Material I

Introduction to Security Valuation

The investment decision process is similar to the process we follow when deciding on a corporate investment or when shopping for clothes or a car. In each case, we examine the item and decide how much it is worth to us. If the price equals its estimated value or is less, you would buy it. The same technique applies to securities except that the determination of a security's value is more formal.

The value of an asset is the present value of its expected cash flows. To convert this estimated stream of returns to a value for the security, we must discount this stream at the required rate of return. This process of valuation requires estimates of (1) the stream of expected cash flows and (2) the required rate of return on the investment.

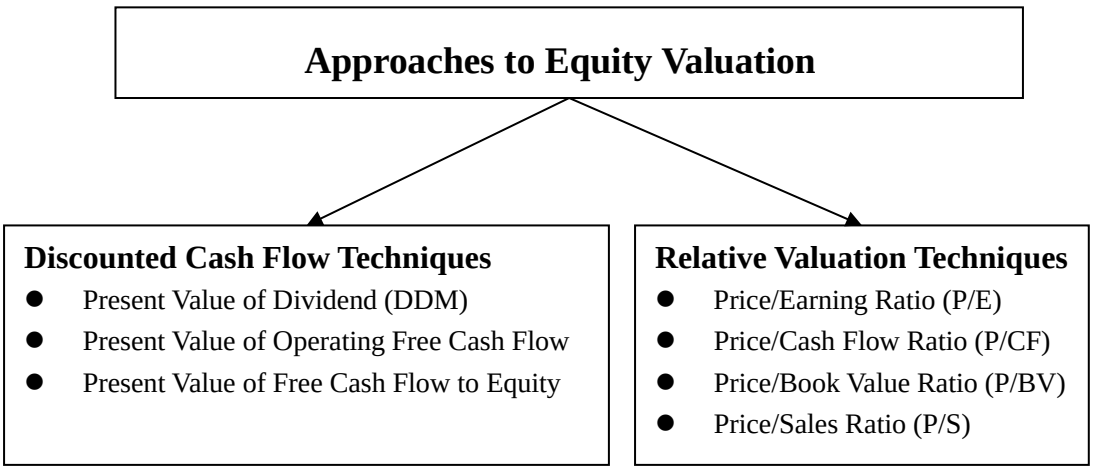
Because of the complexity and importance of valuing common stock, various valuation techniques have been devised over time. These techniques fall into one of two general approaches:

- **The discounted cash flow valuation techniques**, where the value of the stock is estimated based upon the present value of some measure of cash flow, including dividends, operating cash flow, and free cash flow.

- **The relative valuation techniques,** where the value of a stock is estimated based upon its current price relative to variables considered to be significant to valuation, such as earnings, cash flow, book value, or sales.

Figure 1 provides a presentation of the alternative approaches and specific techniques.

Figure 1 Common Stock Valuation Approaches and Specific Techniques



An important point is that both of these approaches and all of these valuation techniques have several common factors. First, all of them are significantly affected by the investor's required rate of return on the stock because this rate becomes the discount rate or is a major component of the discount rate. Second, all valuation approaches are affected by the estimated growth rate of the variable used in the valuation technique—for example, dividends, earnings, cash flow or sales.

Both of these critical variables must be estimated. As a result, different analysts using the same valuation techniques will derive different estimates of value for a stock because they have different estimates for these critical variable inputs. If you are better at estimating these inputs, you will be superior analyst.

1 Discounted Cash Flow Valuation Techniques

All of these valuation techniques are based on the basic valuation model, which asserts that the value of an asset is the present value of its expected future cash flows as follows:

$$V_j = \sum_{t=1}^{n} \frac{CF_t}{(1+k)^t}$$

Where: $V_j = value\ of\ stock\ j$

$n = life\ of\ the\ asset \qquad CF_t = cash\ flow\ in\ period\ t$

k

$= the\ discount\ rate\ that\ is\ equal\ to\ the\ investors'\ required\ rate\ of\ return\ for\ asset\ j,$
$which\ is\ determined\ by\ the\ uncertainty\ (risk)\ of\ the\ asset's\ cash\ flows$

As noted, the specific cash flows used will differ between techniques. They range from dividends (the best-known model) to operating free cash flow and free cash flow to equity.

