An Introduction to Security Valuation

We defined an investment as a commitment of funds to derive a return that would compensate the investor for the time during which the funds are invested, for the expected rate of inflation over the investment horizon, and for the uncertainty involved. From this definition, we know that the first step in making an investment is determining the required return.

Most investments have expected cash flows and a stated market price (e.g., common stock), and you must estimate a value for the investment to determine if its current market price is consistent with your estimated intrinsic value. You must estimate the intrinsic value of the security based on its expected cash flows and your required return.

Recall that in Chapter 8 we discussed the two general approaches to the valuation process: (1) the top-down, three-step approach; or (2) the bottom-up, stock valuation, stock-picking approach. The difference between the two is the perceived importance of the economy and a firm’s industry on the valuation of a firm and its stock. Both can be implemented by either fundamentalists or technicians.

Advocates of the top-down, three-step approach believe that both the economy/market and the industry effect have a significant impact on the total returns for individual stocks. In contrast, those who employ the bottom-up, stock-picking approach contend that it is possible to find underrated stocks relative to their market price, and these stocks will provide superior returns regardless of the market and industry outlook.

Both of these approaches have numerous supporters, and advocates of both approaches have been quite successful.¹ In this book, we advocate and present the top-down, three-step approach because of its logic and empirical support. Although we believe that a portfolio manager or an investor can be successful using the bottom-up approach, we believe that it is more difficult to be successful because these stock pickers ignore substantial information from an analysis of the outlook for the market and the firm’s industry. This chapter will focus on valuation techniques.

¹ For the history and selection process of a legendary stock picker, see Hagstrom (2001) or Lowenstein (1995).
20.1 Theory of Valuation

You may recall from your earlier studies that the value of an asset is the present value of its expected returns. This process of valuation requires estimates of (1) the stream of expected returns and (2) the required return on the investment (its discount rate).

20.1.1 Stream of Expected Returns (Cash Flows)

Estimating an investment’s expected returns encompasses not only the size but also the form, time pattern, and uncertainty of returns, which affect the required return.

Form of Returns

Investment returns can take many forms, including earnings, cash flows, dividends, interest payments, or capital gains (increases in value) during a period. We will consider several valuation techniques that use different forms of returns. For example, one common stock valuation model applies a multiplier to a firm’s earnings, another model computes the present value of a firm’s operating cash flows, and a third model estimates the present value of dividend payments. Returns or cash flows can come in many forms, and you must consider all of them to evaluate an investment.

Time Pattern and Growth Rate of Return

An accurate value for a security must include an estimate of the timing and size of the future cash flows. Because money has a time value, you must estimate the time pattern and growth returns (cash flows) from an investment.

20.1.2 Required Rate of Return

Uncertainty of Returns (Cash Flows)

Recall from Chapter 1 that the required return on an investment is determined by (1) the economy’s real risk-free return, plus (2) the expected rate of inflation during the holding period, plus (3) a risk premium determined by the uncertainty of returns. The factor that causes a difference in required rates of return is the risk premium for investments, which in turn depends on the uncertainty of the investments’ returns or cash flows.

We can identify the sources of the uncertainty of returns by the internal characteristics of assets or by market-determined factors. Earlier, we subdivided the internal characteristics for a firm into business risk (BR), financial risk (FR), liquidity risk (LR), exchange rate risk (ERR), and country risk (CR). The market-determined risk measures are the systematic risk of the asset (its beta), or a set of multiple risk factors that were discussed in Chapter 7.

20.1.3 Investment Decision Process: A Comparison of Estimated Values and Market Prices

To ensure that you receive your required return on an investment, you must estimate the investment’s intrinsic value using your required return and then compare this value to the prevailing market price. If the market price exceeds your estimated value, you should not buy the investment. In contrast, if the intrinsic value of the investment exceeds the market price, you should buy the investment.

For example, you read about a firm that produces athletic shoes and its stock is listed on the TSX. Using one of the valuation models we will discuss, you estimate the intrinsic stock value is $20 per share. After estimating this value, you look on the web and see that the stock is currently selling for $15. You would want to buy this stock. In contrast, if the current market price was $25 per share, you would not want to buy because, based upon your valuation, the stock is overvalued.

The theory of value provides a common framework for the valuation of all investments. Different applications of this theory generate different estimated values for various investments because of the different payment streams and security characteristics. A bond’s interest and principal payments differ substantially from the expected dividends and future selling price for a common stock. The initial discussion that follows applies the discounted cash flow
method to bonds, preferred stock, and common stock. This presentation demonstrates that the
same basic model is useful across a range of investments. Subsequently, because of the diffi-
culty in estimating the value of common stock, we consider two general approaches and
numerous techniques for the valuation of stock.

20.2 Valuation of Investments

20.2.1 Valuation of Bonds

Bond valuation is relatively easy because the size and time pattern of cash flows from the bond
over its life are known. A bond typically promises

1. Interest payments every six months equal to one-half the coupon rate times the face value of
   the bond
2. The payment of the principal on the bond’s maturity date

For example, in 2010, a $10,000 bond due in 2025 with a 10% coupon will pay $500 every
six months for its 15-year life. In addition, the bond issuer promises to pay the $10,000 prin-
cipal at maturity in 2025. Therefore, assuming the bond issuer does not default, the investor
knows what payments (cash flows) will be made and when they will be made.

Applying the valuation theory—which states that the value of any asset is the present
value of its cash flows—the value of the bond is the present value of the interest payments
and the present value of the principal repayment. The only unknown for this asset (assuming
the borrower does not default) is the required return that should be used to discount the
expected stream of returns (cash flows). If the prevailing nominal risk-free rate is 7% and the
investor requires a 3% default risk premium on this bond, the required return would be 10%.

The present value of the semi-annual interest payments is an annuity for 30 periods (15
years every six months) at one-half the required return (5%).

\[
\frac{500 \times 15.3725}{2} = 7,686 \\
(\text{Present Value of Interest Payments at 10%})
\]

The present value of the principal is likewise discounted at 5% for 30 periods:

\[
\frac{10,000 \times 0.2314}{2} = 2,314 \\
(\text{Present Value of the Principal Payment at 10%})
\]

This can be summarized as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Value of Interest Payments</td>
<td>$7,686</td>
</tr>
<tr>
<td>Present Value of Principal Payment</td>
<td>2,314</td>
</tr>
<tr>
<td>Total Present Value of Bond at 10%</td>
<td>$10,000</td>
</tr>
</tbody>
</table>

2 The annuity factors and present value factors are contained in Appendix D at the end of the book, although financial cal-
culators or Excel can make this calculation very easy.

3 If we used annual compounding, this would be 0.239 rather than 0.2314. We use semi-annual compounding because it
is consistent with the interest payments and is used in practice.
This is the price that an investor should be willing to pay for this bond, assuming that the required return on a bond of this risk class is 10%. If the bond’s market price is more than $10,000, the investor should not buy it because the promised yield to maturity at this higher price will be less than the investor’s required return.

