COST OF CAPITAL*

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Table of contents

Notation System Used in this Paper 4
I. Overview of Cost of Capital 7
II. Cost of Capital Components of Capital Structure 11
III. Components of the Cost of Equity Capital 13
IV. Estimating the Cost of Common Equity CAPM 15
V. Estimating the Cost of Equity Capital, The Build-Up Model 19
VI. Estimating the Cost of Equity Capital, The DCF Method 21
VII. The Equity Risk Premium (ERP) 23
VIII. Common Errors in Estimation and Use of Cost of Capital 24
IX. Sources of Information 26
X. Summary 27
Notation System Used in This Paper

While much confusion is caused by the lack of a uniform notation system throughout the field of finance, most business valuation practitioners have adopted the notation system used in this paper. It is the system used in *Valuing a Business, The Analysis and Appraisal of Closely Held Companies* by Pratt, Reilly & Schweihs, and *Cost of Capital: Estimation and Applications* by Pratt. The ASA and AICPA have adopted the system for their fundamentals of business valuation courses. I encourage practitioners to use this system in their reports.

**VALUE AT A POINT IN TIME**

\[
\begin{align*}
PV &= \text{Present value} \\
FV &= \text{Future value} \\
MVIC &= \text{Market value of invested capital}
\end{align*}
\]

**COST OF CAPITAL AND RATE OF RETURN VARIABLES**

\[
\begin{align*}
k &= \text{Discount rate (generalized)} \\
k_e &= \text{Discount rate for common equity capital (cost of common equity capital). Unless otherwise stated, it generally is assumed that this discount rate is applicable to net cash flow available to common equity.} \\
k_{e(pt)} &= \text{Cost of equity prior to tax effect} \\
k_p &= \text{Discount rate for preferred equity capital} \\
k_d &= \text{Discount rate for debt (net of tax effect, if any)} \\
&\quad (\text{Note: For complex capital structures, there could be more than one class of capital in any of the preceding categories, requiring expanded subscripts.}) \\
k_{d(pt)} &= \text{Cost of debt prior to tax effect} \\
k_{ni} &= \text{Discount rate for equity capital when net income rather than net cash flow is the measure of economic income being discounted} \\
c &= \text{Capitalization rate} \\
c_e &= \text{Capitalization rate for common equity capital. Unless otherwise stated, it generally is assumed that this capitalization rate is applicable to net cash flow available to common equity.} \\
c_{ni} &= \text{Capitalization rate for net income} \\
c_p &= \text{Capitalization rate for preferred equity capital}
\end{align*}
\]
$c_d = \text{Capitalization rate for debt}$

(Note: For complex capital structures, there could be more than one class of capital in any of the preceding categories, requiring expanded subscripts.)

$t = \text{Tax rate (expressed as a percentage of pretax income)}$

$R = \text{Rate of return}$

$R_f = \text{Rate of return on a risk-free security}$

$E(R) = \text{Expected rate of return}$

$E(R_m) = \text{Expected rate of return on the “market” (usually used in the context of a market for equity securities, such as the New York Stock Exchange [NYSE] or Standard & Poor's [S&P] 500)}$

$E(R_i) = \text{Expected rate of return on the security } i$

$B = \text{Beta (a coefficient, usually used to modify a rate of return variable)}$

$B_L = \text{Levered beta}$

$B_U = \text{Unlevered beta}$

$RP = \text{Risk premium}$

$RP_m = \text{Risk premium for the “market” (usually used in the context of a market for equity securities, such as the NYSE or S&P 500)}$

$RP_s = \text{Risk premium for “small” stocks (usually average size or lowest quintile or decile of NYSE as measured by market value of common equity) over and above } RP_m$

$RP_u = \text{Risk premium for unsystematic risk attributable to the specific company}$

$RP_i = \text{Risk premium for the } i\text{th security}$

$K_1...K_n = \text{Risk premium associated with risk factor } 1 \text{ through } n \text{ for the average asset in the market (used in conjunction with arbitrage pricing theory)}$

$WACC = \text{Weighted average cost of capital}$

**INCOME VARIABLES**

$E = \text{Expected economic income (in a generalized sense; i.e., could be dividends, any of several possible definitions of cash flows, net income, etc.)}$

$NI = \text{Net income (after entity-level taxes)}$

$NCF_e = \text{Net cash flow to equity}$

$NCF_f = \text{Net cash flow to the firm (to overall invested capital, or entire capital structure, including all equity and long-term debt)}$

$PMT = \text{Payment (interest and principal payment on debt security)}$

$D = \text{Dividends}$

$T = \text{Tax (in dollars)}$

$GCF = \text{Gross cash flow (usually net income plus non-cash charges)}$

$EBT = \text{Earnings before taxes}$

$EBIT = \text{Earnings before interest and taxes}$
**EBDIT**  =  Earnings before depreciation, interest, and taxes
("Depreciation" in this context usually includes amortization. Some writers use EBITDA to specifically indicate that amortization is included.)

