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### Questions

#### The Value of Common Stocks

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**Question 1.** Consider the following three stocks:

- Stock A is expected to provide a dividend of \$10 a share forever.
- Stock B is expected to pay a dividend of \$5 next year. Thereafter, dividend growth is expected to be 4% a year forever.
- Stock C is expected to pay a dividend of \$5 next year. Thereafter, dividends growth is expected to be 20% a year for five years (i.e., until year 6) and zero thereafter.

If the market capitalization rate for each stock is 10%, which stock is the most valuable? What if the capitalization rate is 7%?

**Question 2.** Pharmecology is about to pay a dividend of \$1.35 per share. It's a mature company, future earnings per share (EPS) and dividends are expected to grow with inflation, which is forecasted at 2.75% per year.

- a. What is Pharmecology's current stock price? The nominal cost of capital is 9.5%.
- b. Redo the previous question using forecasted real dividends and a real discount rate.

**Question 3.** Company Q's current return on equity (ROE) is 14%. It pays out one-half of earnings per as cash dividends (payout ration =0.5). Current book value per share is \$500. Book value per share will grow as Q reinvests earnings.

Assume that the ROE and payout ratio stay constant for the next four years. After that, competition forces ROE down to 11.5% and the payout ration increases to 0.8. The cost of capital is 11.5%.

- a. What are Q's EPS and dividends next year? How will EPS and dividends grow in years 2, 3, 4, 5 and subsequent years?
- b. What is Q's stock worth per share? How does that value depend on the payout ratio and growth rate after year 4?

**Question 4.** Brazilian Motors stock sells for 200 reais per share and next year's dividend is 8.5 reais. Security analysts are forecasting earnings growth of 7.5% per year for the next five years.

- a. Assume earnings and dividends are expected to grow at 7.5% in perpetuity. What rate of return are investors expecting?
- b. Brazilian Motors has generally earned about 12% on book equity (ROE =0.12) and paid out 50% of earnings as dividends. Suppose it maintains the same ROE and payout ratio in the long-run future. What is the implication for  $g$ ? For  $r$ ? Should you revise your answer to the previous question.

**Question 5.** In mid-2006, after a year of sharply higher oil prices, major oil companies were selling at unusually low price-earnings (P/E) ratios. In October 2006, for example, *The Wall Street Journal* reported P/Es of 5 for ConocoPhillips and 6 for Marathon Oil. Recall that these reported P/Es equal current price divided by EPS for the prior year.

What are the possible reasons for the low P/Es? *Hint: What if investors expected future oil prices to decline?*

**Question 6.** In August 2006, *The Wall Street Journal* reported a P/E of 63 for Textron, a mature conglomerate that would not normally be regarded as a high-growth company. It turns out that Textron had recently announced a large, one-time loss from discontinued operations. This loss caused a large, one-time reduction in reported earnings. Does this example suggest why extremely high P/EPS ratios can be misleading? Explain briefly.

**Question 7.** Phoenix Corp. faltered in the recent recession but has recovered since. EPS and dividends have grown rapidly since 2014.

	2014	2015	2016	2017	2018
EPS	\$0.75	2.00	2.50	2.60	2.65
Dividends	\$0	1.00	2.00	2.30	2.65
Dividend growth	–	–	100%	15%	15%

The figures for 2017 and 2018 are of course forecasts. Phoenix’s stock price today in 2016 is \$21.75. Phoenix’s recovery will be complete in 2018, and there will be *no further growth* in EPS or dividends.

A security analyst forecasts *next year’s* rate of return on Phoenix stock as follows:

$$r = \frac{\text{DIV}}{P} + g = \frac{2.30}{21.75} + 0.15 = 0.256, \text{ about } 26\%$$

What’s wrong with the security analyst’s forecast? What is the actual rate of return over the next year?

**Question 8.** Each of the following formulas for determining shareholders’ required rate of return can be right or wrong depending on the circumstances:

a.  $r = \frac{\text{DIV}_1}{P_0} + g$

b.  $r = \frac{\text{EPS}_1}{P_0}$

For each formula construct a *simple* numerical example showing that the formula can give wrong answers and explain why the error occurs. Then construct another simple numerical example for which the formula give the right answer.

**Question 9.** Alpha Corp’s earnings and dividends are growing at 15% per year. Beta Corp’s earnings and dividends are growing at 8% per year. The companies’ assets, earnings, and dividends per share are now (at date 0) exactly the same. Yet PVGO accounts for a greater fraction of Beta Corp’s stock price. How is it possible? *Hint: There is more than one possible explanation.*

**Question 10.** Compost Science, Inc. (CSI), is in the business of converting Boston's sewage sludge into fertilizer. The business is not in itself very profitable. However, to induce CSI to remain in business, the Metropolitan District Commission (MDC) has agreed to pay whatever amount is necessary to yield CSI a 10% book return on equity. At the end of the year, CSI is expected to pay a 4\$ dividend. It has been reinvesting 40% of earnings and growing at 4% a year.

- a. Suppose CSI continues on this growth trend. What is the expected long-run rate of return from purchasing the stock at \$100? What part of the \$100 price is attributable to the present value of growth opportunities?
- b. Now the MDC announces a plan for CSI to treat Cambridge sewage. CSI's plant will, therefore, be expanded gradually over five years. This means that CSI will have to reinvest 80% of its earnings. What will be CSI's stock price one this announcement is made and its consequences for CSI are known?

**Question 11.** Permian Partners (PP) produces from aging oil fields in wet Texas. Production is 1.8 million barrels per year in 2006, but production is declining at 7% per year for the foreseeable future. Costs of production, transportation, and administration add up to \$25 per barrel. The average oil price was \$65 per barrel in 2006.

PP has 7 million shares outstanding. The cost of capital is 9%. All of PP's net income is distributed as dividends. For simplicity assume that the company will stay in business forever and that costs per barrel are constant at \$25. Also, ignore taxes.

- a. What is the PV of a PP share? Assume that oil prices are expected to fall to \$60 per barrel in 2007, \$55 per barrel in 2008, and \$50 per barrel in 2009. After 2009, assume a long-term trend in oil-price increases at 5% per year.
- b. What is PP's EPS/P ratio and why is it not equal to the 9% cost of capital?

**Question 12.** The constant-growth DCF formula

$$P_0 = \frac{DIV_1}{r - g}$$

is sometimes written as

$$P_0 = \frac{ROE(1 - b)BVPS}{r - bROE}$$

where BVPS is book equity value per share,  $b$  is the plowback ratio, and ROE is the ratio of earnings per share to BVPS. Use this equation to show how the price-to-book ratio varies as ROE changes. What is price-to-book when  $ROE = r$ ?

**Question 13.** Portfolio managers are frequently paid a proportion of the funds under management. Suppose you manage a \$100 million equity portfolio offering a dividend yield ( $DIV_1/P_0$ ) of 5%. Dividends and portfolio value are expected to grow at a constant rate. Your annual fee for managing this portfolio is 0.5% of portfolio value and is calculated at the end of each year. Assuming that you will continue to manage the portfolio from now to eternity, what is the present value of the management contract? How would the contract value change if you invested in stocks with a 4% yield?