Alternatively, assuming an investor requires a 12% return on this bond, its value would be:

\[
\begin{align*}
500 \times 13.7648 &= 6,882 \\
10,000 \times 0.1741 &= 1,741 \\
\text{Total Present Value of Bond at 12%} &= 8,623
\end{align*}
\]

This example shows that if you want a higher return, you will not pay as much for the bond; that is, a given stream of cash flows has a lower value to you. It is this characteristic that leads to the often-used phrase that the prices of bonds move in an opposite direction of yields.4

### 20.2.2 Valuation of Preferred Stock

Preferred stock owners receive a promise to pay a stated dividend, usually each quarter, for an infinite period. Preferred stock is a perpetuity because it has no maturity. As was true with a bond, stated payments are made on specified dates although the issuer of this stock does not have the same legal obligation to pay investors as do issuers of bonds. Payments are made only after the firm meets its debt obligations. Because this increases the uncertainty of returns, investors demand a higher return on a firm’s preferred stock than on its bonds. Although this differential in required return should exist in theory, it generally does not exist in practice because dividends paid to corporations are typically tax-exempt. This tax advantage stimulates the demand for preferred stocks by corporations; and, because of this demand, the yield on preferred stocks has generally been below that on the highest grade corporate bonds.

Because preferred stock is a perpetuity, its value is simply the stated annual dividend divided by the required return on preferred stock \( \left( k_p \right) \) as follows:

\[
V = \frac{\text{Dividend}}{k_p}
\]

Consider a $100 par value preferred stock that pays a dividend of $8 per year. Because of the expected inflation, the uncertainty of the dividend payment, and the tax advantage to you as a corporate investor, assume that your required return on this stock is 9%. Therefore, the value of this preferred stock to you is

\[
V = \frac{8}{0.09}
= 88.89
\]

As before, if the current market price of the share is $95, you would decide against a purchase, whereas if it is $80, you would buy. Lastly, given the market price of preferred stock,

---

4 To test your mastery of bond valuation, check that if the required return were 8%, the value of this bond would be $11,729.
you can derive its promised yield. Assuming a current market price of $85, the promised yield would be

\[ k_p = \frac{\text{Dividend}}{V} = \frac{8}{85.00} = 0.0941 \]

20.2.3 Approaches to the Valuation of Common Stock

Because of the complexity and importance of valuing common stock, various valuation techniques (see Exhibit 20.1) have been devised over time. These techniques fall into one of two general approaches: (1) 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; and (2) 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.

Both of these approaches and all of these valuation techniques have several common factors. First, they are significantly affected by the investor’s required return on the stock because this rate becomes, or is a major component of, the discount rate. Second, all valuation approaches are affected by the growth rate estimate used in the valuation technique—for example, dividends, earnings, cash flow, or sales. Both of these critical variables must be estimated and 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.

The following discussion of equity valuation techniques considers the specific models and the theoretical and practical strengths and weaknesses of each of them. Notably, the authors’ intent is to present these two approaches as complementary, not competitive, approaches—you should learn and use both of them.
20.2.4 Why and When to Use the Discounted Cash Flow Valuation Approach

Discounted cash flow valuation techniques are obvious choices for valuation because they are the epitome of how we describe value—the present value of expected cash flows. The main difference between the techniques is how one specifies cash flow.

The most straightforward measure of cash flow is dividends because these go directly to the investor, which implies that you should use the cost of equity as the discount rate. However, this dividend technique is difficult to apply to non-dividend-paying firms, or firms that pay very limited dividends because they have high return investment alternatives available. On the other hand, an advantage is that the reduced form of the dividend discount model (DDM) is very useful when discussing valuation for a stable, mature entity where the assumption of relatively constant growth for the long term is appropriate.

The second specification of cash flow is the operating free cash flow, which is generally described as cash flows after direct costs (cost of goods, and S, G & A expenses) and after allowing for cash flows to support working capital outlays and capital expenditures required for future growth, but before any payments to capital suppliers. Because we are dealing with the cash flows available for all capital suppliers, the discount rate employed is the firm’s weighted average cost of capital (WACC). This is a very useful model when comparing firms with diverse capital structures because you determine the value of the total firm (the entity value) and then subtract the value of the firm’s debt obligations to arrive at a value for the firm’s equity.

A third cash flow measure is free cash flow to equity, which is a measure of cash flows similar to the operating free cash flow described above, but after payments to debt holders, which means that these are cash flows available to equity owners. Therefore, the appropriate discount rate is the firm’s cost of equity.

Beyond being theoretically correct, these models allow a substantial amount of flexibility in terms of changes in sales and expenses that implies changing growth rates over time. Once you understand how to compute each measure of cash flow, cash flow estimates can be made for each year by constructing a pro forma statement for each year or you can estimate overall growth rates for the various cash flow values.

A shortcoming with these valuation methods is that they are very dependent on the two significant inputs—(1) the growth rates of cash flows (both the rate of growth and the duration of growth) and (2) the estimate of the discount rate. As we will show in several instances, a small change in either of these values can have a significant impact on the estimated value.

20.2.5 Why and When to Use the Relative Valuation Techniques

While discounted cash flow valuation models can derive intrinsic values that are substantially above or below prevailing prices depending on how your estimated inputs have been adjusted. An advantage of the relative valuation techniques is that they provide information about how the market is currently valuing stock at several levels—that is, the aggregate market, alternative industries, and individual stocks within industries.

The bad news about relative valuation techniques is that they do not provide guidance on whether these current valuations are appropriate. This means all valuations at some point in time could be too high or too low. For example, assume that the market becomes significantly overvalued. If you were to compare the value for an industry to the very overvalued market, you might contend based on such a comparison that an industry is undervalued relative to the market. Unfortunately, your judgment may be wrong because of the benchmark you are using—that is, you might be comparing a fully valued industry to a very overvalued market. Alternatively, comparing an undervalued industry to a grossly undervalued aggregate market, the industry will appear overvalued by comparison.
Therefore, the relative valuation techniques are appropriate to consider under two conditions:

1. You have a good set of comparable entities—that is, comparable companies that are similar in terms of industry, size, and, hopefully, risk.
2. The aggregate market and the company’s industry are not at a valuation extreme—that is, they are not either seriously undervalued or overvalued.

### 20.2.6 Discounted Cash Flow Valuation Techniques

Recall that the basic valuation model says that an asset’s value is the present value of its expected future cash flows:

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

where:
- \(V_j\) = value of Stock \(j\)
- \(n\) = life of the asset
- \(CF_t\) = cash flow in Period \(t\)
- \(k\) = the discount rate that is equal to the investors’ required return for Asset \(j\), which is determined by the uncertainty (risk) of the asset’s cash flows

**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:

\[
V_j = \frac{D_1}{(1 + k)} + \frac{D_2}{(1 + k)^2} + \frac{D_3}{(1 + k)^3} + \ldots + \frac{D_\infty}{(1 + K)^\infty}
\]

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

where:
- \(V_j\) = value of common Stock \(j\)
- \(D_t\) = dividend during Period \(t\)
- \(k\) = required return on Stock \(j\)

An obvious question is: What happens when the stock is not held for an infinite period? A sale of the stock at the end of Year 2 would imply the following formula:

\[
V_j = \frac{D_1}{(1 + k)} + \frac{D_2}{(1 + k)^2} + \frac{SP_{j2}}{(1 + k)^2}
\]

---

5 This model was initially set forth in Williams (1938) and subsequently reintroduced and expanded by Gordon (1962).
The value is equal to the two dividend payments during Years 1 and 2 plus the sale price \( (SP) \) for Stock \( j \) at the end of Year 2. The expected selling price of Stock \( j \) at the end of Year 2 \( (SP_j^2) \) is simply the value of all remaining dividend payments.

\[
SP_j^2 = \frac{D_3}{(1 + k)} + \frac{D_4}{(1 + k)^2} + \ldots + \frac{D_\infty}{(1 + k)^\infty}
\]

If \( SP_j^2 \) is discounted back to the present by \( 1/(1 + k)^2 \), this equation becomes

\[
PV(SP_j^2) = \frac{D_3}{(1 + k)} + \frac{D_4}{(1 + k)^2} + \ldots + \frac{D_\infty}{(1 + k)^\infty} = \frac{D_3}{(1 + k)^3} + \frac{D_4}{(1 + k)^4} + \ldots + \frac{D_\infty}{(1 + k)^\infty}
\]

which is simply an extension of the original equation. Whenever the stock is sold, its value (the sale price at that time) will be the present value of all future dividends. When this ending value is discounted to the present, you are back to the original dividend discount model.

