CHAPTER 7

Cost of Equity Capital

As central as it is to every decision at the heart of corporate finance, there has never been a consensus on how to estimate the cost of equity and the equity risk premium. Conflicting approaches to calculating risk have led to varying estimates of the equity risk premium from 0 percent to 8 percent—although most practitioners use a narrower range of 3.5 percent to 6 percent. With expected returns from long-term government bonds currently about 5 percent in the US and UK capital markets, the narrower range implies a cost of equity for the typical company of between 8.5 and 11.0 percent. This can change the estimated value of a company by more than 40 percent and has profound implications for financial decision making.

McKinsey Quarterly, July 2005

I have discussed financial structure and free cash flow and have shown that obligations such as operating leases, commitments, contingencies, guarantees, and hedges must be considered. I also detailed, throughout this text, the limitations of earnings before interest, taxes, depreciation, and amortization (EBITDA) while explaining how free cash flow should be defined and why free cash flow, making adjustments to various discretionary areas, is superior to the commonly used practices that are popular today. Understanding the cost of equity capital and its significance in assigning fair value is now explored in detail because it is the by-product of those previous chapters.

Unfortunately, because they are not based on fundaments, the primary methods to determine the cost of equity used today often results in widely disparate outcomes. Illustrated both in this chapter and in Chapter 8 are areas of risk the analyst should be concerned with and needs to consider when evaluating the cost of equity in the establishment of fair value. In order to arrive at a fair-value estimate for an equity security, the analyst, for a going concern, must discount its free cash flow. I stress *going concern* because analysts use other measures to arrive at fair value, notably market value of the individual parts, liquidation value, price/sales,

price/earnings, and price/book, most of which are tied into generally accepted accounting principles (GAAP) accounting but are limited in scope and *do not provide what equity investors are really seeking—the maximum amount of cash that could be returned to them without sacrificing the growth or value of the enterprise.* Book value has proven to be an unreliable metric if the book consists of assets where buyers at fair market prices are absent. What is the value of an asset for which there are either no buyers or buyers at unreasonably low prices? It is the free cash flows that then must be discounted. But at what rate?

Book value thus has little to do with cash that could be provided to shareholders unless those assets generate cash flows or can and should be sold and fair-price buyers exist. If assets are written down, stock repurchases occur at greater than current book value, dividends are greater than net income, and in any number of other circumstances, book value will decline, but this result in changes in capital, not necessarily free cash flow. Book value, unless assets are written down or fully depreciated, is more often a measure of management spending, not always their ability to earn a positive economic return on assets.

To this end, once I have determined what I believe is the entity's normalized free cash flow, the firm must be brought to present value using a fair approximation of its cost of equity capital. I discount by the cost of equity capital, not the weighted-average cost of capital, because the free cash flows represent cash that could be distributed to the equity holders. All others holding economic interests in the firm theoretically have been paid already. Inherent in the cost of equity is the magnitude and risk to the free cash flow, which include its consistency and growth rate. As you recall, I used the cost of debt to bring to present value the firm's operating lease obligations.

First, I will present some background on the cost of equity capital itself.

COST OF EQUITY NECESSARY FOR VALUATION

It is odd that a measure of such consequence as the cost of equity capital remains open for definition. While generally defined as the opportunity cost investors expect on their investment, a thoughtful introspection leads to a superior methodology for its calculation. The root of the proposed methodology lies in variables that might cause impairment or strengthening of the expected free cash flow.

McKinsey & Co.[1] believes that the cost of equity should be based on forward-looking projections implied by current stock prices relative to earnings, cash flows, and expected growth. Such is the return required by investors.

[1] *McKinsey on Finance*, Autumn 2002.

$$P_t = \frac{CF_{t+1}}{k_t - g}$$

where

P_t = price of a share at time t
CF_{t+1} = expected cash flow per share at time $t + 1$
k_t = cost of equity
g = expected growth rate of cash flows

The predicament from a practical viewpoint of the McKinsey approach is (1) if the growth rate is greater than the cost of equity, the results are empty, and (2) attempting to arrive at cash flows, McKinsey recommends a proxy of earnings multiplied by the payout ratio. This is a very crude and imprecise measure of cash flows that perhaps might have some validity when looking at a large sample but likely would be way off the mark for many individual entities. Many entities have positive earnings growth but no distributable cash flows.

It is also useful, *from the entity's standpoint*, to depict the cost of equity capital as the after-tax rate of return the company would need to earn on a new investment to prevent cash flow or earnings dilution as a result of additional equity issuance to finance said investment. This is further defined in the upcoming example on Sunoco, where the company is considering constructing a new refinery and needs to sell equity to finance the project. While this is not the cost-of-equity-capital method as defined by McKinsey and others, it is one that makes sense in the marketplace by those actually needing to issue equity capital. Since investors have no project under consideration when undergoing their analysis, I will look at other methods as well.

The cost of equity should be used as the denominator in conjunction with stock-valuation models, the most common of which is the dividend growth model or some variation typically employing earnings or cash flow.

THE CONSTANT-GROWTH-DIVIDEND MODEL

The dividend-growth model in use by many investors today implies that an entity is worth the present value of its dividends. For entities that do not pay a dividend, one may be estimated by substituting a percentage of earnings or operating cash flows. This valuation method often brings faulty results because (1) companies may borrow to pay their dividend (i.e., they do not generate positive free cash flow), (2) it ignores the capital requirements of the firm, (3) it ignores leverage and other credit metrics, (4) it ignores working capital requirements or balance-sheet management, which would allow the entity to pay a dividend, (5) it ignores overspending in discretionary areas, and (6) the required return (discount rate) is arbitrary.

The constant-growth-dividend model assumes that the price of a security is equal to the present value of dividends that are received on the security throughout its life. The main assumptions in this model relate to the discount rate used to value future dividends in current dollars and the pattern of cash dividends in the future. Most models assume that the discount rate is constant across periods, and as you have noticed, such models are merely a reformat of the equation in the preceding section.

$$\text{Value per share of stock} = \sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{(1+k_e)^t}$$

where

DPS_t = expected dividends per share

k_e = cost of equity

In this equation, the value of a share of stock of the firm at the end of period t is equal to the present value of the dividends discounted at an appropriate rate. Note that the equation takes the sum of all future dividends (indicated by the summation sign S) from the following period ($t + 1$) through infinity (∞). In each period i, the dividend is discounted by dividing by one plus the discount rate to the power of $t + n$, which is equal to the number of periods the dividend is paid. For example, the dividend at period $t + 2$ will be discounted to the end of period t by dividing it into $(1 + k_e)$ to the power of 2.

In practice, it is less desirable to estimate valuation based on dividends because firms hesitate to reduce payments even though it is obvious the cash flows and business prospects do not support the current yield. Investors normally recognize this and will adjust the current share price accordingly, causing a further disparity with the artificial fair value estimated by the constant-growth-dividend model. Therefore, some investors prefer to discount earnings, but as the cash flow analyst knows, GAAP-reported earnings are also subject to financial engineering. As the growth rate under this model approaches the cost of equity, the value of the company reaches infinity.

I therefore focus on free cash flow. Even though management can "create short-term free cash flow" through various means, such as allowing accounts payable to age and reducing capital expenditures, such tactics can go on for only so long because such a firm would be in de facto liquidation. We also saw how UPS's free cash flow was negatively affected by the large payment of a pension contribution to terminate a plan. In addition, if management does attempt to squeeze the assets and expenses to create free cash flow, my credit model will pick this up because the power operating cash flows adjust for normalized working capital items.

THE COST OF EQUITY CAPITAL

Cost of equity capital represents the last frontier in security analysis, for without an appropriate discount rate, estimating free cash flow loses much of its significance. Cost of equity is at the very center of valuation. And valuation provides an assessment of a particular security's attractiveness as an investment; to the firm, it represents the cost to place additional equity. Only after it is established is the equity investor able to compare fair value with current value and determine whether the gap is sufficient to warrant investment. If the security's current market price and assessed value are in accord, the investor may decide to either hold or sell the security. If the assessed value is lower than the current market price, an investor may wish to sell or short the security.

The importance of cost of equity can be seen with a simple example. If an investor knew the exact free cash flow for the coming five years for a particular security, would the analyst know its precise fair value? The answer, of course, is no. It depends on the entity's cost of capital. Is inflation 2 or 12 percent? If inflation is at the high end, real after-tax ROIC will not be adequate to replace depreciated assets, which, when placed into service, are set in nominal terms. Are the free cash flows threatened by a series of lawsuits? Will the company's patents be running out? Is the company's free cash bolstered by underfunding of pension and other retirement benefits? Is the company possibly in violation of any debt covenants?

When Sunoco needs to raise equity capital to build a refinery, if it does so by selling 12 million shares instead of 16.8 million, owing to a lower cost of capital, the value of the firm to shareholders certainly is enhanced because dilution is reduced. A similar position should be taken by the portfolio manager in making portfolio decisions. The portfolio may be selected on the basis of criteria that point out undervalued securities based on potential return, as measured by the entity's free cash flow discounted by their cost of capital, return on invested capital (ROIC), and other factors relevant to the analyst. For instance, the portfolio manager may select rules that include other restrictions on firms on the portfolio. For example, the portfolio manager may place restrictions regarding minimum size, growth rates, market share, industry restrictions, dividend yield, or trading volume. Some clients specifically rule out investments in particular industries. Others may wish to invest in only certain industries. Regardless of the restrictions, cost of capital will determine if a firm is investing in value-enhancing assets.

Before I delve into the common cost-of-capital models, Table 7-1 vividly illustrates the importance of the cost of equity capital (discount rate) in equity analysis.

