Cost of Capital

Critical Equation #4 for Business Leaders

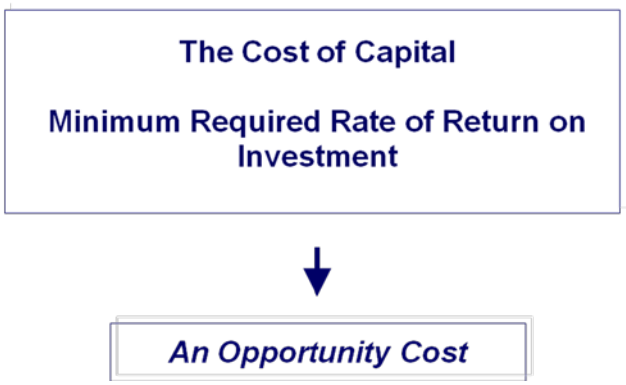
$$K_O = K_D\,(1\text{-}T)(D/\{D+S\}) + K_E(S/\{D+S\})$$

Overview

The economic goal of management is to create shareholder value. Fundamentally, this means earning a return on investment that exceeds the cost of capital. The only operational definition of profitable growth that makes sense is for earned returns to exceed the opportunity costs of those who have entrusted you with their money, typically in the form of debt and/or equity. This is evidence of your ability to create sustainable competitive advantage over time.

Every business leader is paid to create value for shareholders. It is his or her fiduciary responsibility. If you do not expect to earn returns that exceed the cost of capital, you best "call it a day" and return the money so your investors can find value elsewhere. Exhibit 1 reflects the definition of the Cost of Capital in the framework of an Opportunity Cost.

Exhibit 1



A key concept in economics, Opportunity Cost is the cost related to the next-best alternative. Two fundamentally linked opportunity costs in any business are *external* and *internal*. Exhibit 2 shows the *external* opportunity cost. A business must earn on the market value of its assets the aforementioned minimum to satisfy the suppliers of capital. Otherwise, its very existence will quickly become questionable as the market value of equity declines to reflect the inferior returns on investment.

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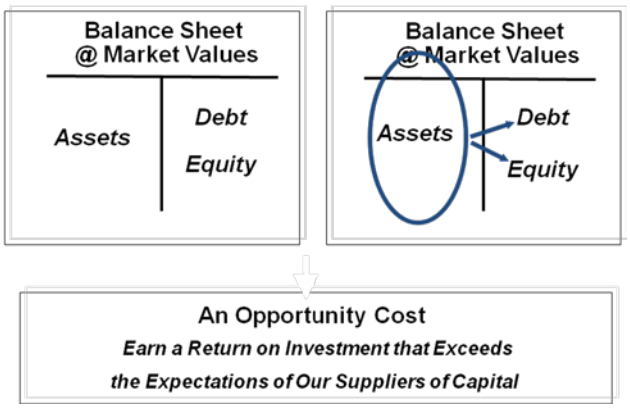
Exhibit 2



As a business leader, once you get that precious dollar, you need to determine how to invest it for the short- and long-term and allocate this scarce resource in annual budgets and long-range business plans. This is the *internal* opportunity cost. The well-known tradeoff of management vs. leadership is always tested as part of internal opportunity cost.

TRI's Critical Equation # 4 – Cost of Capital

Our equation # 4, the cost of capital, is sometimes known as the Hurdle Rate and is represented by

$$K_O = K_D\,(1\text{-}T)(D/\{D+S\}) + K_E(S/\{D+S\})$$

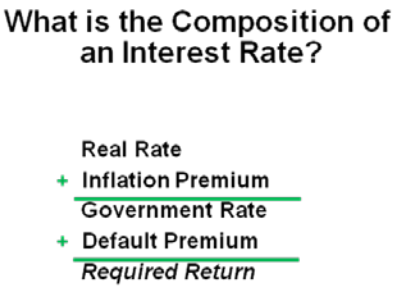
K represents cost, O is overall, or all sources of capital both debt (D) and equity (E). T is the corporate tax rate at the margin, not your effective rate. K_O, K_D. and K_E are, respectively, the overall cost of capital (also known as the weighted average cost of capital or WACC), the cost of debt (effectively your interest rate on debt), and the cost of equity. The multiplication of the cost of debt, K_D, and ($1\text{-}T$) represents interest deductibility prior to computing your tax liability. The $(D/\{D+S\})$ and $(E/\{D+S\})$ are the weights of debt and equity in the capital structure. In the basic case, the D should only be interest-bearing, short- and/or long-term.

