CHAPTER 9
Stocks and Their Valuation

- **Preferred stock**
- **Features of common stock**
- **Determining common stock values**
- **Efficient markets**

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Preferred Stock

- **Hybrid security.**
- **Similar to bonds in that preferred stockholders receive a fixed dividend that must be paid before dividends can be paid on common stock.**
- **However, unlike interest payments on bonds, companies can omit dividend payments on preferred stock without fear of pushing the firm into bankruptcy.**

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Stock Value = PV of Dividends

$$V_p = \frac{D}{(1+k_s)^1} + \frac{D}{(1+k_s)^2} + \frac{D}{(1+k_s)^3} + \ldots + \frac{D}{(1+k_s)^\infty}$$

The dividend stream is a perpetuity (an annuity with no maturity).

```
0        1          2          3
|  13%   |          |          |  ...    ∞
       20.00      20.00      20.00
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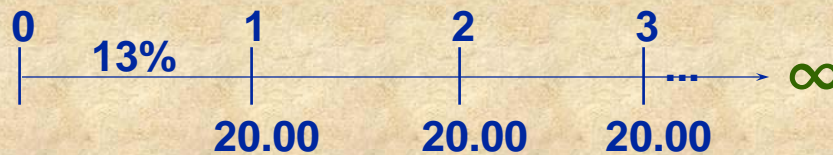
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Since the dividend remains the same, the present value of each dividend decreases as time until receipt increases.

N	I	PV	FV
1	13	17.70	20.00
5	13	10.86	20.00
50	13	0.04	20.00
100	13	0.0001	20.00

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Eventually the "far away" future payments have a present value of virtually zero.

This allows us to develop a simple formula to calculate the value of preferred stock.

$$V_p = \frac{D}{k_p}$$

V_p = value of preferred

D = dividend

k_p = discount rate

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If the appropriate discount rate is 13%, what is the value of a preferred stock with a par value of $200 that promises to pay a dividend equal to 10% of par?

$$V_p = \frac{D}{k_p} = \frac{20.00}{0.13} = 153.85$$

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Preferred Stock

The value of a preferred stock can be found using the calculator. Treat the stock as an annuity (end mode) with a large number of payments (e.g., n=1000).

INPUTS	1000	13		20	
	N	I/YR	PV	PMT	FV
OUTPUT			-153.85		

Facts about Common Stock

- **Represents ownership.**
- **Ownership implies control.**
- **Stockholders elect directors.**
- **Directors elect management.**
- **Management's goal: Maximize the stock price.**

Different Approaches for Valuing Common Stock

- **Dividend growth model**

- **Free cash flow method**

- **Using the multiples of comparable firms**

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Stock Value = PV of Dividends

$$\hat{P}_0 = \frac{D_1}{\left(1+k_s\right)^1} + \frac{D_2}{\left(1+k_s\right)^2} + \frac{D_3}{\left(1+k_s\right)^3} + \ldots + \frac{D_\infty}{\left(1+k_s\right)^\infty}.$$

What is a constant growth stock?

One whose dividends are expected to grow forever at a constant rate, g.

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If a stock has constant growth, we can again develop a simple formula to value the stock.

$$P_0 = \frac{D_0(1 + g)}{k_s - g} = \frac{D_1}{k_s - g}$$

P_0 = price of stock at time 0

D_0 = "old" dividend

D_1 = "new" (or next) dividend

g = dividend growth rate

k_s = appropriate discount rate ($k_s > g$)

What happens if $g > k_s$?

- If $g > k_s$, the constant growth formula leads to a negative stock price, which does not make sense.

- The constant growth model can only be used if:
  - $k_s > g$
  - g is expected to be constant forever

Assume beta = 1.2, k_{RF} = 7%, and k_M = 12%. What is the required rate of return on the firm's stock?

Use the CAPM to calculate k_s:

$$k_s = k_{RF} + (k_M - k_{RF})b_{Firm}$$
$$= 7\% + (12\% - 7\%)(1.2)$$
$$= 13\%$$

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What's the stock's market value?
D_1 = 3.50, k_s = 13%, g = 6%.

Constant growth model:

$$P_0 = \frac{D_1}{k_s - g} = \frac{3.50}{0.13 - 0.06}$$

$$= \frac{\$3.50}{0.07} = \$50.00$$

