5-1

ANSWERS TO END-OF-CHAPTER QUESTIONS

a. A proxy is a document giving one person the authority to act for another, typically the power to vote shares of common stock. If earnings are poor and stockholders are dissatisfied, an outside group may solicit the proxies in an effort to overthrow management and take control of the business, known as a proxy fight. A takeover is an action whereby a person or group succeeds in ousting a firm's management and taking control of the company.

b. The preemptive right gives the current shareholders the right to purchase any new shares issued in proportion to their current holdings. The preemptive right may or may not be required by state law. When granted, the preemptive right enables current owners to maintain their proportionate share of ownership and control of the business. It also prevents the sale of shares at low prices to new stockholders which would dilute the value of the previously issued shares.

c. Classified stock is sometimes created by a firm to meet special needs and circumstances. Generally, when special classifications of stock are used, one type is designated "Class A", another as "Class B", and so on. Class A might be entitled to receive dividends before dividends can be paid on Class B stock. Class B might have the exclusive right to vote. Founders' shares are stock owned by the firm's founders that have sole voting rights but restricted dividends for a specified number of years.

d. Some companies are so small that their common stocks are not actively traded; they are owned by only a few people, usually the companies' managers. Such firms are said to be closely held corporations. In contrast, the stocks of most larger companies are owned by a large number of investors, most of whom are not active in management. Such companies are said to be publicly owned corporations.

e. The over-the-counter (OTC) market is the network of dealers that provides for trading in unlisted securities. An organized security exchange is a formal organization, having a tangible physical location, that facilitates trading in designated ("listed") securities. The two major U.S. security exchanges are the New York Stock Exchange (NYSE) and the American Stock Exchange (AMEX).

f. The secondary market deals with trading in previously issued, or outstanding, shares of established, publicly owned companies. The company receives no new money when sales are made in the secondary market. The primary market handles additional shares sold by established, publicly owned companies. Companies can raise additional capital by selling in this market.

Answers and Solutions: 5 - 8
g. Going public is the act of selling stock to the public at large by a closely held corporation or its principal stockholders, and this market is often termed the initial public offering (IPO) market.

h. Intrinsic value (\(V\)) is the present value of the expected future cash flows. The market price (\(P\)) is the price at which an asset can be sold.

i. The required rate of return on common stock, denoted by \(k_r\), is the minimum acceptable rate of return considering both its riskiness and the returns available on other investments. The expected rate of return, denoted by \(k_e\), is the rate of return expected on a stock given its current price and expected future cash flows. If the stock is in equilibrium, the required rate of return will equal the expected rate of return. The realized (actual) rate of return, denoted by \(k_r\), is the rate of return that was actually realized at the end of some holding period. Although expected and required rates of return must always be positive, realized rates of return over some periods may be negative.

j. The capital gains yield results from changing prices and is calculated as \((P_t - P_0)/P_0\), where \(P_0\) is the beginning-of-period price and \(P_t\) is the end-of-period price. For a constant growth stock, the capital gains yield is \(g\), the constant growth rate. The dividend yield on a stock can be defined as either the end-of-period dividend divided by the beginning-of-period price, or the ratio of the current dividend to the current price. Valuation formulas use the former definition. The expected total return, or expected rate of return, is the expected capital gains yield plus the expected dividend yield on a stock. The expected total return on a bond is the yield to maturity.

k. A zero growth stock has constant earnings and dividends; thus, the expected dividend payment is fixed, just like a bond’s coupon payment. Since the company is presumed to continue operations indefinitely, the dividend stream is a perpetuity. A perpetuity is a security on which the principal never has to be repaid.

l. Normal, or constant, growth occurs when a firm’s earnings and dividends grow at some constant rate forever. One category of nonconstant growth stock is a “supernormal” growth stock which has one or more years of growth above that of the economy as a whole, but at some point the growth rate will fall to the “normal” rate. This occurs, generally, as part of a firm’s normal life cycle.

m. Equilibrium is the condition under which the expected return on a security is just equal to its required return, \(k = k_r\), and the price is stable.
n. The Efficient Markets Hypothesis (EMH) states (1) that stocks are always in equilibrium and (2) that it is impossible for an investor to consistently "beat the market." In essence, the theory holds that the price of a stock will adjust almost immediately in response to any new developments. In other words, the EMH assumes that all important information regarding a stock is reflected in the price of that stock. Financial theorists generally define three forms of market efficiency: weak-form, semistrong-form, and strong-form.