1.1 The Dividend Discount Model (DDM)

The dividend discount model assumes that the value of a share of common stock is the present value of all future dividends as follows:

$$V_j = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \cdots + \frac{D_\infty}{(1+k)^\infty}$$

$$= \sum_{t=1}^{n} \frac{D_t}{(1+k)^t}$$

Where: $V_j = value\ of\ common\ stock\ j \quad D_t = dividend\ duing\ period\ t$

$k = required\ rate\ of\ return\ on\ stock\ j$

1.2 Present Value of Operating Free Cash Flows

In this model, we are deriving the value of the total firm because we are discounting the operating free cash flows prior to the payment of interest to the debt holders but after deducting funds needed to maintain the firm's asset base (capital expenditures).

Also, because we are discounting the total firm's operating free cash flow, we would use the firm's weighted average cost of capital (WACC) as our discount rate. Therefore, once we estimate the value of the total firm, we subtract the value of debt, assuming our goal is to estimate the value of the firm's equity. The total value of the firm is equal to:

$$V_j = \sum_{t=1}^{n} \frac{OFCF_t}{(1 + WACC_j)^t}$$

Where: $V_j = value\ of\ firm\ j \qquad n = number\ of\ periods$

$OFCF_t = the\ firm's\ operating\ free\ cash\ flow\ in\ period\ t$

$WACC_t = \ firm\ j's\ weighted\ average\ cost\ of\ capital$

1.3 Present Value of Free Cash Flow to Equity

The third discounted cash flow technique deals with "free" cash flows to equity, which would be derived after operating free cash flows have been adjusted for debt payments (interest and principal). Also, these cash flows precede dividend payments to the common stockholders.

Such cash flows are referred to as free because they are what is left after providing the funds needed to maintain the firm's asset base (similar to operating free cash flows). They are specified as free cash flows to equity because they also adjust for payments to debtholders and to preferred stockholders.

Notably, because these are cash flows available to equity owners, the discount rate used is the firm's cost of equity (k) rather than the firm's WACC.

$$V_j = \sum_{t=1}^{n} \frac{FCFE_t}{(1 + k_j)^t}$$

Where: $V_j = value\ of\ firm\ j \ \ n = number\ of\ periods$

$FCFE_t = the\ firm's\ free\ cash\ flow\ to\ equity\ in\ period\ t$

Notice that how an analyst would implement the above models depends upon the firm's position in its life cycle. That is, if the firm is expected to experience stable growth, analysts can use the infinite growth model. In contrast, if the firm is expected to experience a period of temporary supernormal growth, analysts should use the multistage growth model.

2 Relative Valuation Techniques

In contrast to the various discounted cash flow techniques that attempt to estimate a specific value for a stock based on its estimated growth rates and its discount rate, the relative valuation techniques implicitly contend that it is possible to determine the value of an economic entity (i.e., the market, an industry, or a company) by comparing it to

similar entities on the basis of several relative ratios that compare its stock price to relevant variables that affect a stock's value, such as earnings, cash flow, book value, and sales.

2.1 Earnings Multiplier Model

The reasoning for this approach recalls the basic concept that the value of any investment is the present value of future returns. In the case of common stocks, the returns that investors are entitled to receive are the net earnings of the firm. Therefore, one way investors can estimate value is by determining how many dollars they are willing to pay for a dollar of expected earnings. For example, if investors are willing to pay 10 times expected or "normal" earnings, they would value a stock they expect to earn $2 a share during the following year at $20.

We can compute the prevailing earnings multiplier, also referred to as the price/earnings (P/E) ratio as follows:

$$Earnings\ Multiplier = Pr\,i\,ce/Earnings\ Ratio = \frac{Current\ Market\ Price}{Expected\ 12-Month\ Earnings}$$

This computation of the current earnings multiplier (P/E ratio) indicates the prevailing attitude of investors toward a stock's value.

We must consider what influences the earnings multiplier (P/E ratio) over time. The infinite period dividend discount model can be used to indicate the variables that should determine the value of the P/E ratios as follows:

$$P_i = \frac{D_1}{k-g}$$

If we divide both sides of the equation by E_1, the result is

$$\frac{P_i}{E_1} = \frac{D_1/E_1}{k-g}$$

Thus, this model implies that the P/E ratio is determined by

1) The expected dividend payout ratio (dividends divide by earnings)
2) The estimated required rate of return on the stock (k)
3) The expected growth rate of dividends for the stock (g)

After estimating the earnings multiple, we would apply it to our estimate of earnings for the next year (E_1) to arrive at an estimated value. In turn, $E_1$is based on the earnings for the current year (E_0) and our expected growth rate of earnings. Using these two estimates, we would compute an estimated value of the stock and compare this estimated value to its market price.

