

An entertaining introduction to efficient markets can be found in B. Malkiel's popular book, *A Random Walk Down Wall Street: Completely Revised and Updated Eighth Edition* (W. W. Norton, 2003).

For a classic discussion of market efficiency, the arguments that support it, and important empirical tests, see E. F. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance* 25 (1970): 383–417, and "Efficient Capital Markets: II," *The Journal of Finance* 46(5) (1991): 1575–1617. Another review of the literature and apparent anomalies can be found in R. Ball, "The Development, Accomplishments and Limitations of the Theory of Stock Market Efficiency," *Managerial Finance* 20(2,3) (1994): 3–48.

For two sides of the debate of whether the price of Internet companies in the late 1990s could be justified by a valuation model, see: L. Pástor and P. Veronesi, "Was There a Nasdaq Bubble in the Late 1990s?" *Journal of Financial Economics* 81(2006): 61–100; M. Richardson and E. Ofek, "DotCom Mania: The Rise and Fall of Internet Stock Prices," *Journal of Finance* 58 (2003): 1113–1138.

## Problems

All problems are available in MyFinanceLab. An asterisk (\*) indicates problems with a higher level of difficulty.

### The Dividend Discount Model

1. Assume Evco, Inc., has a current price of \$50 and will pay a \$2 dividend in one year, and its equity cost of capital is 15%. What price must you expect it to sell for right after paying the dividend in one year in order to justify its current price?
2. Anle Corporation has a current price of \$20, is expected to pay a dividend of \$1 in one year, and its expected price right after paying that dividend is \$22.
  - a. What is Anle's expected dividend yield?
  - b. What is Anle's expected capital gain rate?
  - c. What is Anle's equity cost of capital?
3. Suppose Acap Corporation will pay a dividend of \$2.80 per share at the end of this year and \$3 per share next year. You expect Acap's stock price to be \$52 in two years. If Acap's equity cost of capital is 10%:
  - a. What price would you be willing to pay for a share of Acap stock today, if you planned to hold the stock for two years?
  - b. Suppose instead you plan to hold the stock for one year. What price would you expect to be able to sell a share of Acap stock for in one year?
  - c. Given your answer in part (b), what price would you be willing to pay for a share of Acap stock today, if you planned to hold the stock for one year? How does this compare to your answer in part (a)?
4. Krell Industries has a share price of \$22 today. If Krell is expected to pay a dividend of \$0.88 this year, and its stock price is expected to grow to \$23.54 at the end of the year, what is Krell's dividend yield and equity cost of capital?

### Applying the Dividend-Discount Model

5. NoGrowth Corporation currently pays a dividend of \$2 per year, and it will continue to pay this dividend forever. What is the price per share if its equity cost of capital is 15% per year?
6. Summit Systems will pay a dividend of \$1.50 this year. If you expect Summit's dividend to grow by 6% per year, what is its price per share if its equity cost of capital is 11%?