What about non-dividend-paying stocks? Again, the concept is the same, except that some of the early dividend payments are zero. Notably, there is an expectation that at some point the firm will start paying dividends. If investors lacked such an expectation, no one would be willing to buy the security. A firm that does not pay dividends is reinvesting its capital in very profitable projects so that its earnings and dividend stream will be larger and grow faster in the future. In this case, we would apply the DDM as:

\[
V_j = \frac{D_1}{(1 + k)} + \frac{D_2}{(1 + k)^2} + \frac{D_3}{(1 + k)^3} + \ldots + \frac{D_\infty}{(1 + k)^\infty}
\]

where:

\( D_1 = 0; D_2 = 0 \)

For short holding periods, the DDM would show that the value is the present value of several dividend payments plus the present value of a closing price that would reflect all future dividend payments. For longer holding periods we use the infinite period model, which can indicate what factors affect the price-earnings ratio.

**Infinite Period Model** The infinite period dividend discount model assumes investors estimate future dividend payments for an infinite number of periods.

Needless to say, this is a formidable task. We must make some simplifying assumptions about this future stream of dividends to make the task viable. The easiest assumption is that the future dividend stream will grow at a constant rate infinitely. This is a rather heroic assumption in many instances, but where it does hold, we can use the model to value individual stocks as well as the aggregate market and alternative industries. This model is generalized as follows:

\[
V_j = \frac{D_0(1 + g)}{(1 + k)} + \frac{D_0(1 + g)^2}{(1 + k)^2} + \ldots + \frac{D_0(1 + g)^n}{(1 + k)^n}
\]
where:

- $V_j$ = value of Stock $j$
- $D_0$ = the dividend payment in the current period
- $g$ = the constant growth rate of dividends
- $k$ = the required return of Stock $j$
- $n$ = the number of periods, which we assume to be infinite

This infinite period constant growth rate model can be simplified to the following expression (referred to as the reduced form DDM):

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

You will probably recognize this formula as one that is widely used in corporate finance to estimate the cost of equity capital for the firm—that is, $k = D/V + g$.

To use this valuation model, you must estimate both the required return ($k$) and the expected constant growth rate of dividends ($g$). After estimating $g$, it is a simple matter to estimate $D_1$, because it is the current dividend ($D_0$) times $(1 + g)$.

Consider a stock with a current dividend of $1 per share. You believe that this company’s long-run earnings and dividends will grow at 7%, which implies that you expect next year’s dividend ($D_1$) to be $1.07. For the long run, you expect a nominal risk-free rate of about 8% and a risk premium for this stock of 3%. Therefore, you set your long-run required return on this stock at 11%. To summarize the relevant estimates:

- $g = 0.07$
- $k = 0.11$
- $D_1 = $1.07 ($1.00 \times 1.07$)
- $V = \frac{1.07}{0.11 - 0.07}$
- $V = \frac{1.07}{0.04}$
- $V = $26.75

Now what happens if there is a small change in any of the original estimates?

1. Assume an increase in $k$: $g = 0.07; k = 0.12; D_1 = $1.07.

$$V = \frac{1.07}{0.12 - 0.07}$$
- $V = \frac{1.07}{0.05}$
- $V = $21.40
2. Assume an increase in $g$: $g = 0.08; k = 0.11; D_1 = $1.08.

\[
V = \frac{$1.08}{0.11 - 0.08} = \frac{$1.08}{0.03} = $36.00
\]

These examples show that a small change in either $g$ or $k$ produces a large difference in the stock’s value. The crucial relationship that determines the value of the stock is the spread between the required return ($k$) and the expected growth rate of dividends ($g$). Anything causing a decline in the spread will cause an increase in the computed value, whereas any increase in the spread will decrease the computed value of the stock.

### 20.2.7 Infinite Period DDM and Growth Companies

Recall that the infinite period DDM has the following assumptions:

1. Dividends grow at a constant rate and this rate will continue for an infinite period.
2. The required return ($k$) is greater than the infinite growth rate ($g$). If it is not, the model gives meaningless results because the denominator becomes negative.

What is the effect of these assumptions if you want to use this model to value the stock of growth companies. **Growth companies** have the opportunities and abilities to earn returns on their investments that are consistently above their required rates of return.\(^6\) For example, a firm with a WACC of 12% that is currently earning about 20% on its invested capital would be considered a growth company. In order to exploit these outstanding investment opportunities, these growth firms generally retain a high percentage of earnings for reinvestment, and their earnings will grow faster than those of the typical firm. You will recall from the discussion in Web Chapter 19 that a firm’s sustainable growth is a function of its retention rate and its return on equity (ROE).

The earnings growth pattern for these growth companies is inconsistent with the assumptions of the infinite period DDM. First, the infinite period DDM assumes dividends will grow at a constant rate indefinitely. Although it is unlikely that these firms can maintain such extreme growth rates for an infinite period in an economy where other firms will compete with them for these high rates of return.

Second, during the periods when these firms experience abnormally high growth rates, their growth rates probably exceed their required returns. There is no automatic relationship between growth and risk; a high-growth company is not necessarily a high-risk company. In fact, a firm growing at a high constant rate would have lower risk (less uncertainty) than a low-growth firm with an unstable earnings pattern.

### 20.2.8 Valuation with Temporary Supernormal Growth

Some firms experience periods of abnormally high rates of growth for some finite periods of time. The infinite period DDM cannot be used to value these true growth firms because these high-growth conditions are temporary and therefore inconsistent with the assumptions of the DDM. In a competitive free enterprise economy, it is not reasonable to expect a company to

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\(^6\) Growth companies are discussed in Salomon (1963) and Miller and Modigliani (1961). Models to value growth companies are discussed in Chapter 9.
permanently maintain a growth rate higher than its required return as competition will eventually enter this apparently lucrative business, thus reducing the firm’s profit margins and therefore its ROE and growth rate. Therefore, after a few years of exceptional growth—that is, a period of temporary supernormal growth—a firm’s growth rate is expected to decline. Eventually its growth rate is expected to stabilize at a constant level consistent with the assumptions of the infinite period DDM.

To value a temporary supernormal growth company, you must combine the previous models. In analyzing the initial years of exceptional growth, examine each year individually. If the company is expected to have two or three stages of supernormal growth, you must examine each year during these stages of growth. When the firm’s growth rate stabilizes at a rate below the required return, you can compute the remaining value of the firm assuming constant growth using the DDM and discount this lump-sum constant growth value to the present. The technique should become clear as you work through the following example.

