

Integrated Case

9-23

Mutual of Chicago Insurance Company *Stock Valuation*

Robert Balik and Carol Kiefer are senior vice presidents of the Mutual of Chicago Insurance Company. They are codirectors of the company's pension fund management division, with Balik having responsibility for fixed-income securities (primarily bonds) and Kiefer being responsible for equity investments. A major new client, the California League of Cities, has requested that Mutual of Chicago present an investment seminar to the mayors of the represented cities, and Balik and Kiefer, who will make the actual presentation, have asked you to help them.

To illustrate the common stock valuation process, Balik and Kiefer have asked you to analyze the Bon Temps Company, an employment agency that supplies word processor operators and computer programmers to businesses with temporarily heavy workloads. You are to answer the following questions.

A. Describe briefly the legal rights and privileges of common stockholders.

Answer: [Show S9-1 and S9-2 here.] The common stockholders are the owners of a corporation, and as such they have certain rights and privileges as described below.

1. Ownership implies control. Thus, a firm's common stockholders have the right to elect its firm's directors, who in turn elect the officers who manage the business.
2. Common stockholders often have the right, called the preemptive right, to purchase any additional shares sold by the firm. In some states, the preemptive right is automatically

included in every corporate charter; in others, it is necessary to insert it specifically into the charter.

B. (1) Write a formula that can be used to value any stock, regardless of its dividend pattern.

Answer: [Show S9-3 through S9-6 here.] The value of any stock is the present value of its expected dividend stream:

$$\hat{P}_0 = \frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \frac{D_3}{(1+r_s)^3} + \dots + \frac{D_\infty}{(1+r_s)^\infty}.$$

However, some stocks have dividend growth patterns that allow them to be valued using short-cut formulas.

B. (2) What is a constant growth stock? How are constant growth stocks valued?

Answer: [Show S9-7 and S9-8 here.] A constant growth stock is one whose dividends are expected to grow at a constant rate forever.

“Constant growth” means that the best estimate of the future growth rate is some constant number, not that we really expect growth to be the same each and every year. Many companies have dividends that are expected to grow steadily into the foreseeable future, and such companies are valued as constant growth stocks.

For a constant growth stock:

$$D_1 = D_0(1 + g), D_2 = D_1(1 + g) = D_0(1 + g)^2, \text{ and so on.}$$

With this regular dividend pattern, the general stock valuation model can be simplified to the following very important equation:

$$\hat{P}_0 = \frac{D_1}{r_s - g} = \frac{D_0(1 + g)}{r_s - g}.$$

This is the well-known “Gordon,” or “constant-growth” model for

valuing stocks. Here D_1 is the next expected dividend, which is assumed to be paid 1 year from now, r_s is the required rate of return on the stock, and g is the constant growth rate.

B. (3) What are the implications if a company forecasts a constant g that exceeds its r_s ? Will many stocks have expected $g > r_s$ in the short run (that is, for the next few years)? In the long run (that is, forever)?

Answer: [Show S9-9 here.] The model is derived mathematically, and the derivation requires that $r_s > g$. If g is greater than r_s , the model gives a negative stock price, which is nonsensical. The model simply cannot be used unless (1) $r_s > g$, (2) g is expected to be constant, and (3) g can reasonably be expected to continue indefinitely.

Stocks may have periods of supernormal growth, where $g_s > r_s$; however, this growth rate cannot be sustained indefinitely. In the long-run, $g < r_s$.

C. Assume that Bon Temps has a beta coefficient of 1.2, that the risk-free rate (the yield on T-bonds) is 7%, and that the required rate of return on the market is 12%. What is Bon Temps's required rate of return?