TABLE 7-1

Cost of Equity Capital

Fair Value	Current Free Cash Flow per Share	Growth Rate	Discount Rate (Cost of Equity Capital)
$42.00	$1.20	5%	8%
$31.50	$1.20	5%	9%
$18.00	$1.20	5%	12%

Causing fair value to change (Table 7-1) is the cost of equity capital—current free cash flow and its growth rate remain identical. As evidenced, a one-percentage-point change, from 8 to 9 percent in the cost of equity equates to a staggering 25 percent decline in fair value. If the entity's risk rises further, to a 12 percent cost of equity, the stock should be expected to fall by 57 percent. Such is the importance of the discount rate and the reason it must be established precisely to calculate fair value. If an entity's cost of capital rises, its share price must, by definition, fall until it reaches its new lower fair value, as shown in the table.

One might ask, If the current free cash flow and growth rate are known, why would fair value differ? It differs because the numerator is only a guess, even if an educated one supported by appropriate research and investigation. There are risks to any free cash flow or earnings estimate—patent or customer loss, volatility in input costs, foreign or exchange rate risk, asset risk, rollover of debt risk, and so on—and these are captured by the cost of equity. The fewer and less serious these risks, the more certain we can feel about the numerator—the free cash flows. For such an enterprise with above-average normalized free cash flow and moderate leverage, lower cost of equity normally will place the entity in a position to add value-adding projects with more facility than its competitors.

Popular Methods for Calculating the Cost of Equity Capital

Although I present the four most popular approaches to calculating the cost of equity, academia has devised other models as well, all of which are variations of these four. For example, one model adds a size premium and another a several-stage growth model. As you will see, except for the credit model, they all fall short in deriving an accurate equity cost of capital and in applying the commonsense logic of building up a risk profile from the risk-free rate. After all, the discount rate is meant to measure the risk to the numerator.

Later in this chapter I will explore another commonly used model, which I will refer to as the *project method*. It is simply the yield necessary to maintain the current level of earnings per share owing to new share issuance to finance a project.

Most Widely Practiced Cost-of-Equity-Capital Models

1. Capital Asset Pricing Asset Model (CAPM) using an estimate of beta[2]
2. Dividend-growth model
3. Implied cost of equity using a stock-valuation model, given known stock price and expected growth rate
4. Bond yield plus risk premium approach

COST OF EQUITY USING THE CAPITAL ASSET PRICING MODEL

By far the most commonly used model for estimating the discount rate, or required return, is the capital asset pricing model (CAPM), which, as pointed out in this book's introduction, was borne out of finance theory. Under the CAPM, the expected rate of return on any specific security *j* is provided by the following equation:

$$E(R_j) = R_f + b_j \times (R_m - R_f)$$

where $E(R_j)$ is the expected return on security *j*, R_f is the rate of return on a risk-free investment, b_j is the relative risk of the firm as measured by the beta coefficient, and R_m is the rate of return on the market portfolio.

Most data services that analysts rely on for use in their stock-valuation models estimate a beta with either five years of monthly returns or two to three years of weekly returns.[3] A five-year interval, it is believed, ensures against possible aberrant shocks to the beta owing to unusual short-term events. Others believe that a shorter risk interval may be more appropriate because it reflects the company's current risk profile; especially if the company's business or operating environment has changed, recognizing a shortened time period may unduly overweigh market

[2] The capital asset pricing model (CAPM) should not be confused with the Sharpe ratio, which is used to determine how volatility relates to return. The Sharpe ratio is used by many financial institutions to compare investment returns, adjusted for risk. I have found one instance, however, of a public entity, the Federal Home Loan Bank of Cincinnati, using the Sharpe ratio to evaluate return on equity. For more information, see its 2009 10K.

[3] Bloomberg, the most widely disseminated service, uses weekly data over two years.

misperceptions. Some services adjust the beta toward 1 on the theory that beta moves over time to a market risk.

In the stock-screening models employed at CT Capital, we use the 10-year Treasury note as the risk-free rate because it (10 years) is the approximate horizon period associated with many capital projects and long-term equity investor time horizons.

Since the risk-free rate is itself a leading credit metric, one may wonder why the CAPM went astray from the logic of its own application. My cost-of-equity credit model adds to the risk-free rate, the extent depending on the risk profile of the entity under consideration. The risk-free rate is used in the CAPM precisely because it represents a guaranteed rate of return. Why, then, does the model go on to measure volatility of stock price, which may not capture free cash flows and their associated risk? My model follows the logic.

To understand the relationship established by the CAPM, let me first explain the relative risk measure b_j. The CAPM posits that the expected return on each security varies systematically with the expected return on all securities in the marketplace, that is, the market portfolio. However, some stocks are defensive—their beta is lower than 1, and they fluctuate less on average than the market portfolio. Some stocks are more aggressive—their beta is greater than 1, and they fluctuate more than the market. With a beta of 1, the theory posits, the security is expected to fluctuate identically with the entire market.

The CAPM theory also posits a linear relationship between expected excess return on security *j* and the expected excess return on the market portfolio. In practice, as you will see in the Sunoco example that follows, this relationship is unlikely to hold up for anything but the shortest period. In fact, it is more common than uncommon for the beta to bounce around without regard to changes in the entity's risk profile. While empirical tests show support for the theory, it is much stronger at the portfolio level and generally has been unreliable at the individual-security level. Also, the literature documents several systematic deviations from the CAPM, such as the effect of the dividend yield, size, and book/market ratio on security returns.

A glaring weakness of the CAPM when calculating beta is that it does not, to the degree required and necessary, capture operating and financial risk, it being a measure of stock volatility. For instance, at the time that General Motors' debt was downgraded to "junk" by the three major rating agencies, its beta, according to the most widely used service, Bloomberg, was 1.4. At the same time, Bloomberg listed many companies having investment-grade debt with higher beta coefficients, such as IBM (1.6) and Intel (2.3). This variation is also seen in security analyst research reports. For instance, in a July, 13, 2005, research note from a large brokerage firm, the security analyst following IBM

TABLE 7-2

Beta and Leverage

Beta Lower Than	Average Market Value ($M)	Number of Companies	Total Debt/Net Worth Ratio
0	601	214	38.3[a]
0.5	499	585	64.9[b]
1.0	2,502	1,122	448[c]

[a]114 companies had both negative net worth and negative free cash flow, making the average 38.3 percent misleading.

[b]183 companies had both negative net worth and free cash flow and a beta < 0.5.

[c]322 companies had both negative net worth and free cash flow and a beta <1. 0.

used a beta of 1.1 in his calculation of fair value, a significant variation from the Bloomberg beta.

As business conditions change, so too should the firm's beta. However, as we saw with General Motors, this might not be the case. Many analysts prefer to use a historical beta as the firm's stock price is regressed against an index. However, because stock prices often fluctuate wildly, often for no fundamental reason, beta also moves wildly, unreflective of fundamental factors, issuing a false signal related to the cost of capital.

Many very weak credits have betas lower than 1. Table 7-2 shows that as of December 23, 2009, over 200 U.S. public companies had a beta of below 0, negative free cash flow, an average $600 million market value, and either a total debt/total equity of greater than 100 percent or negative equity, meaning that they had a cost of equity below that of the Treasury rate! A total of 183 companies had a beta of 0.5 or lower, were burning cash, and had a negative net worth.

Because the cost of equity capital, under this model, is calculated through the formula $K = R_f + b(R_m - R_f)$, it implies that companies that have a beta of close to 0 have a cost of equity capital that is close to the risk-free rate, hardly a plausible assumption. And for companies such as Interpharm Holdings that have a negative beta, the equity risk premium is negative $(R_m - R_f)$, implying a cost of equity that is *less* than the rate on Treasury bonds, even though that company has never turned a profit or generated positive cash flows.

An offshoot of the CAPM, called the build-up method, begins with the risk free rate, and then adds (builds on other risk factors), the long-term equity risk premium, small stock premium, industry risk premium, and any company specific risk premium. The long-term equity risk premium is normally equal for all entities, having averaged 6.35 percent according to data from Ibbotson Associates.

Risk Free Rate [a]	4.35 %
+ Long term Equity Risk Premium [b]	6.35 %
+ Smaller Stock Risk Premium [c]	1.67 %
+ Industry Risk Premium [d]	0.10 %
= Market Cost of Equity	12.47 %
+ Company-Specific Risk Premium [e]	5.0 %
= Concluded Cost of Equity	17.47 %

Source: Appraisal Report. Belk, Inc, February 2, 2008, filed as part of Tender Offer Statement.

I would therefore argue against the use of the CAPM when calculating the cost of equity capital, even though it is by far the most widely used and followed technique by security analysts, consultants, and publicly held companies.

IBM STUDY OF COST OF EQUITY USING POPULAR APPROACHES AND CREDIT METHOD

IBM, in conference call materials presented to security analysts, creditors, and investors, calculated its cost of equity, as shown Figs. 7-1 and 7-2. IBM executives had a mere 68 percent confidence level that the firm's beta was in a range of 0.4 through 1.2—a very wide span, especially for an A+ credit-rated company with strong, predictable cash flows and high recurring service revenues. The reader might appropriately ask, If IBM had a low confidence level that its cost of equity capital was between 7.89 and 11.7 percent, what does that suggest for the balance of all public companies?

For example, if IBM had free cash flow of $10 per share that would grow by 5 percent for five years and then 2 percent growth thereafter, its fair value would

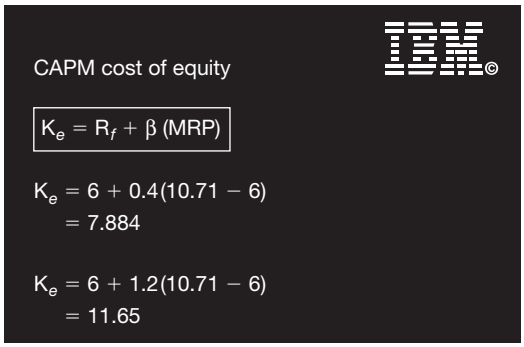
FIGURE 7-1

An IBM Regression Analysis

Source: IBM.