The Component Costs - K_D and K_E

The cost of debt (K_D) is the interest rate on the company's debt. Three primary drivers, found in Exhibit 3, make up the cost of debt, or required return on the debt. First is an understanding of the government rate, which is often depicted as risk free, or at least a proxy for minimal risk. The government has the ability through a variety of macro-economic tools, such as fiscal and monetary policy, to pay its debt. However, as we have learned over the years, the economic stability of governments differs significantly around the globe.

In the most advanced economies, and in the absence of any inflationary expectations, investors in aggregate would not charge 0%. Enjoying consumption today versus tomorrow has a time value. In economics, this is the concept of the opportunity cost of forgoing current consumption. The rate of return for forgoing current consumption is often referred to as the real rate of interest. Over extended periods of time, the real rate of interest is 2% to 3% per annum. Expected inflation will be added to the real rate per Exhibit 3. Since the probability of default is greater for a corporate relative to a sovereign bond, a premium is added to the government rate. The rating agencies (e.g., Moody's and S&P) evaluate a company's ability to meet its financial obligations on time and in full amount and assign ratings. In Exhibit 3, lower ratings correspond to higher default premiums. Typically, the default premiums increase with maturity.

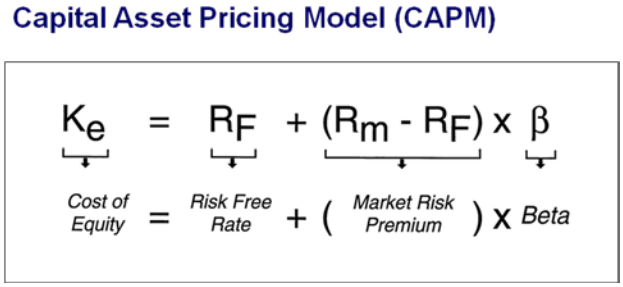
Exhibit 3



A simple way to approximate the weighted average cost of debt is to look at the interest expense from an income statement and divide by the average of beginning and ending debt levels.

A variety of academic models estimate the Stockholders' Required Rate of Return (K_E). The most widely used in practice is the Capital Asset Pricing Model (CAPM), which posits a positive expected relationship between return and risk. Another model used to varying degrees is the Dividend Growth Model. Exhibit 4 shows the standard CAPM.

Exhibit 4



K_E is the cost of equity or minimum stockholders required return, R_F is commonly referred to as the risk-free rate, R_M the expected return in the stock market, and β is a company's Beta.

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In applications of the CAPM, the risk-free rate is typically the interest rate on a government bond. Academics and practitioners debate the appropriate maturity to apply. We believe that given the long-term nature of most investment decisions (as opposed to annual operations) a ten-year or even longer rate is appropriate.

The market risk premium is debated in all circles as well. The debate is around the historical time period to obtain data, the market index to use, and a variety of esoteric statistical issues. The prime difference between the risk-free rate and the market risk premium is that we cannot observe a forward-looking estimate of the return on a market index. We take the old-fashion route of using the well-known Morningstar Ibbotson Data from 1926 to the present for the S&P 500, as well as a 10- to 15-year maturity government bond. Our range from the historical data is for a market-risk premium of 5% to 7%. With a 4% risk-free rate, the range of the expected return on the market would be 9% to 11%.

Beta (β) is the measure of risk in the CAPM, which is the sensitivity of a company to a leading market index. Most betas fall in the range $0 < \beta < 2$, with an average of 1 across all stocks in the market. A variety of statistical tools estimate a company's beta coefficient. The most common is a regression of the returns on the stock against the returns on a market index such as the S&P 500. The details of beta calculations are subject to considerable debate, and some authors have declared "Beta is dead." Others have argued that too much reliance on the CAPM can be myopic and strangle innovation because of excessively high hurdles that can not be met in the early years of a new product or service. In the past few years, many authors also have questioned the theory of market rationality, which is an underlying assumption for the CAPM to be valid. We leave this debate to the pundits.

If a company had a beta of 1.5 it would be 50% more volatile than the market in either direction (i.e., market up 10%, company up 15%; market down 10%, company down 15%). A beta of .5 would imply less volatility in either direction. A beta of 1 should mimic the market. Because of this sensitivity to the market movement, the higher the beta the greater the risk of the company. Exhibit 5 has examples of real-world betas. The issue is not the decimal point accuracy but whether the levels make sense with regard to your perceived risk of these companies. Is it logical -- given all macro, industry, and micro aspects of risk -- that Unilever would be perceived by the stock market as less risky than Intel? Always go back to the firm's fundamentals.