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What's the stock's market value if $D_0 = 2.00$, $k_s = 13\%$, $g = 6\%$.

Constant growth model:

$$P_0 = \frac{D_0(1+g)}{k_s - g} = \frac{2(1+0.06)}{0.13 - 0.06}$$

$$= \frac{\$2.12}{0.07} = \$30.29$$

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What is the stock's market value one year from now, $\hat{P}_1$?

- D_1 will have been paid, so expected dividends are D_2, D_3, D_4 and so on. Thus,

$$\hat{P}_1 = \frac{D_2}{k_s - g} = \frac{\$2.247}{0.13 - 0.06}$$

$$= \$32.10.$$

Could also find $\hat{P}_1$ as follows:

$$\hat{P}_1 = P_0(1.06) = \$32.10.$$

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Find the expected dividend yield, capital gains yield, and total return during the first year.

$$\text{Dividend yld} = \frac{D_1}{P_0} = \frac{\$2.12}{\$30.29} = 7.0\%.$$

$$\text{Cap gains yld} = \frac{\hat{P}_1 - P_0}{P_0} = \frac{\$32.10 - \$30.29}{\$30.29}$$
$$= 6.0\%.$$

Total return = 7.0% + 6.0% = 13.0%.

Rearrange model to rate of return form:

$$\hat{P}_0 = \frac{D_1}{k_s - g} \quad \text{to} \quad \hat{k}_s = \frac{D_1}{P_0} + g.$$

Then, $\hat{k}_s$ = $2.12/$30.29 + 0.06
= 0.07 + 0.06 = 13%.

Supernormal (multiple) growth model

Often stocks do not have constant growth.

Instead, it is possible that they are currently undergoing a period of high or low growth relative to its average growth.

For these stocks we need a different valuation model.

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Supernormal growth model

$$P_0 = \sum_{t=1}^{N} \frac{D_t}{\left(1+k_s\right)^t} + \frac{\left(\dfrac{D_N\left(1+g\right)}{k_s-g}\right)}{\left(1+k_s\right)^N}$$

The model separates the dividends during the unusual growth period.

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Supernormal growth model

In words the formula has three parts.

1. Calculate the expected dividends during the unusual growth period.

2. Calculate the value of the stock at the end of unusual growth using the constant growth model.

3. Calculate the present value of the amounts found in steps 1 and 2.

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If we have supernormal growth of 30% for 3 years, the dividend last year was $2.00, and the long-run constant growth rate is 6%, what should be the price of the stock if the appropriate discount rate is 13%.

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- **Step 1: Dividends during unusual growth**
  - $D_1 = 2.00(1+0.30) = 2.60$
  - $D_2 = 2.60(1+0.30) = 3.38$
  - $D_3 = 3.38(1+0.30) = 4.394$

Step 2: Calculate value of stock at end of unusual growth period using constant growth model.

$$P_3 = \frac{D_3(1+g_c)}{k_s - g_c} = \frac{4.394(1+.06)}{.13 - .06} = \$66.54$$

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Step 3: Compute the present value of the amounts in steps 1 and 2. (This is an uneven cash flow problem.)

CF0 = 0

CF1 = 2.60

CF2 = 3.38

CF3 = 4.394 + 66.54

I = 13

NPV = 54.11

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- **During nonconstant growth,**
  - **D/P and capital gains yield are not constant, and**
  - **capital gains yield is not equal to g.**

- **After t = 3,**
  - **g = constant = 6% = capital gains yield;**
  - **k = 13%; so D/P = 13% − 6% = 7%.**

Free Cash Flow Method

- **The free cash flow method suggests that the value of the entire firm equals the present value of the firm's free cash flows (calculated on an after-tax basis).**

- **The free cash flow in any given year can be calculated as:**

    NOPAT – Net capital investment

Using the Free Cash Flow Method

- **Once the value of the firm is estimated, an estimate of the stock price can be found as follows:**

  - **MV of common stock (market capitalization) = MV of firm – MV of debt and preferred stock.**

  - **$\hat{P}$ = MV of common stock/# of shares.**

Issues Regarding the Free Cash Flow Method