Weak-form efficiency assumes that all information contained in past price movements is fully reflected in current market prices. Thus, information about recent trends in a stock's price is of no use in selecting a stock. Semistrong-form efficiency states that current market prices reflect all publicly available information. Therefore, the only way to gain abnormal returns on a stock is to possess inside information about the company's stock. Strong-form efficiency assumes that all information pertaining to a stock, whether public or inside information, is reflected in current market prices. Thus, no investors would be able to earn abnormal returns in the stock market.

o. Preferred stock is a hybrid—it is similar to bonds in some respects and to common stock in other respects. Preferred dividends are similar to interest payments on bonds in that they are fixed in amount and generally must be paid before common stock dividends can be paid. If the preferred dividend is not earned, the directors can omit it without throwing the company into bankruptcy. So, although preferred stock has a fixed payment like bonds, a failure to make this payment will not lead to bankruptcy. Most preferred stocks entitle their owners to regular fixed dividend payments.

5-2 True. The value of a share of stock is the PV of its expected future dividends. If the two investors expect the same future dividend stream, and they agree on the stock's riskiness, then they should reach similar conclusions as to the stock's value.

5-3 A perpetual bond is similar to a no-growth stock and to a share of preferred stock in the following ways:

1. All three derive their values from a series of cash inflows—coupon payments from the perpetual bond, and dividends from both types of stock.

2. All three are assumed to have indefinite lives with no maturity value (M) for the perpetual bond and no capital gains yield for the stocks.

5-4 Yes. If a company decides to increase its payout ratio, then the dividend yield component will rise, but the expected long-term capital gains yield will decline.

5-5 No. The correct equation has $D_i$ in the numerator and a minus sign in the denominator.

Answers and Solutions: 5 - 10
SOLUTIONS TO END-OF-CHAPTER PROBLEMS

5-6
a. The average investor in a listed firm is not really interested in maintaining his proportionate share of ownership and control. If he wanted to increase his ownership, he could simply buy more stock on the open market. Consequently, most investors are not concerned with whether new shares are sold directly at market prices or through rights offerings. However, if a rights offering is being used to effect a stock split, or if it is being used to reduce the underwriting cost of an issue [by substantial underpricing], the preemptive right may well be beneficial to the firm and to its stockholders.

b. The preemptive right is clearly important to the stockholders of closely held firms whose owners are interested in maintaining their relative control positions.

5-1
\[ D_0 = \$1.50; \quad g_1 - g_2 = 5\%; \quad g_n = 10\%; \quad D_1 \text{ through } D_n = ? \]
\[
\begin{align*}
D_1 &= D_0(1 + g_1) = \$1.50(1.05) = \$1.5750. \\
D_2 &= D_0(1 + g_1)(1 + g_2) = \$1.50(1.05)^2 = \$1.6638. \\
D_3 &= D_0(1 + g_1)(1 + g_2)(1 + g_3) = \$1.50(1.05)^3 = \$1.7634. \\
D_n &= D_0(1 + g_1)(1 + g_2)(1 + g_n) = \$1.50(1.05)^n(1.10) = \$1.9101. \\
D_n &= D_0(1 + g_1)(1 + g_2)(1 + g_n) = \$1.50(1.05)^n(1.10)^n = \$2.1011.
\end{align*}
\]

5-2
\[ D_0 = \$0.50; \quad g = 7\%; \quad k_n = 15\%; \quad \hat{P}_1 = ? \]
\[ \hat{P}_1 = \frac{D_1}{k_n - g} = \frac{0.50}{0.15 - 0.07} = \$6.25. \]

