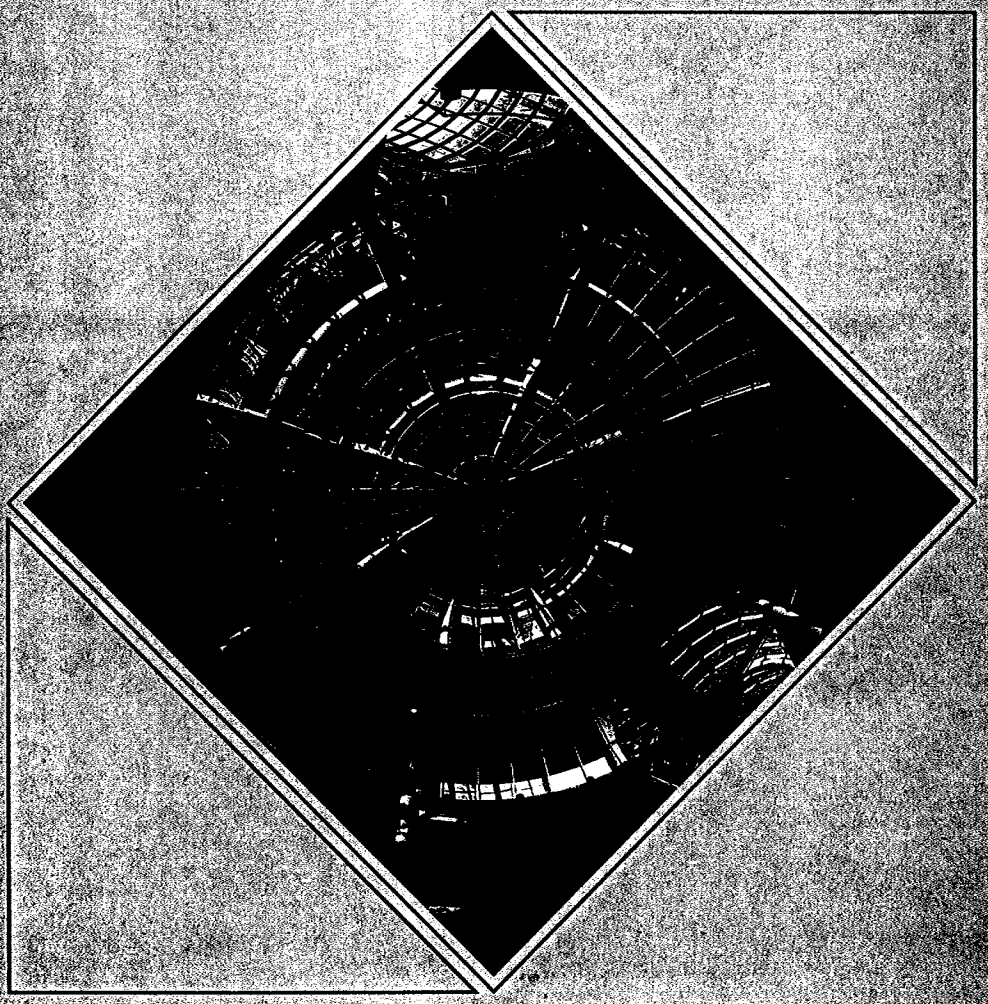
Second Edition

FUNDAMENTALS OF INVESTMENTS



Alexander ♦ Sharpe ♦ Bailey

MONEY MATTERS
Applying Dividend Discount Models

Over the last thirty years, dividend discount models (DDMs) have achieved wide acceptance among professional common stock investors. While few investment managers rely solely on DDMs to select stocks, many have integrated DDMs into their security valuation procedures.

The reasons for the popularity of DDMs are twofold. First, DDMs are based on a simple, widely understood concept: the fair value of any security should equal the discounted value of the cash flows expected to be produced by that security. Second, the basic inputs for DDMs are standard outputs for many large investment management firms. That is, these firms employ security analysts who are responsible for projecting corporate earnings.

Valuing common stocks with a DDM technically requires an estimate of future dividends over an infinite time horizon. Given that accurately forecasting dividends three years from today, let alone twenty years in the future, is a difficult proposition, how do investment firms actually go about implementing DDMs?

One approach is to use a one- or two-stage dividend growth model, as described in the text. However, while such models are relatively easy to apply, investors typically view the assumed dividend growth assumptions as overly simplistic. Instead, investors have generally preferred three-stage models, believing that they provide the best combination of realism and ease of application.

While many variations of the three-stage DDM exist, in general the model is based on the assumption that companies evolve through three phases during their lifetimes. (Figure 15-3 portrays these stages.)

1. *Growth stage.* Characterized by rapidly expanding sales, high profit margins, and abnormally high growth in earnings per share. Because of highly profitable expected investment opportunities, the payout ratio is low. Competitors are attracted by the unusually high earnings, leading to a decline in the growth rate.
2. *Transition stage.* In later years, increased competition reduces profit margins and earnings growth slows. With fewer new investment opportunities, the company begins to pay out a larger percentage of earnings.
3. *Maturity (steady-state) stage.* Eventually, the company reaches a position where its new investment opportunities offer, on average, only slightly attractive returns on equity. At that time, its earnings growth rate, payout ratio, and return on equity stabilize for the remainder of its life.