FIGURE 7-2

IBM Calculation of the CAPM Cost of Equity



Source: IBM.

be in a range of $114 and $190 (excluding net debt), given the wide gap the company admits to in its equity cost of capital. Obviously, this is an unsatisfactory result, indicating a fundamental weakness of the CAPM the company used at its investor conference.

DIVIDEND-GROWTH MODEL TO CALCULATE COST OF EQUITY

Under the dividend-growth model, we solve for K_e by adding the dividend yield and growth rate in the dividend. Dividends serve as a measure of the free cash flows. This serves as a proxy for the required return to shareholders.

$$P_0 = \frac{D_1}{(K_e - g)}$$

Rearranging the terms, we get

$$K_e = \frac{D_1}{P_0} + g$$

where

K_e = cost of equity
$D_1 = D_0 - (1 + g)$
D_0 = four-year average of dividends paid
P_0 = year-end stock value
g = growth rate of dividend (or return on equity × retention rate)

Thus, for IBM, with its $2.20 per share dividend and a stock price of $115, we see

$$K_e = \frac{2.2}{115} + g$$
$$K_e = 1.9\% + 4.0\%$$
$$= 5.9\%$$

If one were to estimate dividend growth of 4 percent for the next five years and 2 percent thereafter, the cost of equity capital of 5.9 percent, significantly lower than that derived under the CAPM, would result in a net present fair value for IBM stock of $286.28.

But g is sometimes calculated as the firm's return on equity multiplied by its retention rate, the theory being that payout could be distributed in the form of dividends. One would assume that the capital structure remains constant. IBM, however, has a small capital base compared with its earnings (and cash flow), which is not unusual for a service-oriented business that has repurchased a significant amount of stock for treasury.

Using that formula for g, we get

$$\text{Retention rate} = \frac{\text{retained earnings for the period}}{\text{after-tax earnings}}$$

We calculated IBM's retained earnings for 2008 by taking the difference in total retained earnings from its balance sheet between fiscal years ending 2007 and 2008 or

2008 Total retained earnings		$70,352
2007 Total retained earnings	Less:	60,640
	2008 Retained earnings:	9,712

And IBM's after-tax earnings for 2008 were $12,334 million. Therefore, its retention rate was

$$\text{Retention rate} = \frac{9{,}712}{12{,}334}$$
$$= 78.7\%$$

For the final step, IBM's return on equity was 72 percent based on its year-ending shareholders' equity of $13,465:

$$\text{Return on equity} = \frac{9{,}712}{13{,}465}$$
$$= 72\%$$

We now see that IBM's cost of capital using the dividend-growth model was

$$\begin{aligned} K_e &= \frac{2.2}{115} + 0.72 \bullet 0.787 \\ &= 1.9\% + 56.7\% \\ &= 58.6\% \end{aligned}$$

Obviously, this results in a very biased cost of equity, resulting from IBM buying back about $28 billion in stock over the past two years compared with $13 billion in shareholders' equity. This small equity base compared with its free cash flow provides an inconclusive result—IBM cannot be reasonably expected to raise its dividend by 57 percent per year. This model results in a fair value for IBM shares of about $19.39.

There are other faults with this model. First, dividends are a board decision and can be fixed despite the inability of the entity to cover them. And for companies that do not pay a dividend, the selection of one is arbitrary, even if one were to choose a low payout of operating cash flows. For instance, for expanding companies or those more leveraged, how does one estimate a fair payout ratio when all or most of their operating cash is being consumed at a time when they show good GAAP earnings?

IMPLIED COST OF EQUITY MODEL

The implied cost of equity is simply the present-value formula where the current stock price is known, the earnings or free cash flow are estimated, and we solve for the denominator, which is the cost of equity. The formula is identical to the dividend-growth model except that free cash flow is used instead of dividends.

$$\begin{aligned} Pt &= \sum_{t=1}^{t=\infty} \frac{E(FCFt)}{(1+K_e)^t} \quad P_t = \text{price of share at time } tFCF_t \\ &= \text{expected free cash flow per share } K_e \\ &= \text{cost of equity} \end{aligned}$$

The model calls for solving for K_e.

For IBM, discounting its projected free cash flows and using its current stock price, we get

$$115 = \frac{10.00}{K_e} + \frac{10.50}{(1+K_e)} + \frac{11.03}{(1+K_e)^2} + \frac{11.58}{(1+K_e)^3} + \frac{12.15}{(1+K_e)^4} + \frac{12.76}{(1+K_e)^5} + \cdots$$

TABLE 7-3

Cost of Equity Capital for IBM

Price, IBM	Implied Cost of Equity (%)
88	15
96	14
104	13
115	12
128	11
144	10
165	9

The current price of the stock is one of the three determinants in the model, the others being the cash flow forecast and the last, cost of equity, which we solve for. Table 7-3 is a matrix showing the cost of equity based on changes in the stock price using the same $10 in current free cash flow with 5 percent growth for the upcoming five years and 2 percent thereafter.

Using a growing annuity program that is programmed to solve this equation, we obtain a cost of equity of 12 percent.

While it might make intuitive sense that the higher the stock price, the lower is the cost of equity capital, perhaps the telling questions are

1. Should short-run stock price volatility have such a profound effect on a firm's economic decisions? On its ability to make long-term investment projects?
2. Why should the analyst not use a more discriminating measure of financial and operating risk in the cost-of-equity-capital calculation?
3. Should not cost of equity for a high-investment-grade-rated entity with predictable future cash flows exhibit greater stability than a model based on stock price? It would seem that this model is one of the tail wagging the dog.
4. What if the entity's stock price drops owing to factors unrelated to its cash flows and credit? Does the price fall really reflect the true cost of equity?

The skeptic might answer the last question as yes. In reality, however, if a board of directors knew the business and its prospects not to be realistically reflected in the stock price, it would finance asset acquisitions with as much debt as possible, staggering the maturities, and wait for its financial results to unfold. If reality still was not reflecting the firm's free-cash-flow generation after several years, it should have little problem with creditors and credit-rating agencies allowing the firm to roll over the debt coming due. Given consistent profitability, its tax shield will provide them with good long-term, low-cost financing, even though the CFO might view the company's capital structure as not where he or she would like. During this time, the CEO would need to convey the company's desired capital structure to shareholders and indicate why it would be unwise to sell equity at current levels.

Another limitation of this model is that security analysts and investors typically overestimate the long-term growth rate of earnings. This being the case, actual cost of equity will be higher than if using the analysts' exaggerated forecasts.

BOND YIELD PLUS RISK PREMIUM MODEL

The theory behind this simple model is that increases in a company's business risk are captured immediately by its bond yield. Of course, this model would not be appropriate if the entity, such as Apple Computer, has no long-term debt or if its debt securities were privately placed, closely held, or inactively traded. This model is just another approach and not one advocated as a primary method.

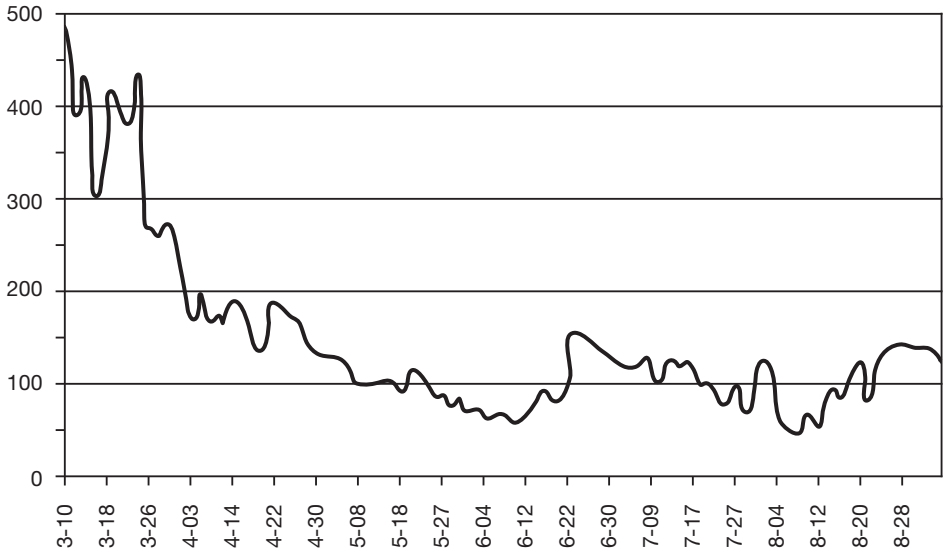
Using this approach, the analyst would add a "normal" spread over the firm's bond yield, typically 3 to 4 percent, because equity holders are last in line in the event of a Chapter 7 bankruptcy, the section of the code in which a business sells its assets and settles its liabilities.

If the bond yield was not readily available, the analyst could approximate it. For example, Fig. 7-3 shows the yield spread of AAA long-term bonds over similar Treasury securities. The analyst then would use a basket index of similar credits for the entity under review to calculate a cost of equity under this method.

IBM has many bonds on its books, including $1 billion principal amount, which at the time of this writing was yielding 5.4 percent to maturity. Adding 3.5 percentage points would yield a cost of equity capital under this method of 8.9 percent. Had no bonds been available, the analyst would have needed to add 3.5 percentage points to a basket of A+ credit ratings, IBM's credit.

FIGURE 7-3

Yield Spread of AAA Long-Term Bonds versus Similar Treasury Securities, March 2009–August 2009



Source: Bloomberg.