**EBITDA**  =  Earnings before interest, taxes, depreciation, and amortization

### PERIODS OR VARIABLES IN A SERIES

\[ i \]  =  The \( i \)th period or the \( i \)th variable in a series (may be extended to the \( j \)th variable, the \( k \)th variable, etc.)

\[ n \]  =  The number of periods or variables in a series, or the last number in a series

\[ \infty \]  =  Infinity

\[ 0 \]  =  Period_0, the base period, usually the latest year immediately preceding the valuation date

### WEIGHTINGS

\[ W \]  =  Weight

\[ W_e \]  =  Weight of common equity in capital structure

\[ W_p \]  =  Weight of preferred equity in capital structure

\[ W_d \]  =  Weight of debt in capital structure

(Note: For purposes of computing a weighted average cost of capital [WACC], it is assumed that preceding weightings are at market value.)

### GROWTH

\[ g \]  =  Rate of growth in a variable (e.g., net cash flow)

### MATHEMATICAL FUNCTIONS

\[ \Sigma \]  =  Sum of (add all the variables that follow)

\[ \Pi \]  =  Product of (multiply together all the variables that follow)

\[ \bar{X} \]  =  Mean average (the sum of the values of the variables divided by the number of variables)

\[ G \]  =  Geometric mean (the product of the values of the variables taken to the root of the number of variables)
I. OVERVIEW OF COST OF CAPITAL

A. Basic Definition

Cost of capital is the expected rate of return that the market requires in order to attract funds to a particular investment. In economic terms, the cost of capital for a particular investment is an opportunity cost – the cost of foregoing the next best alternative investment. In this sense, it relates to the economic principle of substitution – that is, an investor will not invest in a particular asset if there is a more attractive substitute.

The “market” refers to the universe of investors who are reasonable candidates to provide funds for a particular investment. Capital or funds are usually provided in the form of cash, although in some instances capital may be provided in the form of other assets. The cost of capital usually is expressed in percentage terms, that is, the annual amount of dollars that the investor requires or expects to realize, expressed as a percentage of the dollar amount invested.

“The Opportunity Cost of Capital is equal to the return that could have been earned on alternative investments at a specific level of risk”* In other words, it is the competitive return available in the market on a comparable investment, risk being the most important component of comparability.

B. Components of a Company’s Capital Structure

1. Long-term debt (usually including current portion)
2. Preferred equity
3. Common equity

C. Cost of Capital is a Function of the Investment

1. “The cost of capital is a function of the investment, not the investor.”*
2. The cost of capital comes from the marketplace.
3. The marketplace is the universe of investors for a particular asset.
4. The most popular theme of contemporary corporate finance is that companies should be making investments, either capital investments or acquisitions, from which the returns will exceed the cost of capital for that investment.
5. Doing so creates economic value added, economic profit, or shareholder value added.

**D. Cost of Capital is Forward Looking**

1. The cost of capital represents investors’ expectations. There are three elements to these expectations:
   a. The “real” rate of return – the amount investors expect to obtain in exchange for letting someone else use their money on a riskless basis
   b. Expected inflation – the expected depreciation in purchasing power while the money is tied up
   c. Risk – the uncertainty as to when and how much cash flow or other economic income will be received

2. It is the combination of the first two items above that is sometimes referred to as the “time value of money.”
3. While these expectations may be different for different investors, the market tends to form a consensus with respect to a particular investment or category of investments.
4. That consensus determines the cost of capital investments of varying levels of risk.
5. The cost of capital, derived from investors’ expectations and the market’s consensus of those expectations, is

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applied to expected economic income, usually measured in terms of cash flows, in order to estimate present values or to compare investment alternatives of similar or differing levels of risk.

6. “Present value,” in this context, refers to the dollar amount that a rational and well-informed investor would be willing to pay today for the stream of expected economic income being evaluated.

7. In mathematical terms, the cost of capital is the percentage rate of return that equates the stream of expected income with its present cash value.

E. Cost of Capital is Based on Market Value, Not Book Value

F. Cost of Capital is Usually Stated in Nominal Terms (i.e., Includes Expected Inflation)

G. Cost of Capital Equals the “Discount Rate”

The essence of the cost of capital is that it is the percentage return that equates expected economic income with present value. The expected rate of return in this context is called a discount rate. By a “discount rate,” the financial community means an annually compounded rate at which each increment of expected economic income is discounted back to its present value. A discount rate reflects both time value of money and risk and therefore represents the cost of capital. The sum of the discounted present values of each future period’s incremental cash flow or other measure of return equals the present value of the investment, reflecting the expected amounts of return over the life of the investment. The terms “discount rate,” “cost of capital,” and “required rate of return” are often used interchangeably.