Exhibit 5

Betas of Various Companies

Company	Beta
Unilever	.85
Exelon	.75
General Electric	1.10
Exxon Mobil	.95
U.S. Airways	1.50
Intel	1.35
S&P 500	1.00

Are these Betas reasonable given the Risk Profiles of the Individual Companies?

Let's look at an example of the CAPM. Assume a risk-free rate of 5% (from a government yield curve of 10- to 15-year maturity) and a market risk premium of 6% (the average of the aforementioned range). The equation for the CAPM would then be

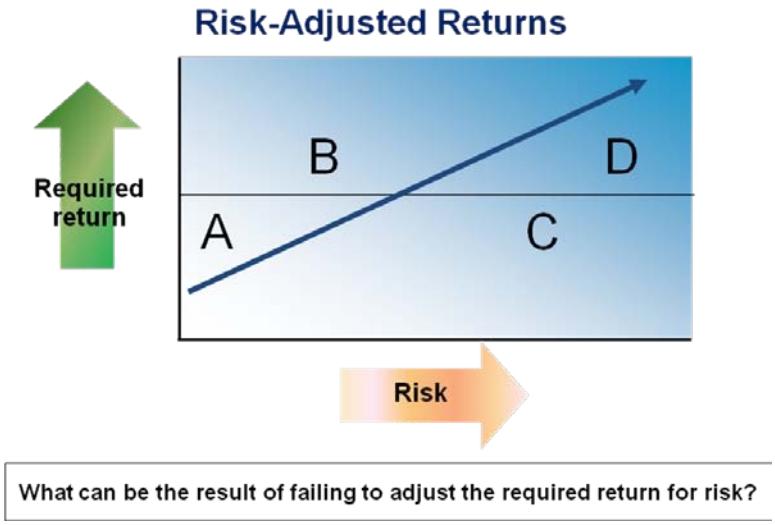
$$K_E = R_F + (R_M - R_F)\,\beta$$

$$K_E = .05 + (.06)\,\beta$$

This reflects the positive expected relationship between return and risk. Beta is the X axis and the cost of equity is the Y axis. The only unknown on the right side is the beta. The merit of the CAPM is its simplicity. Many would argue that simplicity also is its Achilles heel. Everyone faces the same capital markets, but betas differ, as we saw above, due to a firm's fundamentals. If beta was 1.5, the cost of equity would be 14%; if the beta was .5, the cost of equity would be 8%. The fundamental hierarchy would be $K_E > K_D > R_F$.

Exhibit 6 shows the CAPM linear relationship. Note what can happen in investment decisions if fundamental risk-return relationships are ignored. For a business that used the same return for any project regardless of risk, both projects B and D are acceptable because they plot above the line. However, when we try to capture the CAPM, project A is acceptable and D is not. The implication is potential misallocation of firm resources by ignoring the fundamental risk-return relationship.

Exhibit 6



The Weighted Average Cost of Capital - K_o

In this section we bring the components together to calculate the K_o. Exhibit 7 represents a worksheet in which the equity is always at market value or the shares outstanding times the price per share.

For simplicity, we assume the short- and long-term interest bearing debt is $500 at book value. We assume the company has 100 shares at a price of $5 per share. The average interest rate is 16%. The cost of equity is estimated via the CAPM with a R_F of 8%, a risk premium of 6% with a beta of 2. The tax rate is 50% (a reasonable real-world marginal tax rate is 38%, which accounts for state and federal levies). Upon substitution, the overall cost of capital, or WACC, is 14%. This is the minimum the business needs to earn on investment to keep both the debt and equity holders satisfied.

Exhibit 7

Cost of Capital Worksheet

	1	2	3	4 = 3 X (1-T)	5 = 4 X 2
	$	Percent % D & E	Before-Tax Cost***	After-Tax Cost ****	Weighted After Tax Cost
Debt - D	$500	50%	16%	8%	4%
Equity – E *	$500	50%	20%	20%	10%
Total – D&E	$1,000				Σ = 14%