COMPARISON

I now compare the cost of equity capital using the four most popular methods of benchmarking and an estimated 5 percent growth rate for the coming five years and 2 percent growth thereafter. Also included is the credit-model method, detailed in Chapter 8, which rendered an 8.4 percent cost of equity capital.

Method	Cost of Equity Capital (%)	Implied Fair Value of Stock ($)
CAPM	7.9–11.7	114.14–188.97
Dividend growth	5.9	286.26
Implied cost of equity	11.6	115.00
Bond yield plus risk premium	8.9	141.00
Credit model	8.4	168.00

There is such a wide gap is provided by the results of these models that it might be difficult to place, with confidence, a fair value for IBM equity shares within a reasonable range. Even the company itself found the limitations of the most popular model to be unacceptable. It is for this reason that I place greatest confidence in the company's fundamental characteristics, as reflected by its cash flows and credit. They are the real-world economic factors that should influence the cost of capital, cash flows, and investment decisions over the long term and are least influenced by short-term stock volatility and economic fear.

SPREAD VERSUS COST OF CAPITAL

The fact an enterprise does not show a positive spread (ROIC) in a particular year over its cost of capital should not necessarily signify its imprudence as an investment, especially if the current level of free cash flows are deemed to be temporary or underperforming assets could be shut down or sold, resulting in a boost to the ROIC yield. Since the marketplace normally overreacts to shortfalls, high returns could be forthcoming when normal conditions return or the underperforming division is disposed of. Divisional analysis could be a key consideration.

When ROIC is measured in conjunction with the entity's cost of capital, the analyst will be in possession of the most important factors in the evaluation of whether management is doing its part to create value for shareholders. If the company is not able to earn a return on its invested capital at least equal to its cost of capital, its stock will trade at a price reflecting the negative gap, especially if investors do not believe a turn is in the offing. If the entity is able to produce returns on its invested capital above its cost, it creates value, and its stock price should, over time, increase along with growth in the capital base. *Managers are placed in office to create value for their shareholders, and they accomplish this by maintaining the positive spread.* For the low-return company, if there is a need to raise new capital, it will be reflective of the underperformance gap, and add-on capital would be expensive compared with companies that are able to earn returns on invested capital in excess of its cost. *For this reason, restructurings are often part of a capital raise for underperforming firms. Investors and creditors examine the entity and force actions which they believe will bring about the positive spread.*

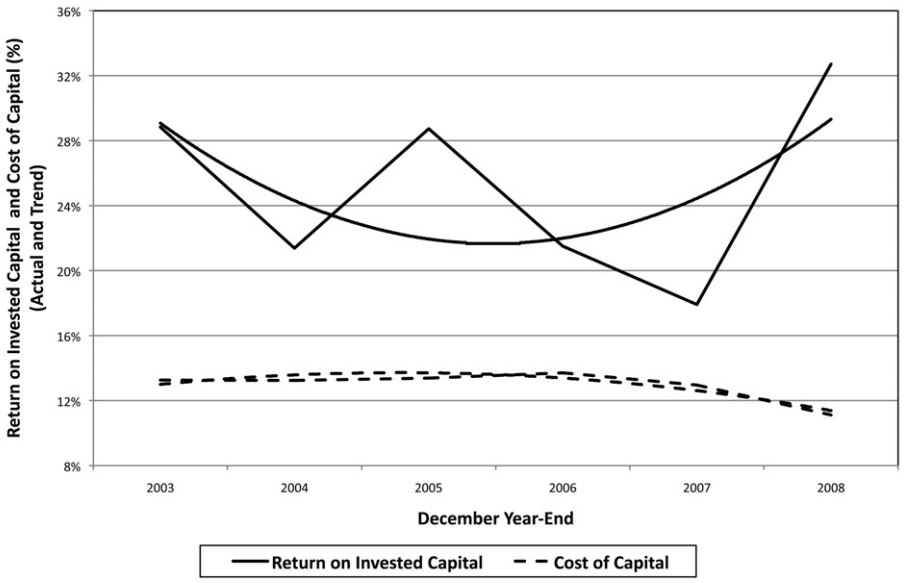
When an entity is considering a project whose ROIC is greater than its cost of capital, it then must weigh the additional benefits versus the increase in financial risk resulting from the project. If the project is sufficiently large, requiring a substantial debt financing that affects target capital and leverage ratios, it should consider speaking to credit-rating agencies prior to final approval. Credit agencies do not like surprises—unless they are unquestionably positive.

Example:

Figure 7-4 shows the ROIC and cost of capital for Altera Corporation, a manufacturer of specialized semiconductor equipment, one of the companies in Table 5-6 that showed a high recovery rate. The company's high ROIC and declining cost of capital were not lost on investors as its stock price has outperformed the general equity market by a significant margin. Trend lines are included owing to the cyclicality.

FIGURE 7-4

Altera Corporation: Cost of Capital versus Return on Invested Capital, with Trends



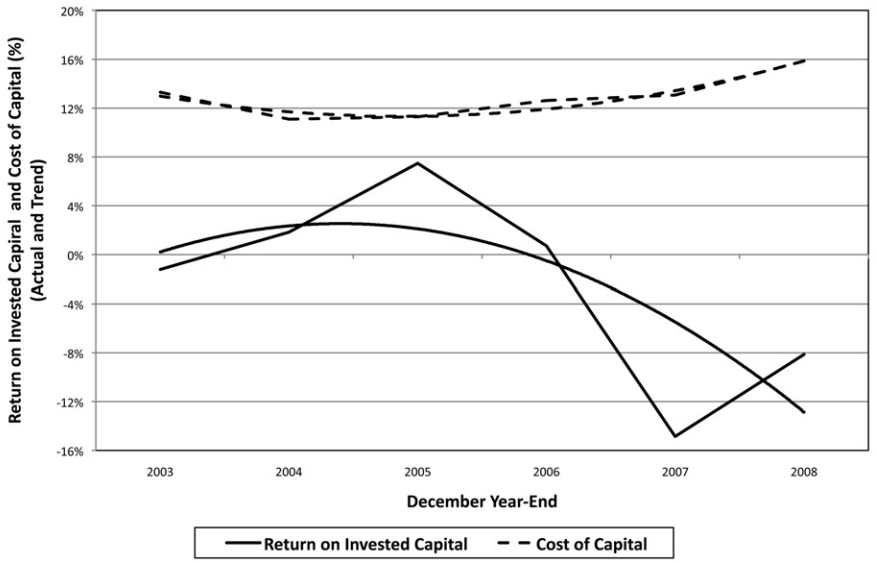
Source: CT Capital, LLC.

Advanced Micro Devices (AMD) is in a similar industry to Altera, but its stock lost 77 percent of its market value over the same period. Unlike Altera, however, AMD was not able to earn its cost of equity capital and therefore had to be categorized as a value-destroying entity, and as such, its stock price has declined. Notice in Fig. 7-5 how AMD, unlike Altera, has seen its cost of capital rise over the time period, reflecting its weakening credit posture.

You also can see how the real cost of capital was not picked up by analysts relying on the CAPM because, despite AMD's severely weakening credit posture during the period, its beta (Fig. 7-6), the central determinant of the CAPM, has been steadily decreasing, indicative of an entity with lessened risk.

FIGURE 7-5

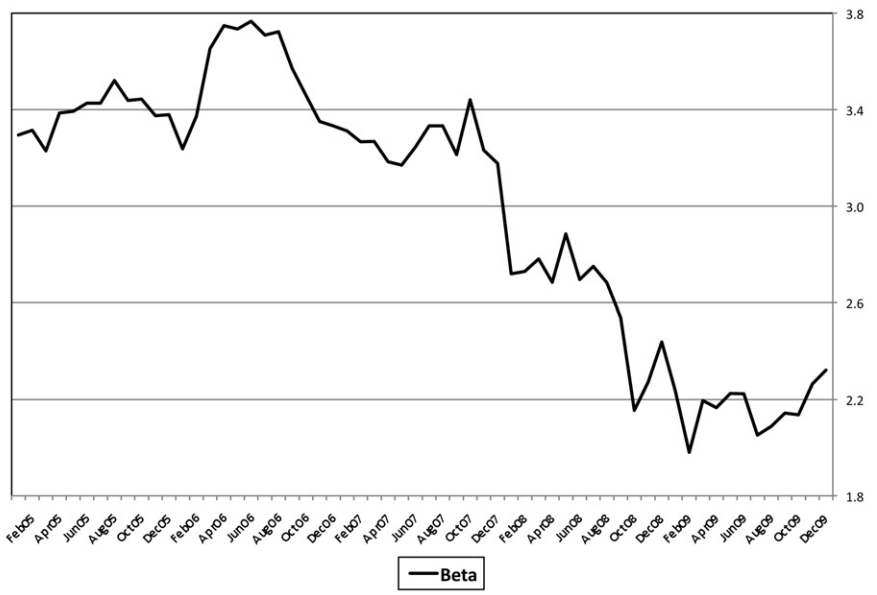
Advanced Micro Devices: Cost of Capital versus Return on Invested Capital, with Trends



Source: CT Capital, LLC.

FIGURE 7-6

Beta Coefficient: Advanced Micro Devices



DIVISIONAL COST OF CAPITAL

Calculating a divisional cost of capital can prove vexing, especially if using the CAPM to estimate a beta. In order to calculate a division's cost of capital, it must be reviewed as a separate entity, not to assign a beta, but to estimate its cost of debt and equity through an evaluation of its cash flows and financial structure. The firm's beta is inappropriate because the cost of equity of the division under review should be set by its cash-flow and credit metrics.