The Wood Company has a current dividend ($D_0$) of $2 per share. The following are the expected annual growth rates for dividends.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dividend Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–3</td>
<td>25%</td>
</tr>
<tr>
<td>4–6</td>
<td>20%</td>
</tr>
<tr>
<td>7–9</td>
<td>15%</td>
</tr>
<tr>
<td>10 on</td>
<td>9%</td>
</tr>
</tbody>
</table>

The required return for the stock (the company’s cost of equity) is 14%. Therefore, the value equation becomes:

\[
V_j = \frac{2.00(1.25)}{1.14} + \frac{2.00(1.25)^2}{(1.14)^2} + \frac{2.00(1.25)^3}{(1.14)^3} + \frac{2.00(1.25)^3(1.20)}{(1.14)^4} + \frac{2.00(1.25)^3(1.20)^2}{(1.14)^5} + \frac{2.00(1.25)^3(1.20)^3}{(1.14)^6} + \frac{2.00(1.25)^3(1.20)^3(1.15)}{(1.14)^7} + \frac{2.00(1.25)^3(1.20)^3(1.15)^2}{(1.14)^8} + \frac{2.00(1.25)^3(1.20)^3(1.15)^3}{(1.14)^9} + \frac{2.00(1.25)^3(1.20)^3(1.15)^3(1.09)}{(0.14 - 0.09)} + \frac{2.00(1.25)^3(1.20)^3(1.15)^3(1.09)}{(1.14)^9} = \$94.36
\]

As before, you would compare this estimate of intrinsic value to the market price of the stock when deciding whether to purchase the stock. The difficult part of the valuation is estimating both the supernormal growth rates and determining how long each of the growth rates will last.\(^7\)

\(^7\) Note that the bulk of the value ($68.94) is due to the continuing dividend starting in year 10, when we assume the dividend will experience constant growth at 9%.
20.2.9 **Present Value of Operating Free Cash Flows**

In this model, the total firm value is determined by 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). Because the total firm’s operating free cash flow is discounted, you would use the firm’s weighted average cost of capital (WACC) as your discount rate. Once the value of the total firm is calculated, you subtract the value of debt and preferred stock, assuming your goal is to estimate the value of the firm’s equity. The total value of the firm is:

\[
V_j = \sum_{t=1}^{\infty} \frac{OFCF_t}{(1 + WACC_j)^t}
\]

where:
- \(V_j\) = value of Firm \(j\)
- \(n\) = number of periods assumed to be infinite
- \(OFCF_t\) = the firm’s operating free cash flow in Period \(t\). The detailed specification of operating free cash flow is discussed in Chapter 9.
- \(WACC_j\) = Firm \(j\)’s weighted average cost of capital. The computation of the firm’s WACC is discussed in Chapter 9.

Similar to the DDM process, it is possible to envision this as a model that requires estimates for an infinite period. Alternatively, if you are dealing with a mature firm whereby its operating cash flows have reached a stage of stable growth, you can adapt the infinite period constant growth DDM model as follows:

\[
V_j = \frac{OFCF_1}{WACC_j - g_{OFCF}}
\]

where:
- \(OFCF_1\) = operating free cash flow in Period 1 equal to \(OFCF_0(1 + g_{OFCF})\)
- \(g_{OFCF}\) = long-term constant growth rate of operating free cash flow

Similarly, assuming that the firm is expected to experience several different growth rates for \(OFCF\), the analyst must estimate the rate of growth and the duration of growth for each of these periods. This calculation is demonstrated in Chapter 9.

20.2.10 **Present Value of Free Cash Flows 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). These cash flows precede dividend payments to the common stockholder. 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 flow). They are specified as free cash flows to equity because they also adjust for payments to debt holders 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 \(WACC\).

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8 This includes all debt items and preferred stock.
where:

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

- \( V_j \) = value of the stock of Firm \( j \)
- \( n \) = number of periods assumed to be infinite
- \( FCFE_t \) = the firm’s free cash flow to equity in Period \( t \). The detailed specification of free cash flow to equity is discussed in Chapter 9.

Again, how an analyst would implement this general model 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 similar to the process used with dividends and for operating free cash flow.

### 20.3 Relative Valuation Techniques

Contrasting the various discounted cash flow techniques, the relative valuation techniques implicitly maintain that it is possible to determine the value of a 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. Therefore, in this section, we discuss the following relative valuation ratios: price/earnings (\( P/E \)), price/cash flow (\( P/CF \)), price/book value (\( P/BV \)), price/sales (\( P/S \)), and the entity value/EBITDA (EV/EBITDA). We begin with the \( P/E \) ratio, also referred to as the earnings multiplier model, because it is the most popular relative valuation ratio. In addition, we will show that the \( P/E \) ratio can be directly related to the DDM in a manner that indicates the variables that affect the \( P/E \) ratio.

#### 20.3.1 Earnings Multiplier Model

Many investors prefer to estimate common stock value by using an earnings multiplier model. The reasoning for this approach recalls that the value of any investment is the present value of future returns and for common stocks; the returns investors are entitled to receive are the firm’s net earnings. Therefore, one way investors can estimate value is by determining how many dollars they are willing to pay per dollar of expected earnings (typically represented by the estimated earnings during the following 12-month period or an estimate of “normalized earnings”). For example, if investors are willing to pay 10 times expected or “normal” earnings, a stock they expect to earn $2 per share during the following year would be valued at $20. The prevailing earnings multiplier, also referred to as the price/earnings (\( P/E \)) ratio, is computed as follows:

\[ \text{Earnings Multiplier} = \frac{\text{Current Market Price}}{\text{Expected 12-Month Earnings}} \]

This indicates the prevailing attitude of investors toward a stock’s value and investors must decide if they agree with the prevailing \( P/E \) ratio (i.e., is the earnings multiplier too high or too low?) based upon how it compares to the \( P/E \) ratio for the aggregate market, for the firm’s industry, and for similar firms and stocks.
To decide whether the $P/E$ ratio is too high or too low, we must consider what influences the earnings multiplier ($P/E$ ratio) over time. For example, over time the aggregate stock market $P/E$ ratio, as represented by the S&P/TSX Composite index, has varied from about 9 to about 26 times earnings.\(^9\) The infinite period dividend discount model can be used to indicate the variables that should determine the value of the $P/E$ ratio as follows:\(^10\)

\[
P_i = \frac{D_i}{k - g}
\]

Dividing both sides of the equation by $E_i$ (expected earnings during the next 12 months), we get

\[
\frac{P_i}{E_i} = \frac{D_i/E_i}{k - g}
\]

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

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

For example, assume a stock has an expected dividend payout of 50%, a required return of 12%, and an expected dividend growth rate of 8%, this would imply that the stock’s $P/E$ ratio should be:

\[
\frac{D}{E} = 0.50; \quad k = 0.12; \quad g = 0.08
\]

\[
\frac{P}{E} = \frac{0.50}{0.12 - 0.08} = 12.50
\]

Again, a small difference in either $k$ or $g$ or both will have a large impact on the earnings multiplier, as shown in the following three examples.

1. Assume a higher $k$ for the stock.

\[
\frac{D}{E} = 0.50; \quad k = 0.13; \quad g = 0.08
\]

\[
\frac{P}{E} = \frac{0.50}{0.13 - 0.08} = 10.00
\]

\(^9\) When computing historical $P/E$ ratios, the practice is to use earnings for the past 12 months rather than expected earnings. Although this will influence the level, it demonstrates the changes in the $P/E$ ratio over time. Although it is acceptable use past $P/E$ ratios for historical comparison, we strongly believe that investment decisions should emphasize future or forward $P/E$ ratios that use expected earnings.