The forecasting process of the three-stage DDM involves specifying earnings and dividend growth rates in each of the three stages. While one cannot expect a security analyst to be omniscient in his or her growth forecast for a particular company, one can hope that the forecasted pattern of growth—in terms of magnitude and duration—resembles that actually realized by the company, particularly in the short run.

Investment firms attempt to structure their DDMs to make maximum use of their analysts' forecasting capabilities. Thus, the models emphasize specific forecasts in the near term when it is realistic to expect security analysts to more accurately project earnings and dividends. Conversely, the models emphasize more general forecasts over the longer term when the distinction between companies' growth rates become less discernible. Typically, analysts are required to supply the following information for their assigned companies:

$$
\begin{aligned}
D_8 &= p_8 E_8 \\
&= p_8 E_6 (1 + g_{e7})(1 + g_{e8}) \\
&= .65 \times \$11.90 \times (1 + .14) \times (1 + .09) \\
&= .65 \times \$14.79 \\
&= \$9.61
\end{aligned}
$$

$$
\begin{aligned}
D_9 &= p_9 E_9 \\
&= p_9 E_6 (1 + g_{e7})(1 + g_{e8})(1 + g_{e9}) \\
&= .70 \times \$11.90 \times (1 + .14) \times (1 + .09) \times (1 + .04) \\
&= .70 \times \$15.38 \\
&= \$10.76.
\end{aligned}
$$

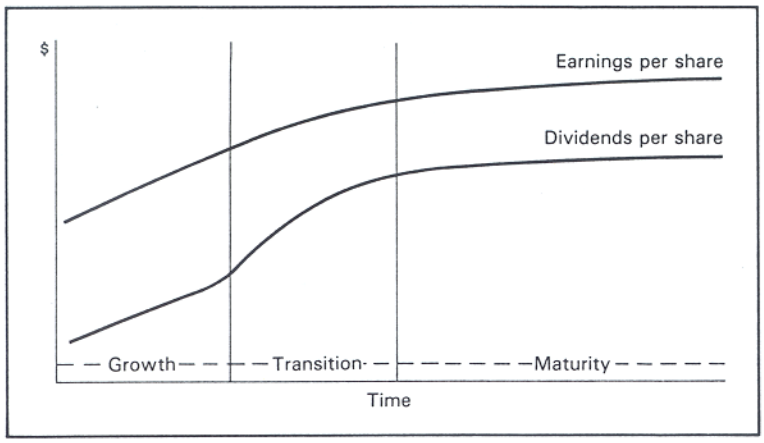


FIGURE 15-3
The Three Stages of the Multiple Growth Model
Source: Adapted from Carmine J. Grigoli, "Demystifying Dividend Discount Models," Merrill Lynch Quantitative Research, April 1982.

1. Expected annual earnings and dividends for the next several years.
2. After these specific annual forecasts end, earnings growth and the payout ratio forecasts until the end of the growth stage.
3. The number of years until the transition stage is reached.
4. The duration (in years) of the transition stage. That is, once abnormally high growth ends, the number of years until the maturity stage is reached.

Most three-stage DDMs assume that during the transition stage, earnings growth declines and payout ratios rise linearly to the maturity stage steady-state levels. (For example, if the transition stage is ten years long, earnings growth at the maturity stage is 5% per year, and earnings growth at the end of the growth stage is 25%, then earnings growth will decline 2% in each year of the transition stage.) Finally, most three-stage DDMs make standard assumptions about companies in the maturity stage—that all such companies have the same growth rates, payout ratios, and return on equity.

With analysts' DDM inputs, plus an appropriate required rate of return for each security, all the necessary information for the three-stage DDM is available. The last step involves merely calculating the discounted value of the estimated dividends to determine the stock's "fair" value.

The seeming simplicity of the three-stage DDM should not lead one to believe that it is without its implementation problems. Investment firms must strive to achieve consistency across their analysts' forecasts. The long-term nature of the estimates involved, the substantial training required to accurately make even short-term earnings forecasts, and the coordination of a number of analysts covering many companies severely complicate the problem. Considerable discipline is required if the DDM valuations generated by a firm's analysts are to be sufficiently comparable and reliable to guide investment decisions. Despite these complexities, if successfully implemented, DDMs can combine the creative insights of security analysts with the rigor and discipline of quantitative investment techniques.

Given a required rate of return on ABC of 12.4%, all the necessary inputs for the multiple growth model have been determined. To begin, it can be seen that $T = 8$, indicating that V_{T-} involves determining the present value of D_1 through D_8:

$$\begin{aligned} V_{T-} = &\left[\frac{\$.60}{(1+.124)^1}\right] + \left[\frac{\$1.60}{(1+.124)^2}\right] + \left[\frac{\$2.40}{(1+.124)^3}\right] \\ &+ \left[\frac{\$3.20}{(1+.124)^4}\right] + \left[\frac{\$5.00}{(1+.124)^5}\right] + \left[\frac{\$6.55}{(1+.124)^6}\right] \\ &+ \left[\frac{\$8.14}{(1+.124)^7}\right] + \left[\frac{\$9.61}{(1+.124)^8}\right] \\ = &\ \$18.89. \end{aligned}$$