Ibbotson® SBBI®
2013 Valuation Yearbook

Market Results for
Stocks, Bonds, Bills, and Inflation
1926–2012

MORNINGSTAR®

Quarterly Dividend Adjustment

When valuing a stock, one should remember that even though dividends grow and are declared annually, they are usually paid in equal quarterly installments. In order to account for this in the discounted cash flow model, each cash flow can be replaced by the following term:

$$CF_i \times \frac{1+(1+k)^{1/4}+(1+k)^{1/2}+(1+k)^{3/4}}{4}$$

If we look at the same example that was used for the two-stage discounted cash flow model but use the quarterly dividend adjustment, the cost of equity estimate becomes 9.96 percent instead of 9.78 percent. The higher discount rate reflects the difference in timing of the cash flows, as shown below.

Estimating Growth Rates

One of the advantages of a three-stage discounted cash flow model is that it fits with life cycle theories in regards to company growth. In these theories, companies are assumed to have a life cycle with varying growth characteristics. Typically, the potential for extraordinary growth in the near term eases over time and eventually growth slows to a more stable level.

In the *Ibbotson Cost of Capital Yearbook* the three-stage growth model is used. In the first stage (the first five years), analysts' consensus estimates of earnings growth are used. These should reflect any extraordinary near-term growth potential. Over years 6 through 10, an average of the analysts' consensus estimates of growth for the entire industry is used (we assume that over a middle horizon, growth of any particular company will lie more in line with the industry as a whole). Finally, in years 11 and beyond, a growth rate estimate for the entire economy is used, reflecting the belief that even in a rapidly growing industry there will come a time when growth slows to be more in line with the overall economy.

Short-term growth rates are generally available from security analysts who follow a particular company or industry. Long-term growth rates can be estimated in a number of ways. One rudimentary estimate of long-term growth is the sustainable-growth model. This model relies on two accounting concepts: return on equity and the plow-back ratio.

Sustainable growth is then given by:

$$g_s = b_s \times ROE_s$$

where:

g_s = the sustainable growth rate for company **s**;

b_s = the plow-back ratio of company **s** calculated as follows:

$$\frac{\text{Annual Earnings} - \text{Annual Dividends}}{\text{Annual Earnings}}\text{; and}$$

ROE_s = the return on book equity of company **s** calculated as follows:

$$\frac{\text{Annual Earnings}}{\text{Book Value of Equity}}$$

This model relies on a number of assumptions that may or may not hold. The first of these assumptions is that ROE and the plow-back of earnings are constant over time. That is, there exists a forecast of these two accounting ratios that is sustainable in the long term. Though the model appears simple to implement at first glance, finding a forecast of the ratios that is sustainable indefinitely is extremely difficult. Dividend policy and potential investment opportunities change over time and have a direct impact on these ratios.

The model assumes that the only possible source of corporate earnings growth is the reinvestment of earnings into the existing business and that any investment of funds in the firm will earn the same rate of return as existing projects. However, firms generally seek projects that have a higher return than existing projects. The sustainable growth model may therefore underestimate a firm's future growth. Other problems may arise because the model relies on accounting practices that can distort earnings.

In addition, other sources of growth may exist that do not require the plow-back of earnings. Changes in technology can advance growth with little capital expenditure by a firm. For instance, efficiency in the transfer of information has improved tremendously over the years as a result of internet technology. Many companies benefit from this increased efficiency with little direct investment in the internet. A company may also grow at the rate of inflation without retaining any earnings. The growth rate that the model estimates is a nominal growth rate, not a real growth rate. If retained earnings are zero, the model predicts zero growth; however, a firm could still grow at the general rate of inflation.

Another approach to estimating long-term growth rates is to focus on estimating the overall economic growth rate. Again, this is the approach used in the *Ibbotson Cost of Capital Yearbook*. To obtain the economic growth rate, a forecast is made of the growth rate's component parts. Expected growth can be broken into two main parts: expected inflation and expected real growth. By analyzing these components separately, it is easier to see the factors that drive growth.

Treasury Inflation-Protected Securities (TIPS), a relatively new investment vehicle in the U.S., can be used in conjunction with traditional long-term government bonds to estimate the market expectation for inflation. Theoretically, the yield on inflation-indexed bonds is equal to the real default-free rate of return.

To estimate long-term inflation, we can start with the current yield on a government bond with approximately 20 years to maturity of 2.41 percent and subtract the current yield on an inflation-indexed bond with approximately 20 years to maturity of 0.15 percent, for an inflation estimate of 2.26 percent.

Once the long-term expected inflation rate is estimated, the real growth rate must be determined. The growth rate in real Gross Domestic Product (GDP) for the period 1929 to 2012 was approximately 3.22 percent. Growth in real GDP (with only a few exceptions) has been reasonably stable over time; therefore, its historical performance is a good estimate of expected long-term (future) performance.

By combining the inflation estimate with the real growth rate estimate, a long-term estimate of nominal growth is formed:

2.26 percent + 3.22 percent = 5.48 percent.

Endnotes

[1] This relationship does not seem to hold empirically with small company stocks. This size effect is discussed in Chapter 7.

[2] In general, small company betas are expected to be higher than large company betas. This, however, does not hold for all time periods. Chapter 6 discusses in more detail the measurement of beta for small stocks.

[3] The beta-adjusted size premia are different from the small stock premia (or non-beta-adjusted size premia) shown in previous editions of the *Ibbotson Stocks, Bonds, Bills, and Inflation Yearbook* (prior to the 1995 Yearbook). The small stock premium reported in older editions of Stocks, Bonds, Bills, and Inflation is the difference in long-term average returns between the large company stock total return series (currently represented by the S&P 500) and the small company stock total return series (currently represented by the Dimensional Fund Advisors U.S. Micro Cap Portfolio). The size premia given here are based on slightly different baskets of stocks from the CRSP (Center for Research in Security Prices) data set and, more importantly, they are adjusted for beta. That is, small stocks do have higher betas than large stocks; the return, above what might be expected because of the higher betas, is the size premium. These size premia increase as the capitalization of the company decreases. Chapter 7 describes the development of these premia in more detail.

[4] Beta estimate is based on the full information beta for SIC code 36 from the *Ibbotson Industry Cost of Capital Reports* as of December 31, 2012 and December 31, 1996. This beta estimation methodology is described in detail in Chapter 6. For more information, visit http://global.morningstar.com/IndReportsStats

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[7] Fama, Eugene, and Kenneth French. "The Cross-Section of Expected Stock Returns," Journal of Finance, Vol. 47, 1992a, pp. 427–465.

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