The economic income referenced here represents total expected returns. In other words, this economic income includes increments of cash flow realized by the investor
while holding the investment, as well as proceeds to the investor on liquidation of the investment. The rate at which these expected future total returns are reduced to present value is the discount rate, which is the cost of capital (required rate of return) for a particular investment.

H. Discount Rate is Not the Same as Capitalization Rate

1. Discount rate and capitalization are two distinctly different concepts.
2. Discount rate is applied to all expected incremental returns to convert the expected return stream to a present value.
3. A capitalization rate is merely a divisor applied to one single element of return to estimate a present value.
4. The only instance in which the discount rate is equal to the capitalization rate is when each future increment of expected return is equal (i.e., no growth), and the expected returns are in perpetuity.
5. One of the few examples would be a preferred stock paying a fixed amount of dividend per share in perpetuity.
6. In the unique case where an amount of return is expected to grow at a constant rate in perpetuity, the capitalization rate applicable to that expected return is equal to the discount rate less the expected rate of growth.
7. This is called the “Gordon Growth Model,” discussed later.
II. COST OF CAPITAL COMPONENTS OF CAPITAL STRUCTURE

A. Debt – Observable in Marketplace

B. Preferred Equity – Observable in Marketplace

C. Common Equity – Not Observable in Marketplace – Must be Estimated
   1. Capital Asset Pricing Model (CAPM)
   2. Build-up Model
   3. DCF Model

D. Weighted Average Cost of Capital (WACC)

   1. When to use: WACC is used when estimating the cost of capital for the entire entity as a whole - usually for a controlling interest
   2. Formula for computing WACC:

   Because we are interested in cash flows after entity-level taxes, literature and practitioners sometime refer to the WACC as an “after-tax WACC.” The basic formula for computing the after-tax WACC for an entity with three capital structure components is:

   \[
   WACC = (k_e \times W_e) + (k_p \times W_p) + (k_{d(pt)[1-t]} \times W_d)
   \]

   where:

   \[
   \begin{align*}
   WACC & \quad \text{Weighted average cost of capital} \\
   k_e & \quad \text{Cost of common equity capital} \\
   W_e & \quad \text{Percentage of common equity in the capital structure, at market value} \\
   k_p & \quad \text{Cost of preferred equity} \\
   W_p & \quad \text{Percentage of preferred equity in the capital structure, at market value} \\
   k_{d(pt)} & \quad \text{Cost of debt (pre-tax)}
   \end{align*}
   \]
\[ t = \text{Tax rate} \]
\[ W_d = \text{Percentage of debt in the capital structure, at market value} \]

3. Because the weights in the capital structure are at market value, and we don’t know the market value of the equity, computing the WACC for a private company is an iterative process. We enter approximate weights and repeat the process until the equation balances. Fortunately, an Excel program is available to do these iterations in short order.

E. Actual vs. Hypothetical Capital Structure

1. When valuing a minority interest, we usually use the company’s actual capital structure because a minority owner does not have the power to change the capital structure.
2. When valuing a controlling interest, we usually use the capital structure that a control owner would choose, keeping in mind that private companies generally have less access to debt than public companies.
III. COMPONENTS OF THE COST OF EQUITY CAPITAL

A. The Risk-Free Rate

1. Usually measured as the current (as of the valuation date) yield to maturity on government securities of some duration.
2. 30 days, 5 years, and 20 years are the commonly used maturities because Ibbotson Associates publishes equity risk premium (ERP) data that match those maturities.
3. The 20-year is the most common maturity used.
   a. It approximately matches the horizon of most equity investments.
   b. It is the least volatile rate.
4. The so-called “risk-free rate” is not free of all risk.
   a. It is presumed to be free of default risk.
   b. It contains “horizon risk” (“maturity risk”) – i.e., as interest rates go up, the value of outstanding fixed income securities go down, and vice versa.

B. The Equity Risk Premium (ERP)

1. Defined as the expected return on a portfolio of market stocks over and above the risk-free rate.
2. Although often estimated based on historical data, it represents the expected long-term premium as of the valuation date.
3. The market portfolio on which the ERP is based is usually the S&P 500, sometimes the NYSE average.

C. “Systematic Risk”

1. Defined as the sensitivity of returns on the investment relative to returns on the market.
2. Measured by “beta” – linear regression (correlation) between the returns on the investment over and above the risk-free rate with the returns on the “market” over and above the risk-free rate.