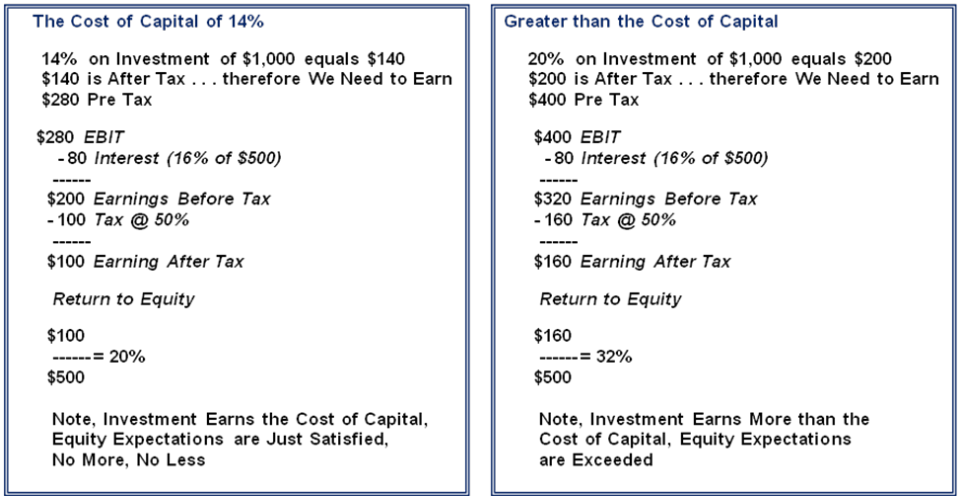
* Shares X Price Referred to as Market Capitalization
** Referred to as Total Enterprise Value
*** Weighted Average Interest Rate and Cost of Equity
**** Tax Rate at the Margin – 50% in this Hypothetical Example
***** WACC, Weighted Average Cost of Capital or K_o

The left side of Exhibit 8 demonstrates that when an investment earns its Overall Cost of Capital with the values from Exhibit 7, the equity expectation of 20% is just satisfied, no more, no less. The right side of Exhibit 8 demonstrates that when the investment earns more than the Overall Cost of Capital the return to equity exceeds the expectation, thus pleasing shareholders. Note that in the case of excess returns, the debt only continues to earn the interest rate. The lenders have no upside unless they have a convertibility option. In the case of convertibility, the initial interest rate would be less than the 16% because the debt holder will take a lower current return for the upside call option value. The downside is that if the investment earns less than the Overall Cost of Capital we could find a point were even the interest of $80 could not be paid, and, as discussed before, bankruptcy could result.

Exhibit 8

Creating Value

Implication for Return to Equity of Earning



What We Observe

In today's world, the range of WACCs typically varies from 8% to 12% depending on the degree of financial leverage. While we see some businesses using very precise decimal point accuracy, the majority use round numbers in practice. Keep in mind, numerous assumptions go into the calculations. We also observe buffers being added to avoid the trap of a company that estimates its cost of capital is 12.5% and has a project with an IRR of 12.7%. This appropriation request may look good (12.7% > 12.5%), but, recognizing the values are estimates, a company could very easily to fall into a Type 1 error trap or "false positive" - the error of rejecting a null hypothesis when it is actually true.

The vast majority of businesses we work with use a form of the CAPM. A few also look at dividend growth models (and when this is done estimates between the two methods can vary widely). We see market risk premiums in applications of the CAPM between 3% to 7%. Many will do risk adjustments for emerging markets, project types, and divergent business units. We also see numerous emerging market appropriation requests accepted with negative NPVs, the rationalization from the strategic argument is **"**We can not afford not to be there.*"* Only a handful use the customer's cost of capital in value selling from a "Customer Economics" perspective. This has always surprised us in technical sales that the commercial team does not get their finance function more involved. Nearly all use NPV, IRR, and Payback in their appropriation requests. We also are seeing increased use of Monte Carlo simulations. This is probably due to recent uncertainty, thinking in terms of ranges as opposed to point estimates, possibly from reduced guidance, and scenario planning's coming back into vogue.

A timeless comment from CSX years ago summarizes the relevance of the cost of capital in practice. This quote tells it all in our opinion

> "Earning cost of capital is absolute priority, CSX business units are expected to earn returns on capital expenditures in excess of their cost of capital, unless such expenditures are necessary to meet safety, environmental or regulatory requirements. Business units that do not earn their cost of capital and do not create an adequate level of free cash flow over an appropriate period of time will be evaluated for sale or other disposition."

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Summary

Any organization, public or private, whose primary financial responsibility is creating shareholder value needs to be aware of, from a practical level, how to calculate and apply to decision making the concept of Cost of Capital. As a business leader, you should be rewarded for creating value and providing true growth over the long term. If that is not in the cards, return the money so your investors can attempt to find value elsewhere.

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