\(^10\) In this formulation of the model we use $P$ rather than $V$ (i.e., the value is stated as the estimated price of the stock). Although the factors that determine the $P/E$ are the same for growth companies, this formula cannot be used to estimate a specific value because these firms often do not have dividends, the infinite growth rate assumption is not valid, and the $(k - g)$ assumptions don’t apply.
2. Assume a higher $g$ for the stock and the original $k$.

\[
\frac{D}{E} = 0.50; \quad k = 0.12; \quad g = 0.09
\]

\[
\frac{P}{E} = \frac{0.50}{0.12 - 0.09} = 16.70
\]

3. Assume a fairly optimistic scenario where the $k$ for the stock is only 11% and there is a higher expected dividend growth rate of 9%.

\[
\frac{D}{E} = 0.50; \quad k = 0.11; \quad g = 0.09
\]

\[
\frac{P}{E} = \frac{0.50}{0.11 - 0.09} = 25.00
\]

As before, the spread between $k$ and $g$ is the main determinant of the size of the $P/E$ ratio. Although the dividend payout ratio has an impact, we are generally referring to a firm’s long-run target payout, which is typically rather stable with little effect on year-to-year changes in the $P/E$ ratio (earnings multiplier).

After estimating the earnings multiple, you would apply it to your 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 your expected growth rate of earnings. Using these two estimates, you would compute an estimated value of the stock and compare this estimated value to its market price.

Consider the following estimates for a firm W:

\[
\frac{D}{E} = 0.50; \quad k = 0.12; \quad g = 0.09; \quad E_0 = $2.00
\]

Using these estimates, you would compute an earnings multiple of:

\[
\frac{P}{E} = \frac{0.50}{0.12 - 0.09} = \frac{0.50}{0.03} = 16.7
\]

Given current earnings ($E_0$) of $2.00 and a $g$ of 9%, you would expect $E_1$ to be $2.18$. Therefore, the value (price) of the stock is estimated as:

\[
V = 16.7 \times $2.18 = $36.41
\]

You would then compare this estimated value to the stock’s current market price to decide whether you should invest in it. This estimate of value is referred to as a two-step process because it requires you to estimate future earnings ($E_1$) and a $P/E$ ratio based on expectations of $k$ and $g$. These two estimates are discussed in Chapter 9.

### 20.3.2 The Price/Cash Flow Ratio

The relative price/cash flow valuation ratio has become more popular as concerns over the propensity of some firms to manipulate earnings per share has grown. 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 \( j \)

The variables that affect this ratio are similar to the \( P/E \) ratio. Specifically, the main variables should be: (1) the expected growth rate of the cash flow variable used, and (2) the risk of the stock as indicated by the uncertainty or variability of the cash flow series over time. The specific cash flow measure used will vary depending upon the nature of the company and industry and which cash flow specification (e.g., operating cash flow or free cash flow) is the best measure of performance for this industry.\(^{11}\) An appropriate ratio can also be affected by the firm’s capital structure.

### 20.3.3 The Price/Book Value Ratio

The price/book value (\( P/BV \)) ratio 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. This ratio gained in popularity and credibility as a relative valuation technique for all types of firms based upon a study by Fama and French (1992) that indicated a significant inverse relationship between \( P/BV \) ratios and excess rates of return for a cross-section of stocks. The \( P/BV \) ratio is specified as follows:

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

where:
- \( P/BV \) = 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 \( j \)

As with other relative valuation ratios, it is important to match the current price with the book value that is expected to prevail at the end of the year. The difficulty is that this future book value is not generally available. One can derive an estimate of the end-of-year book value based on the historical growth rate for all series or use the growth rate implied by the sustainable growth formula: \( g = ROE \times Retention \text{ Rate} \).

The factors that determine the size of the \( P/BV \) ratio are a function of the firm’s ROE relative to its cost of equity as the ratio would be 1 if they were equal—that is, if the firm

\(^{11}\) While there has been a tendency to employ EBITDA as the proxy for cash flow, we do not recommend or encourage this because of the strong upward bias of this series compared to other cash flow measures, as noted in Web Chapter 19.
earned its required return on equity. In contrast, if the firm’s ROE is much larger than its cost of equity, it is a growth company and investors should be willing to pay a premium price over its book value for the stock.

20.3.4 The Price/Sales Ratio
The price/sales (P/S) ratio has a volatile history. It was a favourite of Phillip Fisher (1984), a well-known money manager in the late 1950s, as well as his son Kenneth Fisher (1984) and Senchack and Martin (1987). Recently, the P/S ratio has been suggested as useful by Martin Leibowitz (1997), a widely admired stock and bond portfolio manager. These 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. Although they note the importance of an above-average profit margin, they contend that the growth process begins with sales. 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:
- \( P/S_j \) = the price to sales ratio for Firm \( j \)
- \( P_t \) = the price of the stock in Period \( t \)
- \( S_{t+1} \) = the expected sales per share for Firm \( j \)

Again, it is important to match the current stock price with the firm’s expected sales per share, which may be difficult to derive for a large cross-section of stocks. Two caveats are relevant to the price to sales ratio. First, this particular relative valuation ratio varies dramatically by industry. For example, the sales per share for retail firms, such as Canadian Tire or Shoppers Drug Mart, are typically much higher than sales per share for computer or microchip firms. The second consideration is the profit margin on sales. The point is, retail food stores have high sales per share, which will cause a low P/S ratio, which is considered good until one realizes that these firms have low net profit margins. Therefore, your relative valuation analysis using the P/S ratio should be between firms in the same or similar industries.

20.3.5 Implementing the Relative Valuation Technique
To properly implement the relative valuation technique, it is essential not only to compare the various ratios but also to understand what factors affect each of the valuation ratios and, therefore, know why they should differ. The first step is to compare the valuation ratio over time (e.g., the P/E ratio) for a company to the comparable ratio for the market, for the stock’s industry, and to other stocks in the industry to determine how it compares—is it similar to or is it consistently at a premium or discount? Beyond knowing the overall relationship to the market, industry, and competitors, the real analysis is involved in understanding why the ratio has or should not have this relationship and the implications of this mismatch. Specifically, the second step is to explain the relationship. To do this, you need to understand what factors determine the specific valuation ratio and then compare these factors for the stock being valued versus the same factors for the market, industry, and other stocks.

To illustrate this process, assume you are valuing the stock of a pharmaceutical company using the P/E relative valuation technique. As part of this analysis, you compare the P/E ratios for this firm over time (e.g., the last 15 years) to similar ratios for the S&P/TSX HealthCare
index, the pharmaceutical industry, and specific competitors. This comparison indicates that
the company’s $P/E$ ratios are consistently above all the other sets. Following this, the second
part of the analysis considers whether the fundamental factors that affect the $P/E$ ratio (i.e.,
the firm’s growth rate and its required return) justify the higher $P/E$. A positive scenario
would be that the firm had a historical and expected growth rate that was substantially above
all the comparables and your risk analysis indicates a lower required return due to a lower
beta. This would indicate that the higher $P/E$ ratio is justified. The subsequent question that
needs to be considered is: How much higher should the $P/E$ ratio be? Alternatively, the neg-
ative scenario for this stock with a $P/E$ ratio above most comparables would be if the com-
pany’s expected growth rate was equal to or lower than the industry and competitors’ while
its required $k$ was higher than for the industry and competitors. This set of conditions would
signal a stock that is apparently overpriced based on the fundamental factors that determine
a stock’s $P/E$ ratio.

In subsequent sections, we discuss how an analyst arrives at estimates for $g$ and $k$, and we
demonstrated the process in Chapter 9. At this point, the reader should understand the overall
process required by the relative valuation technique.