2.2 The Price/Cash Flow Ratio

The growth in popularity of the relative price/cash flow valuation can be traced to concern over the propensity of some firms to manipulate earnings per share, whereas

cash flow values are generally less prone to manipulation. The price to cash flow ratio is computed as follows:

$$P/CF_j = \frac{P_t}{CF_{t+1}}$$

Where: $P/CF_j = the\ price/cash\ \ flow\ ratio\ for\ firm\ j$

$P_t = the\ price\ of\ \ the\ stock\ in\ period\ t$

$$CF_{t+1} = the\ expected\ cash\ flow\ per\ share\ for\ firm\ j$$

2.3 The Price/Book Value Ratio

The price/book value (P/BV) has been widely used for many years by analysts in the banking industry as a measure of relative value. The book value of a bank is typically considered a good indicator of intrinsic value because most bank assets, such as bonds and commercial loans, have a value equal to book value.

The P/BV ratio is specified as follows:

$$P/BV_j = \frac{P_t}{BV_{t+1}}$$

Where: $P/BV_j = the\ price/book\ value\ ratio\ for\ firm\ j$

$P_t = the\ price\ of\ \ the\ stock\ in\ period\ t$

$$BV_{t+1} = the\ estimated\ end-of-year\ book\ value\ per\ share\ for\ firm\ j$$

2.4 The Price/Sales Ratio

The advocates consider this ratio meaningful and useful for two reasons. First, they believe that strong and consistent sales growth is a requirement for a growth company. Second, given all the data in the balance sheet and income statement, sales information is subject to less manipulation than any other data item.

The specific P/S ratio is:

$$P/S_j = \frac{P_t}{S_{t+1}}$$

Where: $\frac{P}{S_j} = the\ price\ to\ sales\ ratio\ for\ firm\ j$

$P_t = the\ price\ of\ the\ stock\ in\ period\ t$

$$S_{t+1} = the\ expected\ sales\ pre\ share\ for\ firm\ j$$

3 Estimating the Inputs: The Required Return and the Expected Growth Rate of Valuation Variables

This section deals with estimating two inputs that are critical to the valuation process irrespective of which approach or technique is being used: the required rate of return (k) and the expected growth rate of earnings and other valuation variables—that is, book value, cash flow, sales and dividends.

3.1 Required Rate of Return (k)

Recall that three factors influence an equity investor's required rate of return (k):

1) The economy's real risk-free rate (RRFR)
2) The expected rate of inflation (I)
3) A risk premium (RP)

The Economy's Real Risk-Free Rate

This is the absolute minimum rate that an investor should require. It depends on the real growth rate of the investor's home economy because capital invested should grow at least as fast as the economy.

The Expected Rate of Inflation

If investors expect a given rate of inflation, they should increase their required nominal risk-free rate of return (NRFR) to reflect any expected inflation as follows:

$$NRFR = [[1 + RRFR]\ [1 + E(I)]] - 1$$

Where: $E(I) = expected\ rate\ of\ inflation$

The Risk Premium

The risk premium (RP) causes differences in the required rates of return among alternative investments that range from government bonds to corporate bonds to common stocks.

3.2 Expected Growth Rates

Estimating Growth from Fundamentals

How rapidly a firm's earnings increase depends on (1) the proportion of earnings it retains and reinvests in new assets and (2) the rate of return it earns on these new assets.

$$g = (\text{Re}\,tention\ Rate) \times (\text{Re}\,turn\ on\ Equity)$$
$$= RR \times ROE$$

Therefore, a firm can increase its growth rate by increasing its retention rate (reducing its payout ratio) and investing these added funds at its historic ROE. Alternatively, the firm can maintain its retention rate but increase its ROE.

Breakdown of ROE

Although the retention rate is a management decision, changes in the firm's ROE result from changes in its operating performance or its financial leverage. We can divide the ROE ratio into three components.

This breakdown allows us to consider the three factors that determine a firm's ROE. Because it is a multiplicative relationship, an increase in any of the three ratios will cause an increase in ROE. The first two of the three ratios reflect operating performance, and the third one indicates a firm's financing decision.

The product of these first two components (profit margin and total asset turnover)

equals the firm's return on assets (ROA), which reflects the firm's operating performance before the financing impact.

$$ROE = \frac{Net\ Income}{Equity} = \frac{Net\ Income}{Sales} \times \frac{Sales}{Total\ Assets} \times \frac{Total\ Asset}{Equity}$$
$$= net\ profit\ margin \times Total\ Asset\ Turnover \times Financial\ Leverage$$

Or

$$ROE = \frac{Net\ Income}{Total\ Assets} \times \frac{Total\ Asset}{Equity}$$
$$= Return\ on\ Asset \times Financial\ Leverage$$