The cost of debt can be reasonably estimated as that of the after-tax cost of the parent or, if the division is unconsolidated, the rate at which it borrows, adjusted for an estimated tax rate. If the division or special-purpose entity (SPE) files with the Securities and Exchange Commission (SEC), the appropriate rate would be that of its current after-tax yield unless it is being influenced by the parent, such as with guarantees. If the division is not reflecting a normalized balance sheet, that must be considered because often the parent will take excess cash from the division or in some other way alter its normal stand-alone financial structure. If the parent borrows on behalf of the division, it should be at the parent's cost of debt because this is the rate at which those funds are invested by the division. If the division is to be sold, the acquirer must estimate the division's new cost of debt when determining whether to proceed with the purchase.

The cost of equity must be estimated using the credit model in Chapter 8. Since most of the information to evaluate a division will not be available, a best estimate is required. Segment data often will provide just a partial picture and include many divisions.

For the parent or holding company, of course, such data are available. Typically, entities use the CAPM when computing a segment or divisional cost of equity by taking an average of other pure-play or similar public companies. This would be incorrect.

CASE STUDY: SUNOCO

During 2005, I prepared an analysis on Sunoco, Inc., using a fair estimate for cost of equity capital undertaken for the possibility of the company building a new refinery. At the time of the analysis, the general belief was that additional capacity would be needed within five years because demand was growing by 2 to 3 percent per year. It had been many years since a large refinery had been constructed in the United States. Looking back four years later, I evaluate how the model fared. The materials presented during the remainder of this chapter are excerpts based on that analysis. Several of the concepts of the study are repeated from earlier chapters, but their importance nonetheless bears reiteration in relation to the example.

From the point of view of the entity, the *cost of capital* may be defined as the return managers of the business must attain if they desire to prevent dilution resulting from additional equity issuance. Management's intent to actually follow through by selling additional equity is irrelevant when calculating the cost of equity capital but nevertheless should be quantified to have a better appreciation of investors' attitudes and risk perception of the company.

For this type of analysis, management would need to know the cost of all forms of capital to determine the appropriate financing mix of a project that cannot be financed from existing cash flow from operations.

While it is important to understand the weighted-average cost of capital (WACC) for the firm, which includes all means by which the entity is being financed, for equity investors, it is the cost of equity capital that is used in the discounting of free cash flow. Payment of principal on loans also derives from free cash flow if those obligations cannot be extended. Other outflows, such as interest payments, are paid from operating cash flows.

Having knowledge of all available costs of capital is vital in the evaluation and valuation process to (1) determine the least expensive cost of capital to the firm should current or future financing be necessary and (2) evaluate how raising funds through a particular source will affect the cost of capital of the remaining outlets. For instance, when financial companies raised substantial amounts of debt following the nadir of the worldwide credit crisis, their cost of equity capital declined substantially as their stock prices soared. This then allowed those firms to sell additional equity that was used to repay some of that high-cost debt, lowering the cost of equity even further.

The cost of total capital is the weighted-average cost of the entity's outstanding securities.

The computation for the cost of debt capital is often unambiguous and most often readily available, being the after-tax cost. If the entity is not profitable, it is the coupon rate of a bond divided by the net price to the entity. Thus, if a bond is issued at par with a 7 percent coupon rate, the cost of debt to that firm would be 7 percent.

In nonstressed economic periods, investment research reports on companies with leveraged capital structures typically use an unrealistically low weighted-average cost of capital owing to the entity's large debt allocation. Such companies realistically should see higher, not lower, weighted-average costs of capital despite the tax benefits of debt and indeed would if the analyst used the current market prices of the debt securities instead of prices and interest rates when the debt was originally issued. If the analyst uses a bond-spread estimate, which, at times, is unavoidable owing to illiquidity of the issue, it needs to be a conservative estimate comprised of securities having a fair comparable credit rating. Since rating agencies are not constantly evaluating and updating all securities in the fixed-income universe, the analyst might need to make changes to the current implied bond rating to reflect a more accurate and realistic assessment of its credit position.

Example:

The following was found in a research note for Centerpoint Energy, a very leveraged company:

> Using a bond spread of about 100 basis points and Citigroup Investment Research's equity risk premium of 3.5% yields a weighted average cost of capital (WACC) of 4.7%. The low WACC is a result of the company's high debt to total market capitalization, which results in a WACC more closely weighted to CNP's after-tax cost of debt.

Source: Citibank.

The projected cost of Sunoco's new refinery was $1.5 billion, which at the time this analysis was prepared was equal to about 20 percent of its current market capitalization. From the vantage point of Sunoco's finance department, it was imperative that the company know its current WACC to determine the least expensive method to fund the project.[4]

In order to calculate its cost of equity, the analyst in charge of the project decided to look at the project from several perspectives, including earnings dilution, the CAPM, and my credit model. The cost of capital must be determined with precision because it determines whether the project should proceed, having already estimated the project's ROIC. Some companies simply do not have access to capital, while for others, the cost is high in relation to a conservative estimate of its expected ROIC. Firms with a low cost of capital normally do not have a problem being overtaken by competitors because they can accept projects that their weaker peers cannot, as well as accept a smaller positive spread between the ROIC and the WACC.

As with any capital project, the uncertainly of the cash flows is the central determinant. The outlook for inflation is also crucial because it affects both cash flows and cost of capital. Assumed here is that inflation will remain about 3 percent. If the inflation rate were to increase beyond expectations, cost of capital would need to be adjusted up accordingly through the risk-free rate of the CAPM, whereas for the credit model, a further increase in the cost of capital would be added because it affects consumer demand not captured by the CAPM. An important point often overlooked by users of the CAPM is that lower interest rates do not always lead to a lower cost of capital. **In fact, contrary to popular thinking, a rise in inflation cannot often be overcome by a similar rise in revenues or net income—it must be overcome by a similar rise in free cash flows (which include the tax impacts), or else cost of capital will increase. During periods of higher inflation, the real ROIC often fails to keep up with cost of capital, hence a decline in stock value.**

[4] Sunoco has never been a client of mine or any entity affiliated with me. This was an independent analysis.

Often, the driver of cost of equity is the risk-free rate, which, if economic uncertainty abounds, generally would force cost of equity higher because the prospective free cash flows and credit are affected by the perception of the economic environment. For the CAPM, the drivers are the risk-free rate, stock volatility, and the expected return on stocks.

Calculating Beta under the CAPM

Since Sunoco's beta had been very volatile, resulting from the large swings in the price of oil, the company analyst decided to weight the beta, with the results shown in Table 7-4.

It is logical that Sunoco, given the large swings in the price of crude and refining margins, should have seen greater volatility over more recent periods, and an adjusted beta of 0.925 is probably closer to its true value. Of note is the wide range in the beta over the five-year period, not unusual for cyclic concerns. Intuitively, one would suspect that Sunoco's beta should be at least of the S&P's 1.0 beta.

Using a risk-free rate of 4.1 percent, the cost of equity capital for Sunoco using the CAPM is 8.6 percent, derived as follows:

$$\begin{aligned}\text{Cost of equity} &= 0.041 + 0.925 \times (0.09 - 0.041)\\ &= 8.6\%\end{aligned}$$

Making improvements to the beta has been the subject of much academic research. The primary limitation to the embracement of beta as a capital tool is that analysts are looking for a quantitative solution to a fundamental problem. The *equity risk premium*, defined as the expected return over the risk-free rate, is not designed to *forecast* future growth in cash flows or dividends—the numerator of

TABLE 7-4

Reweighting Sunoco Beta*

Year	Weight	Beta	Weight × Beta	Weighted Beta
2004	35%	1.30	0.35 × 1.30	0.455
2003	25%	0.85	0.25 × 0.85	0.210
2002	20%	0.50	0.20 × 0.50	0.100
2001	10%	0.54	0.10 × 0.54	0.050
2000	10%	1.10	0.10 × 1.10	0.110
			Weighted beta (total)	**0.925**

*Sunoco's weekly prices for 52-week periods were regressed against the Standard and Poor's (S&P) Industrials.

the discount model does that. The CAPM starts with the risk-free Treasury rate and implores the analyst to add on from there. This is perfectly logical. Where it fails is in its central assumption that security-level volatility represents a total and accurate manifestation of operating and financial risk, including free-cash-flow impairment. Clearly, this is not the case by virtue of the vast number of entities that are poor credits, including those in default or technical default, yet have low beta coefficients. These poor credits having a low cost of equity are not consistent with the theory underlying the CAPM. And the same is true for many higher-beta stocks. They have good fundamental outlooks with investment-level credit ratings, yet they are awarded an unfairly high cost of capital owing to the vagaries of their underlying stock trading patterns.

Table 7-5 illustrates the cost of capital using the CAPM and the comprehensive credit model for companies across the credit spectrum. Notice how, for these firms, the cost of equity is more closely aligned with the credit model than with the CAPM. For example, Eddie Bauer, a company in bankruptcy that is currently attempting to reorganize under the bankruptcy code, overwhelmed by massive debt, has an unjustifiably low cost of equity capital according to followers of the most popular cost-of-equity model; the company's cost of capital is lower than those of General Electric, 3M, and many other AAA-rated companies.

Cooper Industries (beta = 1.7), eBay (beta = 2.0), and Assurant (beta = 1.6), all well-known, actively traded credits with an accurate cost of capital under my credit model, show a high cost of capital (owing to stock volatility) if one were to follow the CAPM. Observe that eBay, despite its higher credit rating than Cooper Industries, has a lower cost of equity when using the credit model. Also of interest is that Caterpillar had a higher credit rating than eBay yet, according to its credit, deserves a considerably higher cost of capital.

