Chapter 10

Stock Valuation

Chapter 10 Contents

Learning Objectives
1. Identify the basic characteristics and features of common stock and use the discounted cash flow model to value common shares.
2. Use price to earnings (P/E) ratio to value common stock.
3. Identify the basic characteristics and features of preferred stock and value preferred shares.
4. Understanding the secondary market for common stock.
Principles Used in This Chapter

• Principle 1: Money Has a Time Value.

• Principle 2: There is a Risk-Reward Tradeoff.

• Principle 3: Cash Flows are the Source of Value.

• Principle 4: Market Prices Reflect Information.

Common Stock Basics

• Common stockholders are the owners of the firm.
  – They elect the firm’s board of directors who in turn appoint the firm’s top management team.

• Claim on Income
  – Common stockholders have the right to the firm’s income that remains after bondholders and preferred stockholders have been paid.
  – The common stockholders either receive cash payments in the form of dividends or the firm’s management reinvests the earnings in the firm.
  – The right to residual income means that the potential return is unlimited;
  – However, it could also mean that there maybe little or nothing left after claims of bondholders and preferred shareholders are met.
Common Stock Basics

• Claim on Assets
  – In case of liquidation, common stockholders have residual claim on assets.
  – However, bankrupt firms rarely have enough assets to satisfy the claims of stockholders.

• Voting Rights
  – In general, common shareholders are the only security holders given the right to vote.
  – Common shareholders have the right to elect board of directors and approve any changes in corporate charter.
  – Some firms have multiple classes of stock with different voting rights.
  – Example: Google’s class A stock has one vote per share and class B stock has 10 votes per share.

Common Stock Basics

• Voting Rights
  – Most shareholders vote by proxy. A proxy gives a designated party the temporary power of attorney to vote for the signee at the corporation’s annual meeting.
  – There are two commonly used procedures for voting: majority voting and cumulative voting.
  – Majority Voting: Each share of stock allows the shareholder one vote, and each position on the board is voted on separately. Because each member of the board is elected by a simple majority, a majority of shares has the power to elect the entire board of directors.
  – Cumulative Voting: Each share of stock allows the shareholders a number of votes equal to the number of directors being elected. The shareholders can use all his or her votes for a single candidate or split them among the various candidates.
Common Stock Basics

- **Agency Costs and Common Stock**
  - In theory, common stockholders elect the board and effectively control the firm through their representatives on the board.
  - In reality, stockholders are given a slate of nominees for the board selected by the management.
  - As a result, management effectively elects the board and thus the board may have more allegiance to the managers than to the shareholders. This may lead to agency problems.
  - Managers are employees of the firm but may put their interests ahead of the firm’s stockholders (its owners).
  - The costs associated with manager-stockholder agency problems are difficult to quantify, but it could be significant.

Valuing Common Stock Using the Discounted Dividend Model

- Common stock’s value is equal to present value of all future cash flows that stockholders expect to receive from owning the shares of stock.
  - **One measure** of cash flows to shareholders is dividends
  - Other measures exist which lead to other models

- Unlike bonds, the future cash flows in the form of dividends are not fixed.
  - Thus the value of common stock is derived from discounting “expected dividend”.
Three Step Procedure for Valuing Common Stock with the Discounted Dividends Model

- **Step 1**: Estimate amount and timing of future cash flows the common stock is expected to provide.

- **Step 2**: Evaluate the riskiness of future dividends, and determine the required rate of return.
  - Investor might benchmark the risk from a comparable risk investment.
  - Investor, more appropriately, could use CAPM for discount rate estimation.

- **Step 3**: Calculate present value of the expected dividends by discounting them back to the present at the investor’s required rate of return.

Basic Concept of Stock Valuation Model

- Goal is to value a share of common stock that will be held for only one year.
  - What will be the value of the stock today if it pays a dividend of $2.00, is expected to have a price of $75 and the investor's required rate of return is 12%?