### 20.4 Estimating the Inputs: The Required Return and the Expected Growth Rate

This section deals with estimating two critical inputs to the valuation process irrespec-
tive of the approach or technique used: the required return ($k$) and the expected earn-
ings growth rate and other valuation variables—that is, book value, cash flow, sales, and
dividends.

#### 20.4.1 Required Return ($k$)

The required return will be the discount rate for most cash flow models and affects all the
relative valuation techniques. There is a difference in the discount rate when using the present
value of operating free cash flow technique because, as noted, it uses the weighted average
cost of capital ($WACC$). Notably, the cost of equity is a critical input to estimating the firm’s
$WACC$.

Recall that three factors influence an equity investor’s required 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. Recall that this rate can be affected by
temporary tightness or ease in the capital markets.

**The Expected Rate of Inflation**  Investors are interested in real returns that will allow them
to increase their rate of consumption. Therefore, if investors expect a given rate of inflation,
they should increase their required *nominal* risk-free return ($NRFR$) to reflect any expected
inflation as follows:

$$NRFR = \left[\left(1 + RRFR\right)\left(1 + E(I)\right)\right]^{-1}$$
where:
\[ E(I) = \text{expected rate of inflation} \]

**The Risk Premium** The risk premium (RP) causes differences in the required returns among investments that range from government bonds to corporate bonds to common stocks. The RP also explains the difference in the expected return among securities of the same type. For example, this is the reason corporate bonds with different ratings of AAA, AA, or A have different yields, and why different common stocks have widely varying \( P/E \) ratios despite similar growth expectations.

Recall that risk premiums are demanded because of the uncertainty of returns from an investment. A measure of this uncertainty of returns was the dispersion of expected returns, and several internal factors influence a firm’s variability of returns, such as its business risk, financial risk, and liquidity risk. As well, firms with significant foreign sales and earnings (e.g., Coca-Cola and McDonald’s) have additional risk factors, including exchange rate risk and country (political) risk.

**Changes in the Risk Premium** Because different securities (e.g., government bonds and common stocks) have different patterns of returns and different guarantees to investors, we expect their risk premiums to differ. In addition, a fact that is less recognized is that the risk premiums for the same securities can change over time. For example, Exhibit 20.2 shows the spread between the yields to maturity for AA and BBB-rated corporate bonds from 2001 through 2007. This yield spread, or difference in yield, is a measure of the risk premium for investing in higher risk bonds (BBB) compared to low-risk bonds (AA). As shown, the yield spread varied from about 1% to 1.5% in this short period.


<table>
<thead>
<tr>
<th>Year</th>
<th>Ratio of Rates (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1.05</td>
</tr>
<tr>
<td>2001</td>
<td>1.1</td>
</tr>
<tr>
<td>2002</td>
<td>1.15</td>
</tr>
<tr>
<td>2003</td>
<td>1.2</td>
</tr>
<tr>
<td>2004</td>
<td>1.15</td>
</tr>
<tr>
<td>2005</td>
<td>1.25</td>
</tr>
<tr>
<td>2006</td>
<td>1.2</td>
</tr>
<tr>
<td>2007</td>
<td>1.15</td>
</tr>
<tr>
<td>2008</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Source: Prepared by authors using data from Bloomberg.

### 20.4.2 Estimating the Required Return for Foreign Securities

Our discussion of the required return for investments has been limited to the domestic market. Although the basic valuation model and its variables are the same around the world, there are significant differences in the values for specific variables. This section points out where these differences occur.

**Foreign Real RFR** Because the RRFR in other countries should be determined by the real growth rate within the particular economy, the estimated rate can vary substantially among countries due to differences in an economy’s real growth rate. An example of differences in
the real growth rate of gross domestic product (GDP) can be seen from growth expectations for 2008 real GDP contained in the *IMF World Economic Outlook* as shown in Exhibit 20.3. There is a range of estimates for 2008 of about 1.1% (i.e., 0.5% for the United States compared to 1.6% for the United Kingdom). This difference in the expected growth rates of real GDP implies a substantial difference in the RRFR for these countries.12

**Inflation Rate** To estimate the NRFR for a country, you must also estimate its expected inflation rate and adjust the NRFR for this expectation. The price change data show that the expected rate of inflation during 2008 varied from 0.6% in Germany to 3.0% in the United States. Assuming equal real growth, this inflation estimate implies a difference in the nominal required return between Germany and the United States of 2.4%. As demonstrated earlier, such a difference in \( k \) can have a substantial impact on estimated values.

To demonstrate the combined impact of differences in real growth and expected inflation, Exhibit 20.3 shows the results of the following computation based on the year 2008 estimates:

\[
NRFR = \left[ \frac{(1 + \text{Real Growth}) \times (1 + \text{Expected Inflation})}{(1 + \text{RRFR})} \right] - 1
\]

**Risk Premium** You must also derive an equity risk premium for the investments in each country. Again, the five risk components (business, financial, liquidity, exchange rate, and country risk) differ substantially between countries. *Business risk* can vary because it is a function of the variability of economic activity within a country and of the operating leverage used by firms within the country. Firms in different countries assume significantly different financial risk as well. Regarding liquidity risk, well-developed capital markets are acknowledged to be the most liquid in the world, but some emerging markets are quite illiquid and in such cases investors need to add a significant liquidity risk premium.

Investing globally also means you must estimate *exchange rate risk*. In some countries, substantial volatility in the exchange rate over time can mean significant differences in the domestic return for the country and return in Canadian dollars. The level of volatility for the exchange rate differs between countries. The greater the uncertainty regarding future changes in the exchange rate, the larger the exchange rate risk for the country.13

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12 All the estimates of real growth and inflation are from the *IMF World Economic Outlook* (April, 2008).

13 For a thorough analysis of exchange rate determination and forecasting models, see Rosenberg (1996).
Lastly, we need to recognize country risk, such as upheavals in its political or economic environment. Before investing in foreign markets, investors must evaluate the additional returns they should require to accept this increased uncertainty.

Thus, when estimating required returns on foreign investments, you must assign a unique risk premium for each country.

### 20.4.3 Expected Growth Rates

After deriving a required return, the investor must estimate the growth rate of sales, cash flows, earnings, and dividends. The initial procedure we describe here is a brief summary of the presentation in Web Chapter 19, where we used financial ratios to measure a firm’s growth potential. Subsequently, we discuss the use of historical growth rates as an input to the estimate.

**Estimating Growth from Fundamentals** The growth rate of dividends is determined by the growth rate of earnings and the proportion of earnings paid out in dividends (the payout ratio). Over the short run, dividends can grow faster or slower than earnings if the firm changes its payout ratio. Specifically, if a firm’s earnings grow at 6% a year and it pays out exactly 50% of earnings in dividends, then the firm’s dividends will likewise grow at 6% a year. Alternatively, if a firm’s earnings grow at 6% a year and the firm increases its payout, then during the period when the payout ratio increases, dividends will grow faster than earnings. Because there is a limit to how long this difference in growth rates can continue, most investors assume that the long-run dividend payout ratio is fairly stable. Therefore, our analysis of the dividend growth rate concentrates on an analysis of the growth rate of equity earnings. Also, as shown in Chapter 9, equity earnings are the main factor driving the operating cash flows or the free cash flows for the firm.

When a firm retains earnings to acquire additional assets, it hopefully earns some positive return on these additional assets. This means the firm’s earnings will increase because its asset base is larger. How rapidly a firm’s earnings increase depends on (1) the proportion of earnings it retains and reinvests in new assets and (2) the return it earns on these new assets.