TABLE 7-5

CAPM versus Rating Risk Equity Premium*

Company	Beta	Cost of Equity (CAPM)	Credit Rating	Cost of Equity (Credit Model)
Assurant	1.6	12.3	BBB+	8.8
eBay	2.0	14.5	A−	9.1
Caterpillar	1.9	13.95	A	11.1
Radio One	0.12	4.2	CCC+	19.1
Cooper Industries	1.7	12.9	A	8.2
Eddie Bauer	35.0	5.4	D	33.7

*Assumes 9 percent return on the market and a yield on 10-year Treasury bonds of 3.5 percent, which was the yield at the time this table was prepared, not the time the Sunoco analysis was undertaken. Credit ratings are those of Standard and Poor's.

Cost of Debt and Preferred

When computing the cost of debt, the analyst must establish the interest rate the entity would be required to pay to replace its existing debt under current conditions. Since interest is tax deductible, we need to multiply that coupon (or effective interest) rate by one minus the marginal rate. Thus, if the yield on the entity's bond, when issued at par, is 7 percent. and the company is in the 30 percent cash tax rate, the true after-tax cost to the firm is 4.9 percent. The shield on the outstanding securities does not change if interest rates, after issuance, change.

Using similar logic, the cost of equity capital is not directly affected by the tax rate because the company would not be afforded a tax benefit for shares it issued. A change in the tax rate will affect the free cash flow (if absorbed), which affects the cost of equity—hence there is an indirect impact.

The cost of preferred stock is the after-tax current yield on its existing instruments. Since preferred dividends are, like common stock dividends, paid after taxes, no tax deduction is available to the corporation.

For a profitable enterprise, the cost of debt capital almost always will be lower than equity because debt (1) is generally better secured with assets, (2) holds a higher security position in the event of default, (3) has tax-deductible interest payments, (4) has generally lower underwriting costs, and (4) new equity typically has substantial market impact. If warrants to purchase stock are issued as part of a financing (debt or equity), they may serve to lower the cost of those forms of capital or even permit outside financing to occur at all. Sunoco did not have warrants outstanding.

For debt trading at a large discount to the stated amount on the balance sheet, there could be a considerable variation between the cost of debt as currently priced in the market and that stated by the balance-sheet value. Such is the case in the following example involving MGM, with the data taken from its 2008 10K.

Example:

MGM stated that its weighted-average interest rate was just 6 percent, hardly befitting a company near bankruptcy at the time. For this Standard and Poor's (S&P) CCC-rated entity, the cost of equity capital based on my credit model was 17.3 percent. During the height of the financial crisis, MGM's 7.625 percent bonds due in 2017 yielded 33 percent. Six months later, after the financial crisis had passed, the bonds still yielded 13.71 percent to maturity. And during February 2010, MGM's lenders needed to defer principal payments on its debt for two years, referred to as *forebearance*. Without the forebearance, the foreclosure process would have begun.

From MGM's 2008 10K:

The following table summarizes information related to interest on our long-term debt:

	Year Ended December 31 (In Thousands)		
	2008	2007	2006
Total interest incurred	$773,662	$930,138	$900,661
Interest capitalized	(164,376)	(215,951)	(122,140)
Interest allocated to discontinued operations	—	(5,844)	(18,160)
	$609,286	$708,343	$760,361
Cash paid for interest, net of amounts capitalized	$622,297	$731,618	$778,590
Weighted-average total debt balance	$12.8 billion	$13.0 billion	$12.7 billion
End-of-year ratio of fixed-to-floating debt	58/42	71/29	66/34
Weighted-average interest rate	6.0%	7.1%	7.1%

TABLE 7-6

Sunoco, Inc.

SUNOCO, INC., AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(Million of Dollars)

	At December 31	
	2004	2003
Assets		
Current assets		
Cash and cash equivalents	**$405**	$431
Accounts and notes receivable, net	**1,271**	1,056
Inventories (Note 6)	**765**	494
Deferred income taxes (Note 4)	**110**	91
Total current assets	**2,551**	2,072
Investments and long-term receivables (Note 7)	**115**	143
Properties, plants, and equipment, net (Note 8)	**4,966**	4,405
Prepaid retirement costs (Note 9)	**11**	11
Deferred charges and other assets (Note 2)	**436**	422
Total assets	**$8,079**	$7,053
Liabilities and Shareholders' Equity		
Current liabilities		
Accounts payable	**$2,109**	$1,365
Accrued liabilities	**461**	435
Short-term borrowings (Note 10)	**100**	—
Current portion of long-term debt (Note 11)	**3**	103
Taxes payable	**349**	242
Total current liabilities	**3,022**	2,145

	At December 31	
	2004	**2003**
Long-term debt (Note 11)	**1,379**	1,498
Retirement benefit liabilities (Note 9)	**539**	604
Deferred income taxes (Note 4)	**755**	602
Other deferred credits and liabilities (Note 12)	**247**	208
Commitments and contingent liabilities (Note 12)		
Minority interests (Note 13)	**530**	440
Shareholders' equity (Notes 14 and 15)		
Common stock, par value $1 per share		
Authorized—200,000,000 shares		
Issued, 2004—139,124,438 shares		
Issued, 2003—136,801,064 shares	**139**	137
Capital in excess of par value	**1,656**	1,552
Earnings employed in the business	**2,895**	2,376
Accumulated other comprehensive loss	**(164)**	(187)
Common stock held in treasury, at cost		
2004—69,796,598 shares		
2003—61,420,158 shares	**(2,919)**	(2,322)
Total shareholders' equity	**1,607**	1,556
Total liabilities and shareholders' equity	**$8,079**	$7,053

	December 31 (Millions of Dollars)	
	2004	**2003**
9.375% debentures, payable $16 in 2014 and $20 in 2015 and 2016	**$56**	$200
9% debentures due in 2024	**65**	100
7.75% notes due in 2009	**146**	200
7.60% environmental industrial revenue bonds paid in 2004	**—**	100
7.25% notes due in 2012 (Note 13)	**250**	250
7.125% notes paid in 2004	**—**	100
6.875% notes due in 2006	**54**	150
6.75% notes due in 2011	**177**	200
6.75% convertible subordinated debentures due in 2012 (Note 14)	**9**	10
4.875% notes due in 2014	**250**	—
Floating-rate notes (interest of 2.17% at December 31, 2004) due in 2034 (Note 10)	**103**	—
Revolving credit loan, floating interest rate (2.94% at December 31, 2004) due in 2009 (Note 10)	**65**	65
Floating-rate notes (interest of 2.72% at December 31, 2004) due in 2006 (Note 10)	**120**	120
Revolving credit loans, floating interest rate (3.42% at December 31, 2004) due in 2006 (Note 10)	**6**	28
Other	**85**	85
	1,386	1,608
Less: Unamortized discount	**4**	7
Current portion	**3**	103
	$1,379	$1,498

Since Sunoco's bonds listed in the 10K are *not* actively traded, I estimated, based on available yield spreads at the time relative to the company's BBB rating, that Sunoco's cost of debt of was approximately 6.6 percent, or an after-tax cost of 4.03 percent, based on an implied 39 percent cash tax rate. The use of the effective tax rate would not be appropriate given that we are using cash-based metrics. This cost of debt is derived as follows:

$$= 0.066 \times (1 - 0.39)$$
$$= 4.026$$

Sunoco has a simple capital structure consisting primarily of short- and long-term debt and equity capital. If preferred stock were part of this structure, the logic would be the same; that is, derive its current yield and plug it in based on its percentage of the capital structure.[5] Sunoco also is a lessor and lessee of operating leases. Netting the two and using the current after-tax 4.03 percent as a discount rate adds approximately $323 million to total debt, which I add to the balance-sheet debt ($1,479) included in Table 7-7. About a third of the leases were for marine vessels.

I do not include in this analysis short-term trade obligations as part of the capital structure. Such business expenses, such as payables and payroll, are met from the normal operating cash-flow cycle. On the other hand, operating leases

TABLE 7-7

Sunoco-Weighted Average Cost of Capital

		Credit-Rating Method ($ Millions)		
		Weight	**Cost**	**Weighted Average**
Debt	1,802	0.20	4.00%	0.80
Equity	7,410	0.80	8.96%	7.20
Total	$9,212		Weighted-average cost of capital:	8.00

[5] A quick note on its balance sheet. As we see, Sunoco conforms to SFAS 115, "*Accounting for Certain Investments in Debt and Equity Securities.*" Debt and equity securities not classified as either held-to-maturity securities or trading securities are classified as available-for-sale securities and are reported at fair value, with unrealized gains and losses excluded from earnings and reported in a separate component of shareholders' equity and found as *other comprehensive income (loss).* Four years later, this statement, we now know, would be increasingly important for financial institutions and their investors and creditors.

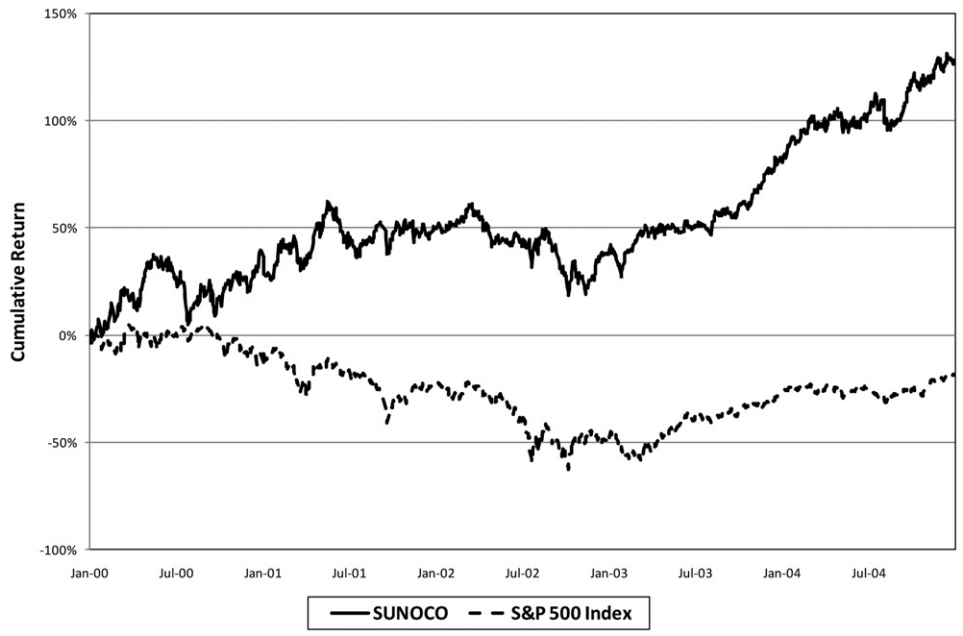
should be included. If the entity has no bank debt, the analyst must impute an interest rate based on its credit rating. If the entity has no credit rating, one must be implied based on its credit metrics and S&P's adjusted financial ratios (see Table 6–6), which must be compared with like credits, or use the one-third of operating lease rule as the imputed interest rate and then determine the after-tax cost.