- Value of Common stock
  = Present Value of future cash flows
  = Present Value of (dividend + expected price)
  = \((2 + 75) / (1.12)^1\)
  = \$68.75
Basic Stock Valuation (Continue example)

• What will be the value of common stock if you hold the stock for two years and sell it for $82?
  – Assume the stock will pay a dividend of $2 in each of the two years and the discount rate is still 12%.

• Value of Common stock
  = Present Value of future cash flows
  = Present Value of (dividends+expected price)
  = \{\frac{($2)}{(1.12)^1}\} + \{\frac{($2+$82)}{(1.12)^2}\}
  = $68.75

Basic Stock Valuation Model expanded

• Since stocks do not have a maturity period, can consider the value of stock to be equal to the present value of future expected dividends.

• Valuing common stocks using general discounted cash flow model is made difficult as analyst has to forecast each of the future dividends.
  – This problem is greatly simplified if we assume that dividends grow at a fixed or constant rate.
  – Simplifying assumptions reduce precision of model
Constant Dividend Growth Rate Model

- If the firm’s cash dividend grow by a constant rate each year, then the common stock can be valued as follows:

\[
V_{cs,0} = \frac{D_0}{r_{cs} - g} = \frac{\text{Dividend in year 1}}{\text{Stockholders’ Required Rate of Return} - \text{Growth Rate}}
\]

- \( V_{cs,0} \) = Value of a share of common stock
- \( D_0 \) = Annual cash dividend in the year of valuation
- \( g \) = annual growth rate in the dividend
- \( D_1 \) = expected dividend for the end of year 1
- \( r_{cs} \) = the common stockholder’s required rate of return
Example-Valuing Common Stock

Consider the valuation of a share of common stock that just paid a $2 dividend and is expected to pay a cash dividend every year from now to infinity. Each year, the dividends are expected to grow at a rate of 10%. The investor’s required rate of return is 15%. What is the value of this common stock?

**STEP 1: Picture the problem**

With a growing perpetuity, a timeline doesn’t have an ending point but goes on forever, with the cash flows growing at a constant rate period after period, or in this case, year after year:

<table>
<thead>
<tr>
<th>Time Period</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 ...</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Flow</td>
<td>$2.00</td>
<td>$2.20(1.10)</td>
<td>$2.42(1.10)</td>
<td>$2.66(1.10)</td>
<td>$2.93(1.10)</td>
<td>$3.22(1.10)</td>
<td>$3.53(1.10)</td>
</tr>
</tbody>
</table>

Value of common stock = present value of expected dividends

The growing dividends go on forever

**STEP 2: Decide on a solution strategy**

Because a share of stock can be viewed as the present value of a growing perpetuity, the equation for the value of a share of stock, which is presented in Equation (10-2), looks exactly like Equation (6-6), the equation for a growing perpetuity. Since this equation only involves division, there is no need to look at an Excel solution or any unique keystrokes with a financial calculator.
Example 2 – Stock Valuation with Dividends

- What is the value of a share of common stock that just paid a $6 dividend and is expected to pay a cash dividend every year from now to infinity, with that dividend growing at a rate of 5 percent per year, if the investor’s required rate of return is 12% on that stock?
Step 1: Picture the Problem

- With a perpetuity, a timeline goes on for ever with the growing cash flow occurring every period.

\[ i = 12\% \]

<table>
<thead>
<tr>
<th>Years</th>
<th>Cash flows</th>
<th>$6</th>
<th>$6(1.05)</th>
<th>$6(1.05)^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>$6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$6(1.05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The growing dividends go on forever.

Value of common stock = Present Value of Expected Dividends.

Step 3: Solve

- Need to first determine \( D_1 \), the dividend next period.