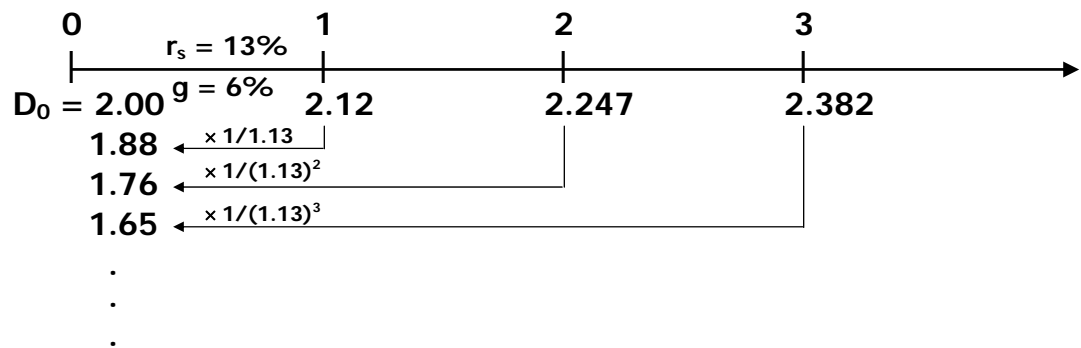
Answer: [Show S9-10 here.] Here we use the SML to calculate Bon Temps's required rate of return:

$$\begin{aligned} r_s &= r_{RF} + (r_M - r_{RF})b_{\text{Bon Temps}} = 7\% + (12\% - 7\%)(1.2) \\ &= 7\% + (5\%)(1.2) = 7\% + 6\% = 13\%. \end{aligned}$$

D. Assume that Bon Temps is a constant growth company whose last dividend (D_0 , which was paid yesterday) was \$2.00 and whose dividend is expected to grow indefinitely at a 6% rate.

(1) What is the firm's expected dividend stream over the next 3 years?

Answer: [Show S9-11 here.] Bon Temps is a constant growth stock, and its dividend is expected to grow at a constant rate of 6% per year. Expressed as a time line, we have the following setup. Just enter 2 in your calculator; then keep multiplying by $1 + g = 1.06$ to get D_1 , D_2 , and D_3 :



D. (2) What is its current stock price?

Answer: [Show S9-12 here.] We could extend the time line on out forever, find the value of Bon Temps's dividends for every year on out into the future, and then the PV of each dividend discounted at $r_s = 13\%$. For example, the PV of D_1 is \$1.8761; the PV of D_2 is \$1.7599; and so forth. Note that the dividend payments increase with time, but as long as $r_s > g$, the present values decrease with time. If we extended the graph on out forever and then summed the PVs of the dividends, we would have the value of the stock. However, since the stock is growing at a constant rate, its value can be estimated using the constant growth model:

$$\hat{P}_0 = \frac{D_1}{r_s - g} = \frac{\$2.12}{0.13 - 0.06} = \frac{\$2.12}{0.07} = \$30.29.$$

D. (3) What is the stock's expected value 1 year from now?

Answer: [Show S9-13 here.] After one year, D_1 will have been paid, so the expected dividend stream will then be $D_2, D_3, D_4,$ and so on. Thus, the expected value one year from now is \$32.10:

$$\hat{P}_1 = \frac{D_2}{r_s - g} = \frac{\$2.247}{0.13 - 0.06} = \frac{\$2.247}{0.07} = \$32.10.$$

D. (4) What are the expected dividend yield, capital gains yield, and total return during the first year?

Answer: [Show S9-14 here.] The expected dividend yield in any Year N is

$$\text{Dividend yield} = \frac{D_N}{\hat{P}_{N-1}},$$

While the expected capital gains yield is

$$\text{Capital gains yield} = \frac{(\hat{P}_N - \hat{P}_{N-1})}{\hat{P}_{N-1}} = r_s - \frac{D_N}{\hat{P}_{N-1}}.$$

Thus, the dividend yield in the first year is 7%, while the capital gains yield is 6%:

$$\begin{aligned} \text{Total return} &= 13.0\% \\ \text{Dividend yield} = \$2.12/\$30.29 &= \underline{7.0\%} \\ \text{Capital gains yield} &= \underline{\underline{6.0\%}} \end{aligned}$$