7. Dorpac Corporation has a dividend yield of 1.5%. Dorpac's equity cost of capital is 8%, and its dividends are expected to grow at a constant rate.
  - a. What is the expected growth rate of Dorpac's dividends?
  - b. What is the expected growth rate of Dorpac's share price?
8. Kenneth Cole Productions (KCP) suspended its dividend at the start of 2009 and as of the middle of 2012, has not reinstated its dividend. Suppose you do not expect KCP to resume paying dividends until July 2014. You expect KCP's dividend in July 2014 to be \$1.00 (paid annually), and you expect it to grow by 5% per year thereafter. If KCP's equity cost of capital is 11%, what is the value of a share of KCP in July 2012?
9. In 2006 and 2007, Kenneth Cole Productions (KCP) paid annual dividends of \$0.72. In 2008, KCP paid an annual dividend of \$0.36, and then paid no further dividends through 2012. Suppose KCP was acquired at the end of 2012 for \$15.25 per share.
  - a. What would an investor with perfect foresight of the above been willing to pay for KCP at the start of 2006? (*Note*: Because an investor with perfect foresight bears no risk, use a risk-free equity cost of capital of 5%.)
  - b. Does your answer to (a) imply that the market for KCP stock was inefficient in 2006?
10. DFB, Inc., expects earnings this year of \$5 per share, and it plans to pay a \$3 dividend to shareholders. DFB will retain \$2 per share of its earnings to reinvest in new projects with an expected return of 15% per year. Suppose DFB will maintain the same dividend payout rate, retention rate, and return on new investments in the future and will not change its number of outstanding shares.
  - a. What growth rate of earnings would you forecast for DFB?
  - b. If DFB's equity cost of capital is 12%, what price would you estimate for DFB stock?
  - c. Suppose DFB instead paid a dividend of \$4 per share this year and retained only \$1 per share in earnings. If DFB maintains this higher payout rate in the future, what stock price would you estimate now? Should DFB raise its dividend?
11. Cooperton Mining just announced it will cut its dividend from \$4 to \$2.50 per share and use the extra funds to expand. Prior to the announcement, Cooperton's dividends were expected to grow at a 3% rate, and its share price was \$50. With the new expansion, Cooperton's dividends are expected to grow at a 5% rate. What share price would you expect after the announcement? (Assume Cooperton's risk is unchanged by the new expansion.) Is the expansion a positive NPV investment?
12. Procter & Gamble will pay an annual dividend of \$0.65 one year from now. Analysts expect this dividend to grow at 12% per year thereafter until the fifth year. After then, growth will level off at 2% per year. According to the dividend-discount model, what is the value of a share of Procter & Gamble stock if the firm's equity cost of capital is 8%?
13. Colgate-Palmolive Company has just paid an annual dividend of \$0.96. Analysts are predicting an 11% per year growth rate in earnings over the next five years. After then, Colgate's earnings are expected to grow at the current industry average of 5.2% per year. If Colgate's equity cost of capital is 8.5% per year and its dividend payout ratio remains constant, what price does the dividend-discount model predict Colgate stock should sell for?
14. What is the value of a firm with initial dividend  $Div$ , growing for  $n$  years (i.e., until year  $n + 1$ ) at rate  $g_1$  and after that at rate  $g_2$  forever, when the equity cost of capital is  $r$ ?
15. Halliford Corporation expects to have earnings this coming year of \$3 per share. Halliford plans to retain all of its earnings for the next two years. For the subsequent two years, the firm will retain 50% of its earnings. It will then retain 20% of its earnings from that point onward. Each year, retained earnings will be invested in new projects with an expected return of 25% per year. Any earnings that are not retained will be paid out as dividends. Assume Halliford's share count remains constant and all earnings growth comes from the investment of retained earnings. If Halliford's equity cost of capital is 10%, what price would you estimate for Halliford stock?

### Total Payout and Free Cash Flow Valuation Models

16. Suppose Amazon.com Inc. pays no dividends but spent \$2 billion on share repurchases last year. If Amazon's equity cost of capital is 8%, and if the amount spent on repurchases is expected to grow by 6% per year, estimate Amazon's market capitalization. If Amazon has 450 million shares outstanding, what stock price does this correspond to?
17. Maynard Steel plans to pay a dividend of \$3 this year. The company has an expected earnings growth rate of 4% per year and an equity cost of capital of 10%.
- Assuming Maynard's dividend payout rate and expected growth rate remains constant, and Maynard does not issue or repurchase shares, estimate Maynard's share price.
  - Suppose Maynard decides to pay a dividend of \$1 this year and use the remaining \$2 per share to repurchase shares. If Maynard's total payout rate remains constant, estimate Maynard's share price.
  - If Maynard maintains the dividend and total payout rate given in part (b), at what rate are Maynard's dividends and earnings per share expected to grow?
18. Benchmark Metrics, Inc. (BMI), an all-equity financed firm, just reported EPS of \$5.00 per share for 2008. Despite the economic downturn, BMI is confident regarding its current investment opportunities. But due to the financial crisis, BMI does not wish to fund these investments externally. The Board has therefore decided to suspend its stock repurchase plan and cut its dividend to \$1 per share (vs. almost \$2 per share in 2007), and retain these funds instead. The firm has just paid the 2008 dividend, and BMI plans to keep its dividend at \$1 per share in 2009 as well. In subsequent years, it expects its growth opportunities to slow, and it will still be able to fund its growth internally with a target 40% dividend payout ratio, and reinitiating its stock repurchase plan for a total payout rate of 60%. (All dividends and repurchases occur at the end of each year.)
- Suppose BMI's existing operations will continue to generate the current level of earnings per share in the future. Assume further that the return on new investment is 15%, and that reinvestments will account for all future earnings growth (if any). Finally, assume BMI's equity cost of capital is 10%.
- Estimate BMI's EPS in 2009 and 2010 (before any share repurchases).
  - What is the value of a share of BMI at the start of 2009?