- Since dividends at the end of last year was $6 and dividends are expected to grow at a rate of 5%, dividends for next period will be:

\[
D_1 = D_0 (1+g) = $6 (1.05) = $6.30
\]

\[
V_{cs} = \frac{D_0(1 + g)}{r_e - g} = \frac{\text{Dividend in year 1}}{\text{Stockholders' Required Rate of Return} - \text{Growth Rate}}
\]

\[
V_{cs,0} = \frac{6.30}{0.12 - 0.05} = \frac{6.30}{0.07} = $90 = \text{Current stock price}
\]
What Causes Stock Prices to Go Up and Down?

\[ V_{cs} = \frac{D_0 (1 + g)}{r_{cs} - g} = \frac{\text{Dividend in year 1}}{\text{Stockholders' Required Rate of Return} - \text{Growth Rate}} \]

- Equation indicates that there are three variables that drive share value:
  - The most recent dividend \((D_0)\),
  - Investor’s required rate of return \((r_{cs})\), and
  - Expected rate of growth in future dividends \((g)\).
- Since most recent dividend \((D_0)\) has already been paid, it cannot affect price.
  - Thus the other two variables, \(r_{cs}\) and \(g\), can vary and lead to changes in stock prices.

Determinants of the Investor’s Required Rate of Return

- Investor’s required rate of return is determined by two key factors:
  1. The level of interest rates in the economy;
  2. The risk of the firm’s stock. (Priced via CAPM)
Determinants of Growth Rate of Future Dividends

• Firm’s growth opportunities relate to:
  
  – The rate of return the firm expects to earn when they reinvest earnings (the return on equity or ROE), and
  
  – The proportion of firm’s earnings that they reinvest (known as the retention ratio, b)

Determinants of Growth Rate of Future Dividends (cont.)

• The growth rate is formally expressed as follows:

\[
\text{Rate of Growth in Dividends (g)} = \left(1 - \frac{\text{Dividend Payout Ratio}}{\text{ROE}}\right) \times \text{Rate of Return on Equity (ROE)}
\]

• \( g \) = the expected rate of growth of dividends
• \( D_1/E_1 \) = the dividend payout ratio
• \( b \) = the proportion of firm’s earnings that are retained and reinvested in the firm.
• \( \text{ROE} \) = the return on equity earned when the firm reinvests a portion of its earning back into the firm.
The Comparable Approach to Valuing Common Stock

- This method estimates the value of the firm’s stock as a multiple of some measure of firm’s performance.
  - Typical measures include the firm’s earnings per share, book value per share, sales per share, cash flow per share
  - The multiple is determined by averaging the multiples observed from comparable companies.
  - The most common metric is earnings per share.
  - This is not a method derived from underlying theoretical relationships but is a method commonly discussed/used.

The P/E Ratio Valuation Model

- Price/Earnings ratio (P/E ratio) is a popular measure of stock valuation.
  - Multiples-based valuations are popular due to the ease of use. Essentially, the investor contributes no real thought to the valuation process.

- P/E ratio is a relative value model because it measures how many dollars investors are willing to pay for each dollar of the company’s earnings.

- Must be careful with the ratio specification
  - Trailing P/E multiple (commonly used) is based on most recently observed 12 month earnings to value stock.
  - Forward P/E multiple based on forecast earnings of next year to value the common stock today.
Forward P/E Ratio Valuation Model

\[
V_{cs,0} = \left( \frac{\text{Appropriate Price Earnings Ratio}}{\text{Estimated Earnings Per Share for Year 1}} \right) \times E_1 = \frac{P}{E_1} \times E_1
\]

- \(V_{cs,0}\) = the value of common stock of the firm.
- \((P/E_1)_{avg}\) = the average forward price earnings ratio for the firm’s competitors based on the current price per share divided by earnings for end of year 1.
- \(E_1\) = the estimated earnings per share of common stock for the end of year 1 of the firm to be valued.

Valuing Common Stock Using Forward P/E Ratio

The Heels Shoe Company sells a line of athletic shoes for children and young adults including cleats and other specialty footwear used for various types of sports. The company is privately owned and is considering the sale of a portion of its shares to the public. The investment banker has suggested that this price can be estimated by looking at the P/E multiples of other publicly traded firms that are in the same general business as the Heels Shoe Company and multiplying their average P/E ratio by Heels’ expected EPS for the coming year. Last year the Heels Shoe Company had earnings of $1.65 per share for the 12-month period ended in March, 2009. Heels’ CFO estimates that company earnings for 2010 will be $1.83 a share.