5-3
\[ P_0 = \$20; \quad D_0 = \$1.00; \quad g = 10\%; \quad \hat{P}_1 = ?; \quad \hat{k}_n = ? \]
\[ \hat{P}_1 = P_0(1 + g) = \$20(1.10) = \$22. \]
\[ \hat{k}_n = \frac{D_1}{\hat{P}_1} + g = \frac{1.00(1.10)}{22} + 0.10 \\
= \frac{1.10}{22} + 0.10 = 15.50\%. \quad \hat{k}_n = 15.50\%. \]

Answers and Solutions: 5-11
D_{0s} = $5.00; \ V_{ps} = $60; \ x_{ps} = ?

k_{ps} = \frac{D_{1s}}{V_{ps}} = \frac{5.00}{60.00} = 8.33%.

\begin{align*}
\text{Step 1: } & \text{Calculate the required rate of return on the stock: } \\
& k_s = k_{RF} + (k_M - k_{RF})b = 7.5\% + (4\%)1.2 = 12.3\%.
\end{align*}

\begin{align*}
\text{Step 2: } & \text{Calculate the expected dividends: } \\
D_0 &= $2.00 \\
D_1 &= $2.40 \\
D_2 &= $2.28 \\
D_3 &= $3.08
\end{align*}

\begin{align*}
\text{Step 3: } & \text{Calculate the PV of the expected dividends: } \\
PV_{D_s} &= \frac{2.40}{1.123} + \frac{2.28}{(1.123)^2} = $2.14 + $2.08 = $4.22.
\end{align*}

\begin{align*}
\text{Step 4: } & \text{Calculate } \bar{P}_s: \\
\bar{P}_s &= \frac{D_s}{(k_s - g)} = \$3.08/(0.123 - 0.07) = $58.11.
\end{align*}

\begin{align*}
\text{Step 5: } & \text{Calculate the PV of } \bar{P}_s: \\
PV &= $58.11/(1.123)^2 = $46.08.
\end{align*}

\begin{align*}
\text{Step 6: } & \text{Sum the PVs to obtain the stock's price: } \\
\bar{P}_s &= $4.22 + $46.08 = $50.50.
\end{align*}

Alternatively, using a financial calculator, input the following:

CF_0 = 0, \ CF_1 = 2.40, \text{ and } CF_2 = 60.99 \ (2.28 + 58.11) \text{ and then enter } I = 12.3 \text{ to solve for NPV = $50.50.}

Answers and Solutions: 5 - 12
5-9 \[ P_0 = \frac{D_1}{k_e - g} = D_0(1 + g) = \frac{35(1 + (-0.05))}{6.15 + (-0.05)} = \frac{35(0.95)}{0.15 + 0.05} = \frac{34.75}{0.20} = \$23.75. \]

5-10
a. \[ k_1 = k_{ef} + (k_e - k_{ef})b_1, \]
\[ k_2 = 9\% + (13\% - 9\%)(0.4) = 10.6\%. \]
\[ k_3 = 9\% + (13\% - 9\%)(-0.5) = 7\%. \]

Note that \( k_3 \) is below the risk-free rate. But since this stock is like an insurance policy because it "pays off" when something bad happens (the market falls), the low return is not unreasonable.

b. In this situation, the expected rate of return is as follows:
\[ \hat{k}_e = \frac{D_1/P_0 + g}{\$1.50/\$25 + 4\%} = 10\.6\%. \]

However, the required rate of return is 10.6 percent. Investors will seek to sell the stock, dropping its price to the following:
\[ \hat{P}_e = \frac{\$1.50}{0.106 - 0.04} = \$22.73. \]

At this point, \( \hat{k}_e = \frac{\$1.50}{\$22.73} + 4\% = 10.6\%, \) and the stock will be in equilibrium.