19. Heavy Metal Corporation is expected to generate the following free cash flows over the next five years:

Year	1	2	3	4	5
FCF (\$ millions)	53	68	78	75	82

After then, the free cash flows are expected to grow at the industry average of 4% per year. Using the discounted free cash flow model and a weighted average cost of capital of 14%:

- Estimate the enterprise value of Heavy Metal.
  - If Heavy Metal has no excess cash, debt of \$300 million, and 40 million shares outstanding, estimate its share price.
20. IDX Technologies is a privately held developer of advanced security systems based in Chicago. As part of your business development strategy, in late 2008 you initiate discussions with IDX's founder about the possibility of acquiring the business at the end of 2008. Estimate the value of IDX per share using a discounted FCF approach and the following data:
- Debt: \$30 million
  - Excess cash: \$110 million
  - Shares outstanding: 50 million
  - Expected FCF in 2009: \$45 million
  - Expected FCF in 2010: \$50 million
  - Future FCF growth rate beyond 2010: 5%
  - Weighted-average cost of capital: 9.4%



21. Sora Industries has 60 million outstanding shares, \$120 million in debt, \$40 million in cash, and the following projected free cash flow for the next four years:





	Year	0	1	2	3	4
<b>Earnings and FCF Forecast (\$ millions)</b>						
1	Sales	433.0	468.0	516.0	547.0	574.3
2	Growth versus Prior Year		8.1%	10.3%	6.0%	5.0%
3	Cost of Goods Sold		(313.6)	(345.7)	(366.5)	(384.8)
4	<b>Gross Profit</b>		154.4	170.3	180.5	189.5
5	Selling, General, and Administrative		(93.6)	(103.2)	(109.4)	(114.9)
6	Depreciation		(7.0)	(7.5)	(9.0)	(9.5)
7	<b>EBIT</b>		53.8	59.6	62.1	65.2
8	Less: Income Tax at 40%		(21.5)	(23.8)	(24.8)	(26.1)
9	Plus: Depreciation		7.0	7.5	9.0	9.5
10	Less: Capital Expenditures		(7.7)	(10.0)	(9.9)	(10.4)
11	Less: Increase in NWC		(6.3)	(8.6)	(5.6)	(4.9)
12	<b>Free Cash Flow</b>		<b>25.3</b>	<b>24.6</b>	<b>30.8</b>	<b>33.3</b>

- Suppose Sora's revenue and free cash flow are expected to grow at a 5% rate beyond year 4. If Sora's weighted average cost of capital is 10%, what is the value of Sora's stock based on this information?
- Sora's cost of goods sold was assumed to be 67% of sales. If its cost of goods sold is actually 70% of sales, how would the estimate of the stock's value change?
- Let's return to the assumptions of part (a) and suppose Sora can maintain its cost of goods sold at 67% of sales. However, now suppose Sora reduces its selling, general, and administrative expenses from 20% of sales to 16% of sales. What stock price would you estimate now? (Assume no other expenses, except taxes, are affected.)
- \*d. Sora's net working capital needs were estimated to be 18% of sales (which is their current level in year 0). If Sora can reduce this requirement to 12% of sales starting in year 1, but all other assumptions remain as in part (a), what stock price do you estimate for Sora? (*Hint:* This change will have the largest impact on Sora's free cash flow in year 1.)



22. Consider the valuation of Kenneth Cole Productions in Example 9.7.
- Suppose you believe KCP's initial revenue growth rate will be between 4% and 11% (with growth slowing in equal steps to 4% by year 2011). What range of share prices for KCP is consistent with these forecasts?
  - Suppose you believe KCP's EBIT margin will be between 7% and 10% of sales. What range of share prices for KCP is consistent with these forecasts (keeping KCP's initial revenue growth at 9%)?
  - Suppose you believe KCP's weighted average cost of capital is between 10% and 12%. What range of share prices for KCP is consistent with these forecasts (keeping KCP's initial revenue growth and EBIT margin at 9%)?
  - What range of share prices is consistent if you vary the estimates as in parts (a), (b), and (c) simultaneously?
23. Kenneth Cole Productions (KCP) was acquired in 2012 for a purchase price of \$15.25 per share. KCP has 18.5 million shares outstanding, \$45 million in cash, and no debt at the time of the acquisition.
- Given a weighted average cost of capital of 11%, and assuming no future growth, what level of annual free cash flow would justify this acquisition price?
  - If KCP's current annual sales are \$480 million, assuming no net capital expenditures or increases in net working capital, and a tax rate of 35%, what EBIT margin does your answer in part (a) require?

