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observed market price. Clearly, given that dividends are paid quarterly and that the observed stock price reflects the quarterly nature of dividend payments, the market-required return must recognize quarterly compounding, for the investor receives dividend checks and reinvests the proceeds on a quarterly schedule. Perforce, a stock that pays four quarterly dividends of \$1.00 commands a higher price than a stock that pays a \$4.00 dividend a year hence. Since investors are aware of the quarterly timing of dividend payments and since the stock price already fully reflects the quarterly payment of dividends, the DCF model used to estimate equity costs should also reflect the actual timing of quarterly dividends.

The annual DCF model inherently understates the investors' true return because it assumes that all cash flows received by investors are paid annually. By analogy, a bank rate on deposits that does not take into consideration the timing of the interest payments understates the true yield if the customer receives the interest payments more than once a year. The actual yield will exceed the stated nominal rate. Bond yield calculations are also routinely adjusted for the receipts of semi-annual interest payments. What is true for bank deposits and for bonds is equally germane to common stocks.

Most, if not all, finance textbooks discuss frequency of compounding in computing the yield on a financial security. The handbooks that accompany popular financial calculators as well as the financial functions available in popular spreadsheet programs such as Excel, used almost universally by the financial community, contain abundant directions with respect to frequency of compounding.

The quarterly DCF model assumes that the company pays dividends quarterly and that each dividend payment is constant for four consecutive quarters. There are four different possible quarterly dividend patterns, depending on the timing of the next dividend increase.¹ Figure 11-2 displays the four dividend increase scenarios.

Appendix 11-A formally derives the quarterly DCF model, which has the following form:

$$K = \frac{[d_1(1 + K)^{3/4} + d_2(1 + K)^{1/2} + d_3(1 + K)^{1/4} + d_4]}{P_0} + g \quad (11-1)$$

where: d_1, d_2, d_3, d_4 = quarterly dividends expected over the coming year
 g = expected growth in dividends
 P_0 = current stock price
 K = required return on equity

¹ This section is adapted from Vander Weide (2003).