Estimate of the price of Heel’s shares based on comparable P/E ratios.

<table>
<thead>
<tr>
<th>Company</th>
<th>P/E Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deckers</td>
<td>26.85</td>
</tr>
<tr>
<td>Nike</td>
<td>18.79</td>
</tr>
<tr>
<td>Timberland</td>
<td>22.18</td>
</tr>
<tr>
<td>Average</td>
<td>22.61</td>
</tr>
</tbody>
</table>
Solution to Forward P/E Valuation Problem

STEP 1: Picture the problem

STEP 2: Decide on a solution strategy
The P/E valuation method is deceptively simple in that the analytics are simple. The estimated price per share is simply the product of the firm's estimated earnings per share for the coming year multiplied by what the analyst estimates to be an appropriate P/E ratio. That is, substitute into Equation (10-4):

\[ V_{cs} = \text{P/E} \times E_1 \]  

Determinants of the P/E Ratio for Stock?

• Can understand the determinants of P/E ratio by analyzing the following equations

\[ V_{cs} = \frac{D_0 (1 + g)}{r_{cs} - g} = \frac{\text{Dividend in year } 1}{\text{Stockholders' Required Rate of Return} - \text{Growth Rate}} \]

\[ \frac{P}{E_1} = \frac{D_1/E_1}{r_{cs} - g} \]

\[ \frac{P}{E_1} = \frac{D_1/E_1}{r_{cs} - g} = \frac{D_1/E_1}{r_{cs} - [(1 - D_1/E_1) \times \text{ROE}]} \]
Determinants of the P/E Ratio for Stock?

- Observe there are 2 fundamental determinants of a firm’s P/E ratio:
  1. Growth rate in dividends, and
  2. Investor’s required rate of return.
- What causes the growth rate in dividends (and earnings) and the investor’s required rate of return to go up and down? These are the real determinants of the P/E ratio.
  - Firm factors impacting the investor’s required rate of return,
  - Economic or macro factors impacting the investor’s required rate of return,
  - Firm factors impacting the growth rate – dividend policy and firm investment opportunities.

Features of Preferred Stock

- **Dividends:**
  - In general, size of preferred stock dividend is fixed, and it is either stated as a dollar amount or as a percentage of the preferred stock’s par value.
  - Unlike common stockholders, preferred stockholders receive the same fixed dividend regardless of how well the firm does.
- **Multiple Classes:**
  - If a company chooses, it can issue more than one class of preferred stock, and each class can have different characteristics.
  - For example, Public Storage (PSA) has 16 different issues of preferred stock outstanding that vary in terms of dividend, convertibility, seniority.
Features of Preferred Stock

- **Claims on Assets and Income:**
  - In the event of bankruptcy, preferred stockholders have priority over common stock. However, they have lower priority than the firm’s debt holders.
  - Firm must pay dividends on preferred stock prior to paying dividend on common stock.
  - Most preferred stock carry a **cumulative feature**. Cumulative feature requires that all past unpaid dividends to be paid before any common stock dividends can be declared.
  - Thus preferred stocks are less risky than common stocks but more risky than bonds.
Features of Preferred Stock

- **Preferred Stock is a Hybrid Security**
  - Like common stocks, preferred stocks do not have a fixed maturity date. Like common stocks, nonpayment of dividends does not lead to bankruptcy of the firm.
  - Like debt, preferred stocks have a fixed dividend. Also, most preferred stocks are periodically retired even though there is no stated maturity date.