### Valuation Based on Comparable Firms

24. You notice that PepsiCo (PEP) has a stock price of \$72.62 and EPS of \$3.80. Its competitor, the Coca-Cola Company (KO), has EPS of \$1.89. Estimate the value of a share of Coca-Cola stock using only this data.
-  25. Suppose that in January 2006, Kenneth Cole Productions had EPS of \$1.65 and a book value of equity of \$12.05 per share.
- Using the average P/E multiple in Table 9.1, estimate KCP's share price.
  - What range of share prices do you estimate based on the highest and lowest P/E multiples in Table 9.1?
  - Using the average price to book value multiple in Table 9.1, estimate KCP's share price.
  - What range of share prices do you estimate based on the highest and lowest price to book value multiples in Table 9.1?
-  26. Suppose that in January 2006, Kenneth Cole Productions had sales of \$518 million, EBITDA of \$55.6 million, excess cash of \$100 million, \$3 million of debt, and 21 million shares outstanding.
- Using the average enterprise value to sales multiple in Table 9.1, estimate KCP's share price.
  - What range of share prices do you estimate based on the highest and lowest enterprise value to sales multiples in Table 9.1?
  - Using the average enterprise value to EBITDA multiple in Table 9.1, estimate KCP's share price.
  - What range of share prices do you estimate based on the highest and lowest enterprise value to EBITDA multiples in Table 9.1?
-  27. In addition to footwear, Kenneth Cole Productions designs and sells handbags, apparel, and other accessories. You decide, therefore, to consider comparables for KCP outside the footwear industry.
- Suppose that Fossil, Inc., has an enterprise value to EBITDA multiple of 9.73 and a P/E multiple of 18.4. What share price would you estimate for KCP using each of these multiples, based on the data for KCP in Problems 25 and 26?
  - Suppose that Tommy Hilfiger Corporation has an enterprise value to EBITDA multiple of 7.19 and a P/E multiple of 17.2. What share price would you estimate for KCP using each of these multiples, based on the data for KCP in Problems 25 and 26?
-  28. Consider the following data for the airline industry for August 1, 2012 (EV = enterprise value, Book = tangible book value, NM = not meaningful because divisor is negative). Discuss the challenges of using multiples to value an airline.

Company Name	Market Cap	EV	EV/Sales	EV/EBITDA	EV/EBIT	P/E	P/Book
Delta Air Lines (DAL)	7,972.7	17,557.7	0.48x	4.1x	6.3x	8.7x	NM
United Continental (UAL)	6,038.9	10,781.9	0.29x	3.2x	5.3x	15.5x	NM
Southwest Airlines (LUV)	6,821.4	6,841.4	0.40x	4.0x	7.3x	21.1x	1.2x
US Airways (LCC)	1,758.1	3,726.1	0.27x	3.6x	4.8x	4.3x	NM
JetBlue Airways (JBLU)	1,441.2	3,122.2	0.65x	4.9x	8.0x	11.9x	0.8x
Alaska Air (ALK)	2,402.5	2,174.2	0.48x	2.7x	4.0x	9.9x	1.9x
SkyWest (SKYW)	333.7	1,551.5	0.42x	5.1x	31.4x	NM	0.3x
Hawaiian (HA)	317.1	480.8	0.27x	2.4x	3.9x	5.5x	3.7x

Source: Capital IQ

### Information, Competition, and Stock Prices

- 29.** You read in the paper that Summit Systems from Problem 6 has revised its growth prospects and now expects its dividends to grow at 3% per year forever.
- What is the new value of a share of Summit Systems stock based on this information?
  - If you tried to sell your Summit Systems stock after reading this news, what price would you be likely to get and why?
- 30.** In mid-2012, Coca-Cola Company (KO) had a share price of \$39. Its dividend was \$1.00 per year, and you expect Coca-Cola to raise this dividend by approximately 7% per year in perpetuity.
- If Coca-Cola's equity cost of capital is 8%, what share price would you expect based on your estimate of the dividend growth rate?
  - Given Coca-Cola's share price, what would you conclude about your assessment of Coca-Cola's future dividend growth?
- 31.** Roybus, Inc., a manufacturer of flash memory, just reported that its main production facility in Taiwan was destroyed in a fire. While the plant was fully insured, the loss of production will decrease Roybus' free cash flow by \$180 million at the end of this year and by \$60 million at the end of next year.
- If Roybus has 35 million shares outstanding and a weighted average cost of capital of 13%, what change in Roybus' stock price would you expect upon this announcement? (Assume the value of Roybus' debt is not affected by the event.)
  - Would you expect to be able to sell Roybus' stock on hearing this announcement and make a profit? Explain.
- 32.** Apnex, Inc., is a biotechnology firm that is about to announce the results of its clinical trials of a potential new cancer drug. If the trials were successful, Apnex stock will be worth \$70 per share. If the trials were unsuccessful, Apnex stock will be worth \$18 per share. Suppose that the morning before the announcement is scheduled, Apnex shares are trading for \$55 per share.
- Based on the current share price, what sort of expectations do investors seem to have about the success of the trials?
  - Suppose hedge fund manager Paul Kliner has hired several prominent research scientists to examine the public data on the drug and make their own assessment of the drug's promise. Would Kliner's fund be likely to profit by trading the stock in the hours prior to the announcement?
  - What would limit the fund's ability to profit on its information?