- **Free cash flow method is often preferred to the dividend growth model--particularly for the large number of companies that don't pay a dividend, or for whom it is hard to forecast dividends.**

(More...)

FCF Method Issues (Continued)

- **Similar to the dividend growth model, the free cash flow method generally assumes that at some point in time, the growth rate in free cash flow will become constant.**
- **Terminal value represents the value of the firm at the point in which growth becomes constant.**

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FCF Method Issues (Continued)

Determining the value of the firm using the free cash flow method uses the same procedure as the dividend models.

The difference is that the dividend in the models is replaced with the free cash flow and the appropriate discount rate is the firm's cost of capital.

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FCF estimates for the next 3 years are -$5, $10, and $20 million, after which the FCF is expected to grow at 6%. The overall firm cost of capital is 10%.

- **Step 1**: Free cash flow during unusual growth

  - **FCF$_1$ = -5.00**

  - **FCF$_2$ = 10.00**

  - **FCF$_3$ = 20.00**

Step 2: Calculate value of stock at end of unusual growth period using constant growth model.

$$P_3 = \frac{FCF_3(1+g_c)}{k_s - g_c} = \frac{20(1+.06)}{.10 - .06} = \$530$$

Step 3: Compute the present value of the amounts in steps 1 and 2. (This is an uneven cash flow problem.)

CF0 = 0

CF1 = -5

CF2 = 10

CF3 = 20 + 530

I = 10

NPV = 416.94

If the firm has $40 million in debt and has 10 million shares of stock, what is the price per share?

Value of equity = Total value – Value of debt

= $416.94 – $40

= $376.94 million.

Price per share = Value of equity/# of shares

= $376.94/10

= $37.69

Using the Multiples of Comparable Firms to Estimate Stock Price

- Analysts often use the following multiples to value stocks:
  - P/E
  - P/CF
  - P/Sales

- Example: Based on comparable firms, estimate the appropriate P/E. Multiply this by expected earnings to back out an estimate of the stock price.

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Why do stock prices change?

$$\hat{P}_0 = \frac{D_1}{k_i - g}.$$

1. k_i could change:
   $k_i = k_{RF} + (k_M - k_{RF})b_i.$
   $k_{RF} = k^* + IP.$

2. g could change due to economic or firm situation.

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What's the Efficient Market Hypothesis?

Securities are normally in equilibrium and are "fairly priced." One cannot "beat the market" except through good luck or better information.

Weak-form EMH: Cannot profit by looking at past trends. A recent decline is no reason to think stocks will go up (or down) in the future. Evidence supports weak-form EMH, but "technical analysis" is still used.

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Semistrong-form EMH: All publicly available information is reflected in stock prices, so doesn't pay to pore over annual reports looking for undervalued stocks. Largely true, but superior analysts can still profit by finding and using new information.

Strong-form EMH: All information, even inside information, is embedded in stock prices. Not true--insiders can gain by trading on the basis of insider information, but that's illegal.

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Is the stock market efficient?

- **Empirical studies have been conducted to test the three forms of efficiency. Most of which suggest the stock market was:**
  - **Highly efficient in the weak form.**
  - **Reasonably efficient in the semistrong form.**
  - **Not efficient in the strong form. Insiders could and did make abnormal (and sometimes illegal) profits.**

Behavioral Finance

- **Behavioral finance – incorporates elements of cognitive psychology to better understand how individuals and markets respond to different situations.**