Recall Equation 19.32 on page 40:

\[
g = \text{Percentage of Earning Retained} \times \text{Return on Equity} = RR \times ROE
\]

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 or by maintaining its retention rate but increasing its ROE. For example, a firm retains 50% of net earnings and consistently has an ROE of 10%; its net earnings will grow at the rate of 5% a year, as follows:

\[
g = RR \times ROE
\]
\[
= 0.50 \times 0.10
\]
\[
= 0.05
\]
If the firm increases its retention rate to 75% and can invest these additional funds in projects that likewise earn 10%, its growth rate will increase to 7.5%:

\[
g = 0.75 \times 0.10 = 0.075
\]

**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. As discussed in Web Chapter 19, the ROE ratio can be divided into three components:

\[
ROE = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total Assets}} \times \frac{\text{Total Assets}}{\text{Equity}} = \frac{\text{Profit Margin}}{\text{Turnover}} \times \frac{\text{Total Asset Turnover}}{\text{Financial Leverage}}
\]

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.

Knowing this breakdown, you must examine past results and expectations for a firm and develop estimates of the three components and therefore an estimate of a firm’s ROE. This ROE estimate combined with the firm’s expected retention rate will indicate its future growth potential. Finally, it is important to note that when estimating growth, it is necessary to estimate not only the rate but also the duration of growth (how long the firm can sustain this rate of growth). Clearly, the higher the growth rate, the more significant the duration of growth estimate is to the ultimate value of the stock. Also, a high growth rate generally requires a high ROE, which is difficult to sustain because numerous competitors want to experience these high rates of return.

**Estimating Growth Based on History** Although we have a strong bias in favour of using the fundamentals to estimate future growth (i.e., estimating the components of ROE), we also believe in using all the information available to make this critical estimate. Therefore, we suggest that analysts also consider the historical growth rate of sales, earnings, cash flow, and dividends and consider not only the different rates of growth but also the variability in the growth pattern over time for these series.

Although we demonstrate these computations for the market, for an industry, and for a company in Chapters 8 and 9, the following discussion considers some suggestions on alternative calculations. In terms of the relevant period to consider, one is struck by the cliché “more is better” as long as you recognize that “recent is relevant.” Specifically, about 20 years of annual observations would be ideal, but it is important to consider subperiods as well as

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14 You will recall from Web Chapter 19 (Exhibit 19.7) that it is possible to employ an extended DuPont system. For purposes of this discussion, the three ratios indicate the significant factors and differences among countries. It may be instructive to review that section now.
the total period—that is, 20 years, two 10-year periods, and four 5-year periods would indicate the overall growth rate but also would indicate if there were any changes in the growth rate during the critical recent periods.

The specific measurement can be done using one or more of three techniques: arithmetic or geometric average of annual percentage changes, linear regression models, and log-linear regression models. Irrespective of the technique used, we strongly encourage a time-series plot of the annual percentage changes.

The arithmetic or geometric average technique involves computing the annual percentage change and then computing either the simple arithmetic average or the geometric average of these values for the period. As you will recall from the discussion in Chapter 3, the arithmetic average will always be a higher value than the geometric average (except when the annual values are constant) and the difference between the arithmetic and geometric average values increase with volatility. Remember that the geometric mean is generally preferred because it provides the average annual compound growth rate.

The linear regression model goes well with the suggested time-series plot and is as follows:

\[ EPS_t = a + bt \]

where:
- \( EPS_t \) = earnings per period in Period \( t \)
- \( t \) = year \( t \) where \( t \) goes from 1 to \( n \)
- \( b \) = the coefficient that indicates the average absolute change in the series during the period

It would be very informative to superimpose this regression line on the time-series plot because it would provide insights on changes in absolute growth.

The log-linear model considers that the series might be better described in terms of a constant growth rate. This model is as follows:

\[ \ln(EPS_t) = a + bt \]

where:
- \( \ln(EPS_t) \) = the natural logarithm of earnings per share in Period \( t \)
- \( b \) = the coefficient that indicates the average percentage change in the series during the period

Analysis of these historical growth rates both visually with the time-series graph and with the alternative calculations should provide you with significant insights into the trend of the growth rates as well as the variability of the growth rates over time. As discussed in Web Chapter 19, this could provide information on the unit’s business risk with the analysis of sales and EBIT growth.

### 20.4.4 Estimating Dividend Growth for Foreign Stocks

The underlying factors determining the growth rates for foreign stocks are similar to those for Canadian stocks, but the value of the equation's components may differ substantially from what is common in Canada. The differences in the retention rate or the components of ROE
result from differences in accounting practices as well as alternative management performance or philosophy. Therefore, it is important to determine the different values for the ratios and the reasons for the differences.

**Retention Rates** The retention rates for foreign corporations differ within countries, but differences also exist among countries due to differences in the countries’ investment opportunities. As an example, firms in Japan have a higher retention rate than firms in Canada, whereas the rate of retention in France is much lower. Therefore, you need to examine the retention rates for a number of firms in a country as a background for estimating the standard rate within a country.

**Net Profit Margin** The net profit margin of foreign firms can differ because of different accounting conventions between countries. As noted in Web Chapter 19, foreign accounting rules allow firms to recognize revenue and allocate expenses differently from Canadian firms. Also, different foreign amortization practices require adjustment of earnings and cash flows.

**Total Asset Turnover** Total asset turnover can likewise differ among countries because of different accounting conventions on the reporting of asset values at cost or market values. For example, in Japan, a large part of the market values for some firms comes from their real estate holdings and their common stock investments in other firms. These assets are reported at cost, which typically substantially understates their true value. This also means that the total asset turnover ratio for these firms is substantially overstated.

This ratio will also be impacted by leases that are not capitalized on the balance sheet. If leases are not capitalized, both assets and liabilities are understated.

**Total Asset/Equity Ratio** This ratio, a measure of financial leverage, differs among countries because of differences in economic environments, tax laws, management philosophies regarding corporate debt, and accounting conventions. In several countries, the attitude toward debt is much more liberal than in Canada. A prime example is Japan, where debt as a percentage of total assets is almost 50% higher than this ratio in Canada. Notably, most corporate debt in Japan entails borrowing from banks at fairly low rates of interest. Balance sheet debt ratios may be higher in Japan than in Canada or other countries; but because of the lower interest rates in Japan, the fixed-charge coverage ratios, such as the times interest earned ratio, might be similar to those in other countries.

Consequently, when analyzing a foreign stock market or an individual foreign stock that involves estimating the growth rate for earnings and dividends, you must consider the three components of the ROE just as you would for a Canadian stock but recognize that the financial ratios for foreign firms can differ from those of Canadian firms, as discussed in Web Chapter 19 references.

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**Summary**

1. Valuation techniques require an estimate of the investor’s required return on the stock and the growth rate. As both are estimated, 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.

2. The investment decision process requires the investor to estimate an investment’s intrinsic value and then compare this value to the prevailing market price. If the market price exceeds the estimated value, the investment should not be purchased. In contrast, if the investment’s intrinsic value exceeds the market price, you should buy the investment.

3. A discounted cash flow method is typically used to value both bonds and preferred stock. The cash flows from the bond are valued as an annuity with a lump sum return of principal at maturity while preferred stock dividends are valued as a perpetuity.
4. Common stock valuation techniques fall into one of two general approaches: (1) discounted cash flow, where the value of the stock is estimated based upon the present value of some measure of cash flow; and (2) relative valuation, where the value is estimated based upon the stock’s current price relative to variables considered to be significant to valuation, such as earnings, cash flow, book value, or sales.