5-11
\[ D_0 = \$1, \ k_0 = 7\% + 6\% = 13\%, \ g_1 = 50\%, \ g_2 = 25\%, \ g_n = 6\%. \]

\[ D_0 \, 1 \, 2 \, 3 \, 4 \]
\[ g_1 = 50\% \, 1.50 \, 1.875 \, 1.9875 \]
\[ g_2 = 25\% \, 1.875 \, 20.393 \, 1.9875/(0.13 - 0.06) \]
\[ 1.327 \, 1.875 \, 20.393 \, \frac{1.9875}{10.268} \]
\[ 22.704 \, 25.03 \]

Answers and Solutions: 5 - 14
b. Due to the longer period of supernormal growth, the value of the stock will be higher for each year. Although the total return will remain the same, $k_s = 10\%$, the distribution between dividend yield and capital gains yield will differ. The dividend yield will start off lower and the capital gains yield will start off higher for the 5-year supernormal growth condition, relative to the 2-year supernormal growth state. The dividend yield will increase and the capital gains yield will decline over the 5-year period until dividend yield = 4% and capital gains yield = 6%.

c. Throughout the supernormal growth period, the total yield will be 10 percent, but the dividend yield is relatively low during the early years of the supernormal growth period and the capital gains yield is relatively high. As we near the end of the supernormal growth period, the capital gains yield declines and the dividend yield rises. After the supernormal growth period has ended, the capital gains yield will equal $g_s = 6\%$. The total yield must equal $k_s = 10\%$, so the dividend yield must equal $10\% - 6\% = 4\%$.

d. Some investors need cash dividends (retired people) while others would prefer growth. Also, investors must pay taxes each year on the dividends received during the year, while taxes on capital gains can be delayed until the gain is actually realized.

$$k_s = k_{st} + (k_w - k_{st})b = 11\% + (11\% - 11\%)1.5 = 15.5\%.$$  
$$\hat{p}_t = D_t / (k_s - g) = $2.25 / (0.155 - 0.05) = $21.43.$$  

$$k_s = 9\% + (12\% - 9\%)1.5 = 13.5\%.$$  
$$\hat{p}_t = $2.25 / (0.135 - 0.05) = $26.47.$$  

$$k_s = 9\% + (11\% - 9\%)1.5 = 12.0\%.$$  
$$\hat{p}_t = $2.25 / (0.12 - 0.05) = $32.14.$$  

d. New data given: $k_{st} = 9\%$, $k_w = 11\%$, $g = 6\%$, $b = 1.3$.  

$$k_s = k_{st} + (k_w - k_{st})b = 9\% + (11\% - 9\%)1.3 = 11.6\%.$$  
$$\hat{p}_t = D_t / (k_s - g) = $2.27 / (0.116 - 0.06) = $40.54.$$  

Answers and Solutions: 5 - 21
5-21 a. Old $k_s = k_{SR} + (k_{DR} - k_{SR})b = 9\% + (3\%)1.2 = 12.6\%$. 
New $k_s = 9\% + (3\%)0.9 = 11.7\%$.

Old price: $\hat{p}_s = \frac{D_0}{k_s - g} = \frac{D_0(1 + g)}{k_s - g} = \frac{\$2 (1.07)}{0.126 - 0.07} = \$38.21$.

New price: $\hat{p}_s = \frac{\$2 (1.05)}{0.117 - 0.05} = \$31.34$.

Since the new price is lower than the old price, the expansion in consumer products should be rejected. The decrease in risk is not sufficient to offset the decline in profitability and the reduced growth rate.

b. $P_{old} = \$38.21$, $P_{new} = \$2 (1.05)$.

Solving for $k_s$, we have the following:

\[
\$38.21 = \frac{\$2.10}{k_s - 0.05} \Rightarrow 
\$2.10 = \$38.21(k_s) - \$1.9105
\]

\[
\$4.0105 = \$38.21(k_s) \Rightarrow 
k_s = \frac{\$4.0105}{\$38.21} = 0.10496.
\]

Solving for $b$:

\[
10.496\% = 9\% + 3\%(b) \\
1.496\% = 3\%(b) \\
b = \frac{1.496\%}{3\%} = 0.49865.
\]

Check: $k_s = 9\% + (3\%)0.49865 = 10.4960\%$.

\[
\hat{p}_s = \frac{\$2.10}{0.104960 - 0.05} = \$38.21.
\]

Therefore, only if management's analysis concludes that risk can be lowered to $b = 0.49865$, or approximately 0.5, should the new policy be put into effect.

Answers and Solutions: 5 - 22