When I run through my credit model in the next chapter, I arrive at a cost of equity capital of 8.96 percent, and thus I determine Sunoco's WACC as shown in Table 7-7.

The $7.410 billion equity is the market value of Sunoco stock at the time. Preference is made to use market value as opposed to book value because it represented a closer relation to the assets values and capital strength than the depreciated balance-sheet value. Sunoco's gross PPE was $8 billion, with $3.7 billion in depreciation, resulting in the $4.966 billion balance-sheet figure. At the time, it was generally believed that industry capacity constraints were just a few years away, and this was being reflected in the strong performance of Sunoco stock relative to the S&P 500 (Fig. 7-7).

FIGURE 7-7

Cumulative Return: SUNOCO versus S&P 500 Index



Cost-of-Equity Project Method

The cost of equity also can be calculated by determining the "hit" to earnings per share resulting from undertaking a new investment project. This method, although simple, is a common tool, although it does not address cash flow. Again, presume that Sunoco wishes to build that new oil refinery having a cost equal to 20 percent of its current market value, or $1.48 billion. Assume that to complete the new equity offering successfully, the company needs to sell its shares at a 12 percent discount to the current market value of $100 per share, which includes all underwriting, legal, accounting, and other costs. This amounts to 16.8 million additional shares (Table 7-8).

Some managers or board members like to see, as part of the analysis, the percentage reduction to earnings so, with a 10 percent increase in pretax income the following year, the cost of capital would be 10.4 percent (7.31/8.16), which represents the new estimated earnings divided by the new outstanding shares. It is a shareholder-reported GAAP number, assuming that the entity was able to grow its pretax income by 10 percent. This analysis would make more sense if

TABLE 7-8

Sunoco

NEW CAPITAL REFINERY ANALYSIS

		Increase in Pretax ($ Millions)			
	2004* (With New Refinery)	10%	15%	35%	50%
Pretax income	995	1,094	1,144	1,343	1,492
Provision for taxes (39.2%)	390	429	449	527	585
Net income	605	665	715	836	925
EPS	8.16	7.31	7.64	8.98	9.97
Common dividends	86	124.5	124.5	124.5	124.5
Shares outstanding	74.1	90.9	90.9	90.9	90.9
Addition to retained earnings	519	540	590	711	800
Addition to retained EPS	7.00	5.94	6.28	7.61	8.61

*Actual for 2004. Addition to retained earnings is from operations (not shareholders' equity) only and assumes that the refinery began operation in the next period or was purchased. It excludes, for instance, purchase of treasury stock, which likely would occur if the projection were met. Also, since Sunoco purchased $568 million in treasury stock during 2004, the shares outstanding do not match the 69.1 actual shares outstanding at the end of the fiscal year. The 74.1 million shares used is basic or average weighted shares outstanding during the year from which earnings per share reported to shareholders was calculated. Because of the fewer shares outstanding, earnings and cash flow per share would be boosted automatically, all else equal. Also, small movements in refining margins would have a large impact on profits, cash flow, and cost of capital. For the purpose of this example, we presume that margins are constant. Sunoco raised its dividend in March 2005, but for purposes of comparison, I left it unchanged.

the project would contribute immediately to earnings, a dubious assumption with a multiyear project.

Such analysis, however, omits the extra dividend paid on the new shares. It is for this reason that I choose to look, in this method, at the cash effect of the project based on the difference in additional retained earnings per share (Table 7-8), which would include the cost of the added dividend payments on the common. If the company paid preferred dividends, I also would need to include that cost in the table. Owing to the dilution and extra dividend requirement, pretax income would need to rise about 27 percent to return to the same addition to retained earnings as prior to the dilution.

An internal rate of return (IRR) was not used in the study owing to its severe limitation regarding interim-period cash flows. The IRR is useful only when there are no interim cash flows or if any interim cash flows can be reinvested at the IRR rate, hardly a plausible assumption for a company such as Sunoco. In fact, the assumed reinvestment rate is often the driving force behind the IRR analysis because over 10 years it accounts for a large majority of the return.

Clearly, the cost of this mammoth project might meet with some skepticism by Sunoco's board. However, the projected 10 percent increase in pretax profits shown in the first column of Table 7-8 is just for year one, and it could be argued by those in management and those of the board of directors favorably disposed that such a large expansion would lead to, over 5 to 10 years, much greater increases in income and cash flows depending on the growth in demand for refined products and the *crack spread*, which is the margin between the cost of crude and the price realized for product. We will see when looking at Sunoco's ROIC that refining margins are notoriously unstable.

Another way of looking at the project would be the yield needed to return the same earnings to shareholders (exclusive of the dividend) as prior to undertaking the project so that

$$\begin{aligned}\text{Required yield} &= \frac{\text{current earnings}}{\text{price of new shares to be sold}} \\ &= \frac{\$8.16}{\$88} \\ &= 9.3\%\end{aligned}$$

where \$88 is the price of the new shares to be sold, and \$8.16 is current earnings. The newly issued shares must each earn \$8.16 to result in the total firm earnings per share. Being earnings per share, it is an after-tax requirement. Pretax, it is a 15.3 percent requirement. This is greater than the prior method of 10.4 percent because it does not consider any increase in earnings resulting from the project.

However, as noted in Table 7-8, Sunoco also will need to pay dividends on the additional 16.8 million shares, or

$1.20 (current rate per share) × 16.8 (additional shares) = $20,16 million

Or a pretax requirement of $33.16 million because dividends are paid after-taxes, and we are measuring the cash needed to pay the additional dividend with balance-sheet cash remaining at its prior level.

$$\frac{\$20.16}{(1-0.392)} = \$33.16$$

Given Sunoco's 39.2 percent tax rate, it would need to earn $33.16 million added cash (in addition to the current $8.16 per share) to pay the new dividends and have retained earnings unchanged. The dividend requirement is ignored as this method typically is computed[6]; it is merely concerned with maintaining the earnings per share, not cash flow or change in shareholders' equity.

I now show the blended cost of capital using the three methods discussed. The 8.95 percent WACC (Table 7-10) averages the results of the three cost-of-equity methods shown. I did not include the implied cost-of-capital method or other methods reviewed earlier in this chapter because they are used infrequently compared with the CAPM, and I wanted to introduce the project method because investor conference calls normally focus on the earnings impact when accretion can be expected and the extent, if any, of dilution. If the analyst wished to include the implied cost of capital as another method when evaluating the firm's cost of equity, it would be averaged with the other estimates of Table 7-10.

TABLE 7-9

Sunoco

	$ Million	Weight	Cost	Weighted Average
Debt	1,802	0.20	4.0%	0.80
Equity	7,410	0.80	9.3%	7.44
Total	$9,212		Weighted average cost of capital:	8.24%

[6] This method was popularized by Erich Helfert in his landmark book, *Techniques of Financial Analysis* (Richard D. Irwin), originally published in 1963.

TABLE 7-10

Sunoco

WEIGHTED BLENDED COST OF CAPITAL

		Cost	Weight	Weighted Average
Equity:	CAPM	8.6%		
	Credit-rating method	8.96%		
	Project method	9.3%		
	Average cost of equity:	8.95%	0.80	7.16
Debt		4.0%	0.20	0.80
			Weighted-average cost of capital:	7.96%

The closeness in the results is surprising, but as the years unfolded, the credit-rating method remained relatively stable, whereas the CAPM cost of equity actually declined, resulting from a fall in Sunoco's beta.

We now have the cost of capital (7.96 percent) that Sunoco would compare with its ROIC, assuming that project financing is raised in the same allocation as its current capital structure. If the capital raise is dissimilar to the existing capital structure, it is that cost weighting that will be measured against the expected ROIC from the project. If the projected free cash flow based ROIC comfortably exceeded the WACC for the project, it would be brought to committee and the board.

Sunoco's 2004 ROIC

Sunoco and the refining group in general at the time the study was prepared were earning a high ROIC, and their stocks were reflecting this, as we saw from the stock chart. Using my formula to compute ROIC, we get

$$\text{ROIC} = \frac{\text{four-year average free cash flow} - \text{net interest income}}{\text{invested capital (equity} + \text{total interest-bearing debt} + \text{present value of operating leases} - \text{cash and marketable securities)}}$$

$$= \frac{591 - 10}{1{,}607 + 1{,}802 - 405}$$

$$= \frac{581}{3{,}004}$$

$$= 19.3\% \text{ (ROIC for 2004)}$$

Although 2000–2004 had been good to the refiners, during the period 1988–2004, there were eight years when Sunoco's ROIC was negative owing to low "crack "spreads and/or slack demand for its products.

