SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

Selected Solutions to Problem Set #2:

Section I. Basic Accounting

1)a) Accrual basis accounting recognizes revenues and expenses when earned, without regard to the actual timing of the cash transactions involved. Cash basis accounting recognizes revenues and expenses in the period when the cash transactions involved occur. (See p.178-9 in readings).

b) The percentage-of-completion method recognizes revenue and costs in proportion to the work completed; production activity is considered to be the critical event signaling completion of the earnings process rather than delivery or cash collections. The percentage-of-completion method is used for long-term projects when reliable estimates of production completed, revenues and costs are available.

The completed contract method recognizes revenues and expenses only at the end of the contract. It must be used when any one of the conditions (specified for the percentage-of-completion method) is not met, generally when no contract exists or estimates of selling prices or collectibility are not reliable. It must be used for short-term contracts. (See p. 182 in readings)

c) Cash flow from operations (CFO) also called net operating cash flow is the cash generated or used by a business over a specified period of time derived by adjusting aftertax profit for noncash charges and noncash receipts. CFO can be calculated using either the direct or the indirect method. By the direct method:

CFO = Collections from customers -
Payments to suppliers and employees, etc. -
Tax payments - interest payments

The basic idea behind Free Cash Flow (FCF) is to provide a value for the cash left after the firm has accounted for used up capital the new investment required to finance expansion. There are various equivalent methods to arrive at FCF:

FCF = CFO - Cash for PPE (New and replacement)
= Net Operating Income before replacement of depreciated assets
- Replacement of Depreciated Assets - New PPE investment
= Earnings Before Interest and Taxes - Taxes + Depreciation - New PPE Investment

d) Primary earnings per share is earnings available to common shareholders divided by the number of shares currently outstanding. No account is taken of the dilution associated with convertible securities and warrants. Fully diluted earnings per share is earnings available to common shareholders divided by (the number of shares currently outstanding plus the additional number of shares if all convertible securities and warrants were exercised), ignoring the possibility that some or all of the convertible securities and warrants may not be exercised.

2) a) Balance sheet: property plant and equipment up $1 mil., cash down $1 mil. Income statement: no immediate change. Cash Flow statement: purchase of property plant and equipment has a cash outflow of $1 mil. which reduce the net increase (increase the decrease) in the cash balance at the end of the year by $1 mil.

b) Balance sheet: property, plant and equipment (PPE) up $1 mil., cash down $400,000, and bank loans (liabilities) up by $600,000. Income statment: no immediate impact. Cash flow statement: PPE purchase has a $1 mil. outflow, with bank borrowings increasing $600,000 resulting in a decrease (reduction in net increase) in year end cash balance of $400,000.

c) Balance sheet: cash up $100,000, accounts receivable down by $100,000. Income statement: no change as the $100,000 in revenue was recognized when sale was made. Cash flow statement: change in accounts receivable of $100,000, resulting in an increase in cash balance because the reduction in an asset is a source of cash.

d) Balance sheet: shareholder's equity down $10 mil., cash down $10 mil. Income statement: no immediate change, though throughout the year interest earned will decline because the $10 mil. is no longer invested and earnings per share numbers will increase because fewer shares are outstanding. Cash flow statement: repurchase of common shares results in a reduction in cash balance of $10 million.

3) Solution depends on manipulating Return on Equity (ROE):

ROE = (Earnings available to Common Shareholders)/(Book Value of Shareholder's Equity)

= (Earnings/Sales) (Sales/Assets) (Assets/Equity)

= (Profit Margin) (Asset Turnover) (Financial Leverage)

Introducing the new calibrator will reduce the division's profit margin, but this is not the only determinant of ROE. If the asset turnover of the new calibrator is very high this could offset the lower profit margin and increase ROE.

4) Manipulation or management of earnings can be classified into two general groups, accrual management and real variable management. Accrual management has to do with accounting choices associated with the timing and recognition of earnings. Examples would include selection of depreciation rules (straight line vs. accelerated cost recovery), inventory value methods (LIFO vs. FIFO), valuation of pension liabilities, valuation of intangible assets (e.g., amortization method) and methods of revenue recognition (percentage-of-completion vs. completed contracts methods). Real variable management has to do with the timing of real transactions, such as the sale of undervalued assets, factoring of accounts receivable, altering scheduled maintanence schedules and refunding of debt.

Because of the numerous possible method available to manipulate earnings, this answer will not go into the details of each case. A complete answer would describe how the particular decision would lead to differences in earnings. For example, if reference is made to the use selection of different depreciation rules, then the depreciation techniques such as straight line and accelerated depreciation would be described and, based on these descriptions, the answer would discuss how the depreciation method would lead to differences in earnings. In this case, straight line would lead to a smaller depreciation expense each period relative to accelerated cost recovery.

Section III. Equity Valuation: Stock Valuation Models

1. It is possible to pay too much for any company's stock. The expected return from holding any stock should reflect the returns associated with other stocks in the same risk class. This return is composed of a capital gain and dividend yield component (see III.5). The current price of the stock is too high when the combination of expected price increase (due to improved future prospects and accumulation of retained earnings) and dividend payout is insufficient to warrant the current price level.