E. Now assume that the stock is currently selling at \$30.29. What is its expected rate of return?

Answer: The constant growth model can be rearranged to this form:

$$\hat{r}_s = \frac{D_1}{P_0} + g.$$

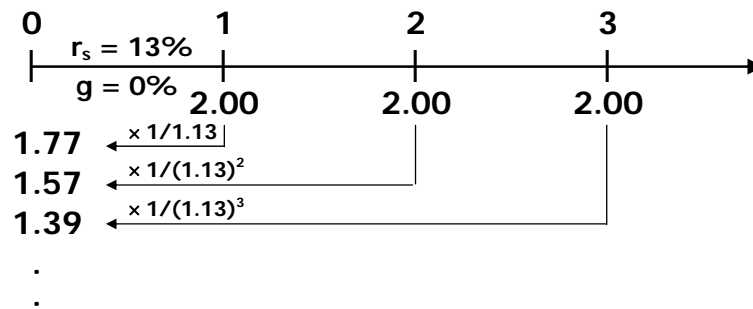
Here the current price of the stock is known, and we solve for the expected return. For Bon Temps:

$$\hat{r}_s = \$2.12/\$30.29 + 0.060 = 0.070 + 0.060 = 13\%.$$

F. What would the stock price be if its dividends were expected to have zero growth?

Answer: [Show S9-15 here.] If Bon Temps's dividends were not expected to grow at all, then its dividend stream would be a perpetuity.

Perpetuities are valued as shown below:



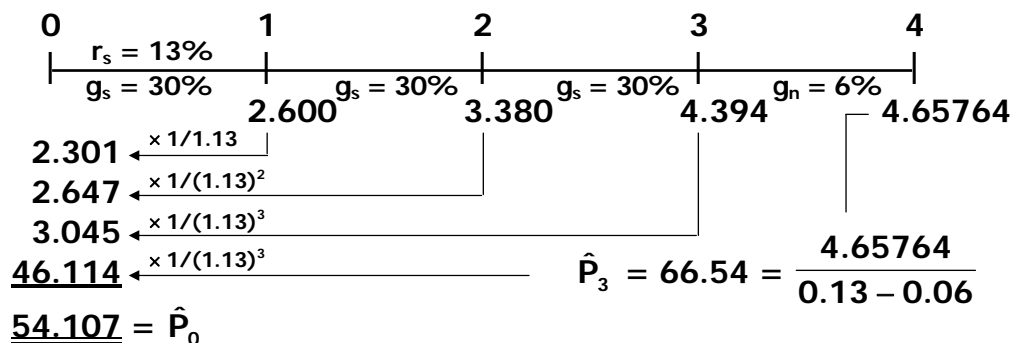
$$\hat{P}_0 = \underline{\underline{15.38}}$$

$$\hat{P}_0 = D/r_s = \$2.00/0.13 = \$15.38.$$

Note that if a preferred stock is a perpetuity, it may be valued with this formula.

G. Now assume that Bon Temps is expected to experience nonconstant growth of 30% for the next 3 years, then return to its long-run constant growth rate of 6%. What is the stock's value under these conditions? What are its expected dividend and capital gains yields in Year 1? Year 4?

Answer: [Show S9-16 through S9-18 here.] Bon Temps is no longer a constant growth stock, so the constant growth model is not applicable. Note, however, that the stock is expected to become a constant growth stock in 3 years. Thus, it has a nonconstant growth period followed by constant growth. The easiest way to value such nonconstant growth stocks is to set the situation up on a time line as shown below:



Simply enter \$2 and multiply by (1.30) to get $D_1 = \$2.60$; multiply that result by 1.3 to get $D_2 = \$3.38$, and so forth. Then recognize that after Year 3, Bon Temps becomes a constant growth stock, and at that point \hat{P}_3 can be found using the constant growth model. \hat{P}_3 is the present value as of $t = 3$ of the dividends in Year 4 and beyond and is also called the terminal value.

With the cash flows for D_1 , D_2 , D_3 , and \hat{P}_3 shown on the time line, we discount each value back to Year 0, and the sum of these four PVs is the value of the stock today, $P_0 = \$54.107$.

The dividend yield in Year 1 is 4.80%, and the capital gains yield is 8.2%:

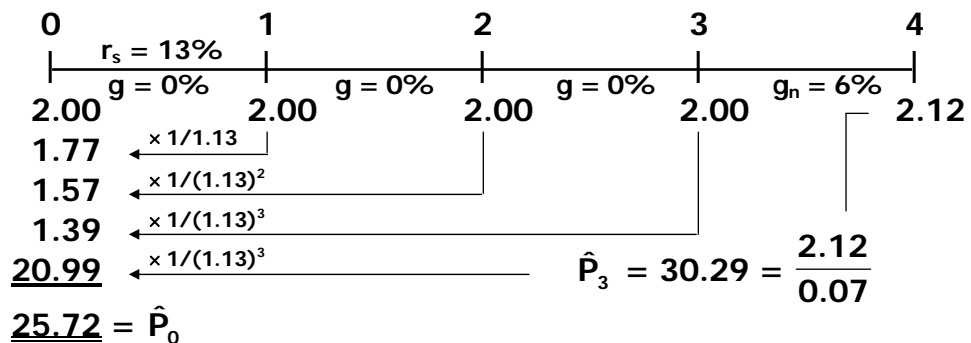
$$\text{Dividend yield} = \frac{\$2.600}{\$54.107} = 0.0480 = 4.8\%.$$

$$\text{Capital gains yield} = 13.00\% - 4.8\% = 8.2\%.$$

During the nonconstant growth period, the dividend yields and capital gains yields are not constant, and the capital gains yield does not equal g . However, after Year 3, the stock becomes a constant growth stock, with $g = \text{capital gains yield} = 6.0\%$ and $\text{dividend yield} = 13.0\% - 6.0\% = 7.0\%$.

H. Suppose Bon Temps is expected to experience zero growth during the first 3 years and then resume its steady-state growth of 6% in the fourth year. What would be its value then? What would be its expected dividend and capital gains yields in Year 1? In Year 4?

Answer: [Show S9-19 and S9-20 here.] Now we have this situation:



During Year 1:

$$\text{Dividend yield} = \frac{\$2.00}{\$25.72} = 0.0778 = 7.78\%.$$

$$\text{Capital gains yield} = 13.00\% - 7.78\% = 5.22\%.$$

Again, in Year 4 Bon Temps becomes a constant growth stock;

hence $g = \text{capital gains yield} = 6.0\%$ and $\text{dividend yield} = 7.0\%$.

I. Finally, assume that Bon Temps's earnings and dividends are expected to decline at a constant rate of 6% per year, that is, $g = -6\%$. Why would anyone be willing to buy such a stock, and at what price should it sell? What would be its dividend and capital gains yields in each year?

Answer: [Show S9-21 and S9-22 here.] The company is earning something and paying some dividends, so it clearly has a value greater than zero. That value can be found with the constant growth formula, but where g is negative:

$$P_0 = \frac{D_1}{r_s - g} = \frac{D_0(1 + g)}{r_s - g} = \frac{\$2.00(0.94)}{0.13 - (-0.06)} = \frac{\$1.88}{0.19} = \$9.89.$$

Since it is a constant growth stock:

$$g = \text{Capital gains yield} = -6.0\%,$$

Hence:

$$\text{Dividend yield} = 13.0\% - (-6.0\%) = 19.0\%.$$

As a check:

$$\text{Dividend yield} = \frac{\$1.88}{\$9.89} = 0.190 = 19.0\%.$$

The dividend and capital gains yields are constant over time, but a high (19.0%) dividend yield is needed to offset the negative capital gains yield.

J. Suppose Bon Temps embarked on an aggressive expansion that requires additional capital. Management decided to finance the expansion by borrowing \$40 million and by halting dividend payments to increase retained earnings. Its WACC is now 10%, and the projected free cash flows for the next 3 years are -\$5 million, \$10 million, and \$20 million. After Year 3, free cash flow is

K. Suppose Bon Temps decided to issue preferred stock that would pay an annual dividend of \$5 and that the issue price was \$50 per share. What would be the stock's expected return? Would the expected rate of return be the same if the preferred was a perpetual issue or if it had a 20-year maturity?

Answer: [Show S9-29 and S9-30 here.]

$$\begin{aligned}\hat{r}_p &= \frac{D_p}{V_p} \\ &= \frac{\$5}{\$50} \\ &= 10\%.\end{aligned}$$

If the preferred has a 20-year maturity its value would be calculated as follows:

Enter in your financial calculator: N = 20; I/YR = 10; PMT = 5; FV = 50; and then solve for PV = \$50.

However, to find the value of the perpetual preferred's dividends after Year 20 we can enter the following data: N = 20; I/YR = 10; PMT = 5; FV = 0; and then solve for PV = \$42.57. Thus, dividends in Years 21 to infinity account for \$50.00 – \$42.57 = \$7.43 of the perpetual preferred's value.