The discounted cash flow techniques allow flexibility in terms of changes in sales and expenses that implies changing growth rates over time. Relative valuation techniques provide information about how the market is currently valuing stock at several levels—the aggregate market, alternative industries, and individual stocks within industries.

5. The dividend discount model (DDM) assumes that the value of a share of common stock is the present value of all future dividends. This model assumes that whenever the stock is sold, its sale price at that time will be the present value of all future dividends. For non-dividend-paying stocks, the concept is the same, except that some of the early dividend payments are zero—notably, there is an expectation that at some point the firm will start paying dividends. Unfortunately, if there is a small change in either g or k, there will be a significant change in the computed stock’s value.

6. The infinite period DDM cannot be used to value firms that are experiencing abnormally high rates of growth. These high-growth conditions are temporary, and therefore, after a few years of exceptional growth, the firm’s growth rate is expected to decline and eventually stabilize at a constant level consistent with the assumptions of the infinite period DDM. To value a temporary super-normal growth company, you estimate each year’s growth, and determine the value of the cash flows once there is constant growth. All of these values are then discounted to the present.

7. To determine value using operating free cash flows (operating cash flows before interest and after deducting funds needed to for capital expenditures), the firm’s weighted average cost of capital (WACC) is used as the discount rate. Once the value of the total firm is calculated, the value of debt is subtracted. The firm’s cost of equity capital (k) is used to determine value using the free cash flows to equity (cash flows after operating free cash flows have been adjusted for interest and principal repayment).

8. Relative valuation techniques implicitly maintain that it is possible to determine the value of a 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. To properly implement these techniques, the valuation ratio must be compared over time (e.g., the price/earnings (P/E) ratio) for a company to the comparable ratio for the market, for the stock’s industry, and to other stocks in the industry to determine how it compares. Secondly you need to examine the factors that affect each valuation ratio and then compare these factors for the stock being valued versus the same factors for the market, industry, and other stocks.

9. The basic valuation models and variables are the same around the world but there are significant differences in the values for specific variables when dealing with foreign investments. The inputs require an estimate of the NRFR as well as derivation of an equity risk premium for the investments in each country. Investing globally also means that there are differences in accounting practices and management philosophies that the investor must consider.

Key Terms

- earnings multiplier model, p. 63
- perpetuity, p. 54
- price/earnings (P/E) ratio, p. 63
- valuation process, p. 51

Suggested Readings


CFA

For Chapter CFA Questions and Problems, please see Appendix A at the end of this text.
Problems

1. What is the value to you of a 9% coupon bond with a par value of $10,000 that matures in 10 years if you require a 7% return? Use semi-annual compounding.
2. What would be the value of the bond in Problem 1 if you required an 11% return?
3. The preferred stock of the Rayman Radiology Company pays a $9 dividend. You require an 11% return on this stock. What is the maximum price you would pay for it? Would you buy it at a market price of $96?
4. The Big Basketball Company (BBC) earned $10 a share last year and paid a dividend of $6 a share. Next year, you expect BBC to earn $11 and continue its payout ratio. Assume that you expect to sell the stock for $132 a year from now. If you require 12% on this stock, how much would you be willing to pay for it?
5. Given the expected earnings and dividend payments in Problem 4, if you expected a selling price of $110 and required an 8% return on this investment, how much would you pay for the BBC stock?
6. Over the long run, you expect dividends for BBC in Problem 4 to grow at 8% and you require an 11% on the stock. Using the infinite period DDM, how much would you pay for this stock?
7. Based on new information regarding the popularity of basketball, you revise your growth estimate for BBC to 9%. What is the maximum P/E ratio you will apply to BBC, and what is the maximum price you will pay for the stock? Your required return is still 11%.
8. The Shamrock Dogfood Company (SDC) has consistently paid out 40% of its earnings in dividends. The company’s return on equity is 16%. What would you estimate as its dividend growth rate?
9. Given the low risk in dog food, your required return on SDC is 13%. What P/E ratio would you apply to the firm’s earnings?
10. What P/E ratio would you apply if you learned that SDC had decided to increase its payout to 50%? (Hint: This change in payout has multiple effects.)
11. Discuss three ways a firm can increase its ROE. Make up an example to illustrate your discussion.
12. It is widely known that grocery chains have low profit margins—on average they earn about 1% on sales. How would you explain the fact that their ROE is about 12%? Does this seem logical?
13. Compute a recent five-year average of the following ratios for three companies of your choice (attempt to select diverse firms): a. Retention rate b. Net profit margin c. Equity turnover

Questions

1. Discuss the difference between the top-down and bottom-up approaches. What is the main assumption that causes the difference in these two approaches?
2. What is the benefit of analyzing the market and alternative industries before individual securities?
3. Discuss why you would not expect all industries to have a similar relationship to the economy. Give an example of two industries that have different relationships to the economy.
4. Discuss why estimating the value for a bond is easier than estimating the value for common stock.
5. Would you expect the required return for a Canadian investor in Canadian common stocks to be the same as the required return on Japanese common stocks? What factors would determine the required return for stocks in Canada versus Japan?
6. Would you expect the nominal RFR in Canada to be the same as in Germany? Discuss your reasoning in detail.
7. Would you expect the risk premium for an investment in an Indonesian stock to be the same as that for a stock from the United Kingdom? Discuss your specific reasoning.
8. Would you expect the risk premium for an investment in a stock from Singapore to be the same as that for a stock from Canada? Discuss your specific reasoning.
9. Give an example of a stock where it would be appropriate to use the reduced form DDM for valuation and discuss why you feel that it is appropriate. Similarly, give an example and discuss a stock where it would not be appropriate to use the reduced form DDM.
10. Give an example of a stock that has temporary, supernormal growth where it would be appropriate (necessary) to use the modified DDM.
11. Under what conditions will it be ideal to use one or several of the relative valuation ratios to evaluate a stock?
12. Discuss a scenario where it would be appropriate to use one of the present value of cash flow techniques for the valuation.
13. Discuss why the two valuation approaches (present value of cash flows and the relative valuation ratios) are competitive or complementary.
d. Total asset turnover
e. Total assets/equity

Based on these ratios, explain which firm should have the highest growth rate of earnings.

14. You have been reading about the Moncton Computer Company (MCC), which currently retains 90% of its earnings ($5 a share this year). It earns an ROE of almost 30%. Assuming a required return of 14%, how much would you pay for MCC on the basis of the earnings multiplier model? Discuss your answer. What would you pay for Moncton Computer if its retention rate was 60% and its ROE was 19%? Show your work.

15. Great Can Company's (GCC) latest annual dividend of $1.25 a share was paid yesterday and maintained its historic 7% annual rate of growth. You plan to purchase the stock today because you believe that the dividend growth rate will increase to 8% for the next three years and the selling price of the stock will be $40 per share at the end of that time.

a. How much should you be willing to pay for the GCC stock if you require a 12% return?
b. What is the maximum price you should be willing to pay for the GCC stock if you believe that the 8% growth rate can be maintained indefinitely and you require a 12% return?
c. If the 8% rate of growth is achieved, what will the price be at the end of Year 3, assuming the conditions in Part b?

16. On the Canadian Bond Indices website (http://www.canadianbondindices.com) find the average yield of AA and provincial bonds for a recent month. Compute the risk premium (in basis points) and the percentage risk premium on AA corporate bonds relative to provincial bonds. Discuss how these values compare to those shown in Exhibits 20.3.