Sunoco ROIC and Market Values 1988-2004

Year End (December)	ROIC (%)	Market Value ($M)
1988	(3.9)	3,420
1989	(2.5)	4,359
1990	0.1	2,969
1991	2.2	3,234
1992	(5.3)	2,976
1993	(5.4)	3,131
1994	(6.0)	3,073
1995	(7.2)	2,054
1996	(0.4)	1,779
1997	1.6	3,009
1998	(5.1)	3,373
1999	11.2	2,120
2000	14.3	2,864
2001	20.1	2,935
2002	11.8	2,533
2003	17.1	3,951
2004	19.3	5,975

A Final Decision

The team responsible for bringing the project forward now should have the beginning information necessary, including site design and financial projections, prepared in consultation with outside engineers and attorneys. An integral part of the approval process is overcoming the necessary legal obstacles from local and federal authorities. The internal team might consist, among others, of Sunoco's financial unit, project engineers, vice president of marketing, vice president of refining and supply, and chairman (who is also the CEO) because a project of this magnitude is a challenging, time-consuming, extremely costly, and risky process. The CFO will initiate discussions with the company's investment banker and credit-rating agencies, whereas the board of directors will continue to be made current on the project status. The board, by this time, will have seen reams of information related to the long-term supply and demand outlook for the industry, including percentage forecasted utilizations, legal requirements, tax effects, incentives, crude days of supply, inventory for all products, and so on.

The CFO must decide what avenue(s) of capital raises to pursue and then report back to the board for final approval. Given the information from the preceding, including current leverage ratios, the lower cost of debt capital, projected growth of earnings and cash flow, and Sunoco's good credit rating, one might

expect the company to raise the majority of the new offering via the debt markets. However, as you recall, I used the current equity market value in the calculation of the capital structure, and some board members might prefer the capital structure be based on the book value, which would have resulted in a total debt/shareholders' equity of closer to 100 percent. Sunoco's investment bankers also will provide advice on current market conditions for all forms of capital. Most likely, however, given the extreme volatility of cash flows associated with the industry, the board would prefer equity financing whenever possible, avoiding a fix charge coverage issue if product prices collapse, as the company's ROIC history has shown.

Firms with more stable cash flows generally would prefer debt financing, perhaps in obligations maturing in 3, 10, 12, and 20 years, which allows for uncertainties in the fixed-income markets at the time the bonds mature. Otherwise, it would be expected that the raise would be similar to the existing capital structure.

It would be important that Sunoco have the credit-rating agencies on its side because a lower rating would affect (raise) the cost of debt capital and perhaps the equity capital as well. A drop to BB+ from BBB certainly would cause a market impact. S&P defines BB+ as an entity that faces "major ongoing uncertainties or exposure to adverse business, financial, or economic conditions which could lead to inadequate capacity to meet timely interest and principal payments." This contrasts with BBB, which S&P defines as an entity "having adequate capacity to pay interest and repay principal."

Often the ultimate decision is not based on the least expensive route but rather on which form of capital is more easily obtainable. For example, if refining-sector securities were experiencing strong institutional demand, as was the case at the time the study was prepared, Sunoco's investment bankers might suggest a greater percentage of the capital be raised via equity, even though it has a higher cost. If the equity route is not as available, then debt might be the only means open until the new debt can be replaced with equity. If the project is under way but not expected to produce free cash flow for the foreseeable future, the equity analyst must decide if such a company has investable long-term value, given that such a scenario would raise its cost of equity above the 8.96 percent reflected under the credit method.

Project Free Cash Flow and Stock Valuation

In a project this size, the manager spearheading ("owning") the project would estimate a wide range of free-cash-flow outcomes for a five- to ten-year period with the subsequent assumption that afterward the firm's free cash flow will grow at a rate equal to either the historical growth rate in gross national product (GNP) or

the long-term expected growth rate for the industry. Undoubtedly, such estimates will prove a daunting task because it is normally difficult for refiners to forecast its free cash flows accurately. The analysis and financial projections will serve as a guideline because the decision will rest on comfort levels, investor's interest in the securities to be offered, and the belief that the capacity is needed.

Table 7-11 shows the net present value of Sunoco shares resulting from the Chapter 8 cost-of-equity-capital credit model. I show it for Sunoco both exclusive and inclusive of net debt. If Sunoco had net cash, I would add the value per share to the current present value, net of required working capital. For simplicity, I show fair value prior to consideration of working capital needs, which would be a function of the time of year the project began, because Sunoco generates greater cash flows during the summer as demand for gasoline is greater, margins are typically higher, and there may be less maintenance work on the refineries located in the Northeast as they prepare for winter distillates.

Assuming that Sunoco realizes 5 percent growth in its free cash flow, total firm free cash flow would increase to $754 million (from the $591 million four-year average in 2004) by 2009. Certainly, if one believed that 2004's 19.3 percent ROIC would continue, the decision would be an easy one given Sunoco's cost of capital. However, as pointed out, eight of the prior 17 years saw negative ROICs, a disturbing instability.

Given this scenario, it would seem that the project would meet with detractors because the $163 million in additional annual average free cash flow, given 5 percent growth over the 2004 four-year average, would be roughly equal to the company's cost of equity. The $95.01 net of debt value at the bottom of Table 7-11 represents the current fair value to equity holders given a projected 5 percent annual current growth (beginning 2005) and 90.9 million shares outstanding. As the table shows, fair value currently would be, given the dilution, roughly where the stock is currently trading, $100 per share.[7] If upcoming growth of the total firm's free cash flow were expected to be lower than 5 percent per year, the project would not cover its cost of capital, and Sunoco's current stock price would be expected to decline. Those in favor of the project would argue that a project of this size could be expected to result in excess of 5 percent annual growth over existing free cash flow given projected industry demand growth of about 2 to 3 percent per year and the absence of other major refineries being contemplated.

Given Sunoco's WACC of 7.96 percent, one would doubt the needed 5 percent or more growth from the current level of free cash flow to have the level of certainty

[7] The price when the study was conducted. For projects having more certain free cash flow, the payback period is often used. The payback period is defined as the time required after revenues are first received to achieve break-even cumulative cash flow. Because of normal regulatory delays and volatility in price realization, a payback period was not utilized in this example.

to go forward.[8] While the approximate $11 million in after-tax interest expense, given the $ 270 million in debt that would need to be raised, would not appear to be much of a hurdle for Sunoco, the larger question is the severe share dilution. Those expected free cash flows could, if realized, pay off the bonds rather quickly, which is fine for creditors, especially given the conservative financing. For stockholders, the risk is obvious—that of the free cash flow not materializing. Is the project worth the possibility of a dramatic fall in the stock price, as implied by the table?

A more stable cash flow entity would tend to be more favorably inclined to proceed with a large project having a small gap between cost of capital and ROIC. In general, it is doubtful a company in the refining industry would approve any project with a ROIC of less than 15 percent. This is a multiyear project where cost overruns are not uncommon, and cash inflows uncertain. And as Table 7-11 shows, if the price of refined product were to fall, resulting in a 10 percent decline in free cash flow, Sunoco's stock price could be expected to fall by almost two-thirds. For this reason, many companies, unless they can raise funds inexpensively, prefer to sit on their capital rather than invest in projects offering returns slightly above their cost. The margin for error should not be taken lightly.

TABLE 7-11

Sunoco: Fair Value of Equity Security Based on Various Growth Rates in Free Cash Flow

Assumptions: $591.3 million average four-year free cash flow (years 2000–2004)
Thereafter, 3 percent
Cost of capital of 8.96 percent
Net debt of $13.14 per share derived from $1,649 in fixed debt minus $405 in cash

Assumptions					
Average free cash flow	$591.30				
Growth rate in free cash flow	−10%	−5%	0%	3%	5%
Cost of capital	8.96%	8.96%	8.96%	8.96%	8.96%
Growth after five years	−5%	−3%	0%	2%	3%
Value per share	$36.48	$48.28	$65.90	$88.15	$108.15

Fair value with 5% growth = $108.15
Fair Value net of debt = $ 95.01

[8] During March 2009, after years in the planning stage, Kuwait decided to scrap a new $15 billion refinery project, calling it "not feasible." Their decision was due to the global fall in the prices of refined products.

Follow-Up to the Sunoco Study

Four years after this example was prepared, Sunoco's stock was selling at $55 per share, not adjusting for its poststudy two-to-one stock split. What went wrong with the credit model? Nothing, so far as the cost of equity is concerned—Sunoco's cost of capital under the credit model budged up just slightly to 9.4 percent. Its free cash flow suffered a precipitous drop owing to a large fall in demand and margins associated with the severe recession. The fall in the price of its stock was seen in the study as a real risk if free-cash-flow growth did not materialize. Sunoco had negative free cash flow during 2008 and 2009, not unusual given its historical instability. In the original analysis, the conclusion was that a project of this size was not recommended given that historic volatility in the company's free cash flow made the expected ROIC too uncertain owing to the potential risk to the stock.

Sunoco and other companies in its sector saw their stock prices drop by very sizable percentages during the ensuing five years. A look at the present-value table reveals that given the cost of capital picked up by the credit model, if one had fairly estimated Sunoco's free cash flow, the current $55 split-adjusted price is indeed approximated by the model, had those shares been issued. Of greater interest is how the credit model picked up the volatility in Sunoco's credit metrics, including cash flows, resulting in its stable discount rate over the ensuing years. If the poststudy volatility had been a surprise, the model's cost of capital would have increased more than it did. This contrasts with its four-year post analysis (2009) beta, as reported by Bloomberg, of just 0.58, indicating that risk had been reduced over the years. Clearly, this has not been the case, leading one to believe that the closeness of the initial CAPM cost of equity capital with that estimated by the credit model was coincidental. One could not conclude, given the weakness in and volatility of Sunoco's free cash flows, that its cost of equity capital declined during the ensuing four years; thus devotees of the CAPM would have been using a poor approximation of risk.

This leads us to the credit model itself.