2. The growth rate of the firm can be measured in various ways. The growth in assets, the growth in earnings, the growth rate in the firm's stock price, etc. For the growth rate in dividends to equal the growth rate in earnings, it is required that the firm have a constant dividend payout, which is not usually the case. Assuming unrealistically that the available and accumulating assets are generating earnings at a constant rate, then again a constant dividend payout is required. Firms attempt to keep the variability of dividends at a much lower level than the variables which are more representative of firm growth. Hence, the growth rate in dividends will be, at best, a lagging indicator of firm growth.

Also, consider firms which are growing rapidly and have a high demand for capital to finance expansion. These firms will tend to payout little or no earnings, tending to allocate current earnings to retained earnings. This will produce little or no dividend growth for rapidly growing companies. Similarly, maturing firms with limited growth prospects will tend to payout larger fractions of earnings in dividends, resulting in increasing dividends at a time that the firm has a low growth rate.

3. This is an application of the constant dividend growth model.

$$P_0 = D_1/(r - g) = \$1.50/(.08-.04) = \$37.50 < \$40$$

The stock is overpriced.

4. This is an example of differential dividend growth periods, where there is a period of no growth followed by a period with constant dividend growth:

$$P_0 = \frac{12}{1.09} + 0 + 0 + 0 + \frac{12}{.09 - .08} = \frac{12}{1.09} + \frac{P_4}{(1.09)^4} = 11.01 + 850.11 = \$861.12$$

5. Discounted cash flow models are based on the concept that the value of a share of stock is equal to the present value of the cash flow that the stockholder expects to receive from holding the stock.

Consider an investment which is purchased at t=0 and held for one year until t=1 and then sold, at which time the dividend (D) on the stock is paid. The price of the stock will equal the discounted present value of the proceeds:

$$P_0 = \frac{P_1}{1 + r_g} + \frac{D_1}{1 + r_d}$$

where r_g is the discount rate for capital gains and r_d is the discount rate for dividends. These two rates will not necessarily be the same due to the different levels of risk and tax rates associated with dividends and capital gains.

Assuming the $r_g = r_d$ and the the term structure of discount rates is flat (the discount rates for progressively longer maturity discounting periods are all equal), then progressive substitution will give the general form of the discounted dividend model of stock prices:

$$P_0 = \frac{P_1 + D_1}{1 + r} = \frac{D_1}{1 + r} + \frac{P_2 + D_2}{(1 + r)^2} = \frac{D_1}{1 + r} + \frac{D_2}{(1 + r)^2} + \frac{P_3 + D_3}{(1 + r)^3} = \sum_{t=1}^{\infty} \frac{D_t}{(1 + r)^t}$$

As an aside, this presentation gives a representation for the expected return on the stock:

$$r = \frac{P_1 - P_0}{P_0} + \frac{D_1}{P_0} \qquad E[r] = \frac{E[P_1] - P_0}{P_0} + \frac{E[D_1]}{P_0}$$

The expected return on the stock (the discount rate) is the sum of the expected capital gain and the expected dividend yield.

From this point, a number of increasingly more complicated models can be derived, depending on assumptions made about dividend behaviour.

Case 1: **Constant Dividends**

If $D_t = D$ which is fixed over time, then the discounted dividend model is reducable to an annuity and $P_0 = D/r$

Case 2: **Constant Dividend Growth Model**

In this model it is assumed that dividends grow at a constant rate g over time:

$$D_{t+1} = D_t (1 + g)$$

Following the same derivation as for the annuity, this leads to the result that:

$$P_0 = D_1/(r - g)$$

It is possible to develop more complicated versions of the discounted dividend model by allowing for periods of differential dividend growth, as in III.4

How does these models relate to the P/E ratio? Extending the analysis to include earnings can be accomplished by making the (unrealistic) assumption that firms payout a constant fraction of earnings in the form of dividends. Because $E_t = D_t + RE_t$ (Earnings is either paid out as dividends or held as retained earnings --RE), then constant dividend payout implies that $D_t = bE_t$. In the constant dividend model this implies that earnings are constant over time and in the constant dividend growth model this implies that earnings grow at the rate g because $D_{t+1} = b\,E_{t+1} = b\,E_t\,(1 + g)$ ---> $E_{t+1} = E_t\,(1 + g)$

Hence, in the constant dividend model P/E = 1/r and in the constant growth rate model P/E = {b(1 + g)}/{r - g}.

What are the limitations of these models? Examine the assumptions that are needed to develop the results.

What is the appropriate accounting variable to use? One problem with the discounted cash flow models is that the mechanismgenerating dividends and earnings is not discussed. The concept of **free cash flow** is specified as the cash flow which remains after remains after allowance has been made for assets used up in producing output, as well as cash invested in new assets for expanding output. FCF is related to dividends by:

CF0 + Borrowing - Capital Expenses = Dividends

But: FCF = CFO - Capital Expenses

Hence, if borrowing = 0 then FCF = Dividends. Hence, with appropriate adjustment for borrowing activity used to finance capital expenses, then FCF can be substituted for D in the discounted dividend model, providing a more advanced rationale for the cash flow used in the valuation.