## Data Case

As a new analyst for a large brokerage firm, you are anxious to demonstrate the skills you learned in your MBA program and prove that you are worth your attractive salary. Your first assignment is to analyze the stock of the General Electric Corporation. Your boss recommends determining prices based on both the dividend-discount model and discounted free cash flow valuation methods. GE uses a cost of equity of 10.5% and an after-tax weighted average cost of capital of 7.5%. The expected return on new investments is 12%. However, you are a little concerned because your finance professor has told you that these two methods can result in widely differing estimates when applied to real data. You are really hoping that the two methods will reach similar prices. Good luck with that!

- Go to Yahoo! Finance (<http://finance.yahoo.com>) and enter the symbol for General Electric (GE). From the main page for GE, gather the following information and enter it onto a spreadsheet:
  - The current stock price (last trade) at the top of the page.
  - The current dividend amount, which is in the bottom-right cell in the same box as the stock price.

2. Next, click “Key Statistics” from the left side of the page. From the Key Statistics page, gather the following information and enter it on the same spreadsheet:
  - a. The number of shares of stock outstanding.
  - b. The Payout ratio.
3. Next, click “Analyst Estimates” from the left side of the page. From the Analyst Estimates page, find the expected growth rate for the next five years and enter it onto your spreadsheet. It will be near the very bottom of the page.
4. Next, click “Income Statement” near the bottom of the menu on the left. Copy and paste the entire three years of income statements into a new worksheet in your existing Excel file. (*Note:* if you are using IE as your browser, you can place the cursor in the middle of the statement, right-click, and select “Export to Microsoft Excel” to download an Excel version.) Repeat this process for both the balance sheet and cash flow statement for General Electric. Keep all the different statements in the same Excel worksheet.
5. To determine the stock value based on the dividend-discount model:
  - a. Create a timeline in Excel for five years.
  - b. Use the dividend obtained from Yahoo! Finance as the current dividend to forecast the next five annual dividends based on the five-year growth rate.
  - c. Determine the long-term growth rate based on GE’s payout ratio (which is one minus the retention ratio) using Eq. 9.12.
  - d. Use the long-term growth rate to determine the stock price for year five using Eq. 9.13.
  - e. Determine the current stock price using Eq. 9.14.
6. To determine the stock value based on the discounted free cash flow method:
  - a. Forecast the free cash flows using the historic data from the financial statements downloaded from Yahoo! to compute the three-year average of the following ratios:
    - i. EBIT/Sales
    - ii. Tax Rate (Income Tax Expense/Income Before Tax)
    - iii. Property Plant and Equipment/Sales
    - iv. Depreciation/Property Plant and Equipment
    - v. Net Working Capital/Sales
  - b. Create a timeline for the next seven years.
  - c. Forecast future sales based on the most recent year’s total revenue growing at the five-year growth rate from Yahoo! for the first five years and the long-term growth rate for years 6 and 7.
  - d. Use the average ratios computed in part (a) to forecast EBIT, property, plant and equipment, depreciation, and net working capital for the next seven years.
  - e. Forecast the free cash flow for the next seven years using Eq. 9.18.
  - f. Determine the horizon enterprise value for year 5 using Eq. 9.24.
  - g. Determine the enterprise value of the firm as the present value of the free cash flows.
  - h. Determine the stock price using Eq. 9.22.
7. Compare the stock prices from the two methods to the actual stock price. What recommendations can you make as to whether clients should buy or sell GE stock based on your price estimates?
8. Explain to your boss why the estimates from the two valuation methods differ. Specifically, address the assumptions implicit in the models themselves as well as those you made in preparing your analysis. Why do these estimates differ from the actual stock price of GE?