yet revealed to the public (or they can “tip off” their friends or relatives). While in many cases these actions can be illegal, there are many countries and circumstances where regulation is absent or under-enforced.

KEY TAKEAWAY

- Shareholders are both a source of capital and enactors of corporate governance. Through both of these can they influence management’s behavior.

EXERCISES

1. Some managers attempt to “smooth out” earnings over time, to minimize the volatility of the stock price. Is this damaging or beneficial to the stockholders?
2. Sarah owns many shares of stock in ABC Corp. Recently, ABC has been cited for excessive pollution. What actions could Sarah take if she wishes to influence the future actions of ABC’s management?
3. Bill is a manager at XYZ, and he recommends to the board that they nominate Chris for the open board seat because he is highly experienced in the field. Chris is currently a manager at FGH Inc., where Bill is a member of the board. Are there any potentially issues with Bill’s recommendation?

10.6 End-of-Chapter Problems

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EXERCISES

1. 8% preferred stock is currently trading at \$133.33. What implicit return is the market demanding?
2. If the market demands a return of 11% on a preferred stock with a 7% coupon, at what price will it trade?
3. A stock is expected to pay \$2 in dividends every year. At what price must it trade to yield a return on equity of 9%?
4. A stock is expected to pay \$1 in dividends next year. Dividends are expected to grow in future years at a rate of 5% per year. If the market demands a return of 11%, at what price should the stock trade? If the market demanded return drops to 10%, at what price should the stock trade?
5. A stock paid \$1.50 in dividends last year. The dividends have been growing by 3% on average over the past 10 years, and this trend is expected to continue indefinitely. If other comparable stocks are returning 9%, at what price should the stock trade?
6. A \$30 stock is expected to pay a dividend of \$2 next year, and dividends are expected to grow at 2% per year thereafter. What is the expected market return for this stock?
7. ABC Company has hit on hard times, and is expected to shut down. As inventory is liquidated, yearly dividends are expected to be \$2, \$3, and \$4 in years 1, 2, and 3, respectively. After year 3, the company will have no value. What should the stock be worth if the market demands an 8% return?
8. DEF Inc. is expected to pay dividends of \$1, \$1.50, and \$2 during the next three years. After that, dividends are expected to grow at 5% per year. If the market demands a return of 11%, what should be the price of DEF in three years? What should be its stock price today?
9. GHI Ltd. is not currently paying a dividend. In five years, it expects to pay a dividend of \$0.50, and dividends are expected to grow at 6% a year afterward. If the return demanded is 12%, what should GHI be worth today?
10. JKL Corp. has earnings of \$1.38 per share. MNO Corp. is a close competitor, with \$1.59 earnings per share. If MNO stock is currently trading at \$39.75 and you believe that the stocks are comparable, what would be a reasonable price expectation for JKL stock?
11. Analysts expect PQR Inc. to earn \$1.15 per share this year. The stock is currently trading at \$33.35. When PQR surprises analysts by outperforming by \$0.30 per share, by how much should the stock price increase? (Assume the P/E ratio will remain constant.)
12. STU Company expects \$2 million of FCF next year. Growth is expected to be 3% per year, and the WACC is 7%. What is the value of the company?

If the company has no debt and 2 million shares of stock outstanding, what should be its stock price?

13. VWX Ltd. had FCF of \$1.5 million last year. Over the next five years, FCF is expected to grow at 10% per year. Afterward, FCF growth will slow to 4% per year. If the WACC is 9%, there are 1 million shares outstanding, and the company has issued \$10 million market value of debt and \$5 million market value of preferred stock, what is a share of VWX stock worth?