Valuing Preferred Stock

- Since preferred stockholders generally receive a fixed dividend and the stocks are perpetuities (non-maturing), it can be valued using the present value of perpetuity equation:

\[
\text{Value of Preferred Stock} = \frac{\text{Annual Preferred Stock Dividend}}{\text{Market’s Required Yield on Preferred Stock}}
\]

- \( V_{ps} \) = the value of a share of preferred stock
- \( D_{ps} \) = the annual preferred stock dividend
- \( r_{ps} \) = the market yield or the rate of return on the preferred stock’s promised dividend
Valuing Preferred Stock

• Estimating the Market Yield:
  - The market yield on a share of preferred stock is typically estimated using the market prices of similar shares of preferred stock which can be observed in the financial market.
    \[ r_{ps} = \frac{D_{ps}}{V_{ps}} \]

• Example: Compute the yield on XYZ’s preferred stock if it has a promised annual dividend of $1.20 per share and each share is currently selling for $32.50?

\[ r_{ps} = \frac{D_{ps}}{V_{ps}} = \frac{1.20}{32.50} = 0.0369 \text{ or } 3.69\% \]

Example: Valuing Preferred Stock

Consider Con Edison’s (ED) preferred stock issue, which pays an annual dividend of $5.00 per share, does not have a maturity date, and on which the market’s required yield or promised rate of return \( (r_{ps}) \) for similar shares of preferred stock is 6.02%. What is the value of the Con Edison preferred stock?

**STEP 3: Solve**

Substituting into Equation (10-6) a value of $5.00 for \( D_{ps} \), and 0.0602 for \( r_{ps} \), we can determine the value of the Con Edison preferred stock as follows:

\[ V_{ps} = \frac{D_{ps}}{r_{ps}} = \frac{5.00}{0.0602} = 83.06 \]

Thus, the present value of this preferred stock is $83.06.

**STEP 4: Analyze**

Since preferred stock is a level perpetuity, its value on any future date will be the same as its present value today. That is, the value of this preferred stock is $83.06 today, and if all else remains the same, the preferred shares will be worth $83.06 five years from now, ten years from now, and 100 years from now as long as the promised rate of return on the shares remains the same.
<table>
<thead>
<tr>
<th>Type of Security</th>
<th>Cash Flow</th>
<th>Discount Rule</th>
<th>Valuation Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond</td>
<td>Present value of interest and principal payments. These payments are set forth in the contract between the bond issuing company and the owner of the bond.</td>
<td>Market's required yield to maturity (YTM).</td>
<td>Bond Value: [ \text{Principal} \left(1 + \frac{1}{1 + \text{YTM}_{	ext{market}}} \right) ]</td>
</tr>
<tr>
<td>Preferred stock</td>
<td>Present dividends. Dividends are defined as a continuously set dividend yield that is multiplied by the par or face value of the preferred stock to get the preferred stock dividend.</td>
<td>Market or required yield on preferred stock.</td>
<td>Value of Preferred Stock: [ \frac{\text{Annual Preferred Stock Dividend}}{\text{Market's Required Yield on Preferred Stock}} ]</td>
</tr>
<tr>
<td>Common stock</td>
<td>Expected future dividends. No dividend is prescribed for common stock. Expected dividends must be estimated, so we value common stock using expected rather than promised future cash flows.</td>
<td>Investor's expected rate of return which is the investor's required rate of return since common stock dividends are risky and expected future dividend and discount then using a risk-adjusted or expected rate of return for investing in shares of stock of firms with similar risk to the common stock being valued.</td>
<td>Value of Common Stock: [ \frac{D_0(1 + g)}{r_e - g} ]</td>
</tr>
</tbody>
</table>

Bonds and preferred stock state a promised cash payment to the security holder. In the case of a bond, interest and principal must be paid in accordance with the terms of the bond contract. Preferred stock is composed of a dividend (yield) which when multiplied by the face or par value of the preferred stock, equals the promised preferred dividend. Both bonds and preferred stock are valued by discounting these promised cash flows back to the present. However, since these are promised (and not expected) cash flows, we discount the cash flows using promised rate of return as reflected in current market prices of similar securities. Common stock, on the other hand, does not have a contractual promised dividend payment, so we apply the discounted cash flow model in this instance by estimating expected Multi dividends and then discounting them back to the present using the expected rate of return that an investor would require if investing in a stock with similar attributes of the shares being valued.