Note: Technically, these returns over and above the risk-free rate are called excess returns. As a practical matter, it does not make much difference whether beta is measured by excess return or total return.

D. Size Premium

It is generally (although not universally) recognized that smaller companies have higher costs of capital than their beta-adjusted ERPs would imply.

E. Specific Company Risk Premium

A final adjustment to the cost of equity capital to recognize any differences in risk between the subject company and the population of companies on which the other factors were based. It is usually an upward adjustment to the cost of capital, but it could be a decrease.
IV. ESTIMATING THE COST OF COMMON EQUITY
CAPM

A. CAPM – Basic Version

1. CAPM is the cornerstone of modern financial theory.
2. The basic precept of CAPM is that the cost of capital is a linear function of the risk-free rate plus the equity risk premium times the investment’s systematic risk.
3. The reason that systematic risk is the only risk recognized in the pure CAPM is that it is theoretically possible to diversify away all other risk by holding a perfectly balanced market portfolio.
4. Formula for basic CAPM model

\[ E(R_i) = R_f + B(RP_m) \]

where:
- \( E(R_i) \) = Expected return (cost of capital) for an individual security
- \( R_f \) = Rate of return available on a risk-free security (as of the valuation date)
- \( B \) = Beta
- \( RP_m \) = Equity risk premium for the market as a whole (or, by definition, the equity risk premium for a security with a beta of 1.0)

5. Examples of CAPM calculations

a. Company with less than average sensitivity to the market (assuming risk-free rate of 7% and an equity risk premium of 8%)

\[
E(R_i) = 0.07 + 0.8(0.08) = 0.07 + 0.064 = 0.134
\]
b. Company with average sensitivity to the market

\[ E(R_j) = 0.07 + 1.0(0.08) \]
\[ = 0.07 + 0.08 \]
\[ = 0.15 \]

c. Company with above average sensitivity to the market

\[ E(R_k) = 0.07 + 1.2(0.08) \]
\[ = 0.07 + 0.096 \]
\[ = 0.166 \]

B. Expanded CAPM

1. Formula

\[ E(R_i) = R_f + B(RP_m) + RP_s + RP_u \]

where:

- \( E(R_i) \) = Expected rate of return on security \( i \)
- \( R_f \) = Rate of return available on a risk-free security as of the valuation date
- \( RP_m \) = General equity risk premium for the market
- \( RP_s \) = Risk premium for small size
- \( RP_u \) = Risk premium attributable to the specific company (\( u \) stands for unsystematic risk)
- \( B \) = Beta

2. Example

Lazard, Hazard and Zipp (LHZ), a fictional investment banking firm with publicly traded stock:

a. Risk-free rate. As of the valuation date, the yield to maturity on 20-year U.S. government bonds is 7.0%.

b. Beta. The LHZ beta is 1.3.
c. *Equity risk premium.* The general equity risk premium is 8.0%.

d. *Size premium.* The size premium for this size firm in excess of the risk captured in CAPM through beta is 3.3%. (We will assume here that this is on the borderline between Ibbotson’s ninth and tenth size deciles.)

e. *Company-specific risk factor.* Because of special factors, the analyst has estimated that there should be an additional specific risk factor of 1.0%.

Substituting this information we have the following:

\[
E(R_i) = 7.0 + 1.3(8.0) + 3.3 + 1.0 \\
= 7.0 + 10.4 + 3.3 + 1.0 \\
= 21.7
\]

3. Tabular presentation:

**CAPM Cost of Equity Capital for LHZ**

<table>
<thead>
<tr>
<th>Risk-free rate</th>
<th>7.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity risk premium:</td>
<td></td>
</tr>
<tr>
<td>General equity risk premium</td>
<td>8.0</td>
</tr>
<tr>
<td>Beta</td>
<td>( \times 1.3 )</td>
</tr>
<tr>
<td></td>
<td>10.4</td>
</tr>
<tr>
<td>Small stock size premium</td>
<td>3.3</td>
</tr>
<tr>
<td>Specific risk premium</td>
<td>1.0</td>
</tr>
<tr>
<td>LHZ cost of equity capital</td>
<td>21.7%</td>
</tr>
</tbody>
</table>

**C. Assumptions Underlying CAPM**

Eight assumptions underlie the CAPM:

1. Investors are risk averse.
2. Rational investors seek to hold efficient portfolios, that is, portfolios that are fully diversified.
3. All investors have identical investment time horizons (i.e., expected holding periods).
4. All investors have identical expectations about such variables as expected rates of return and how capitalization rates are generated.
5. There are no transaction costs.
6. There are no investment-related taxes. (However, there may be corporate income taxes.)
7. The rate received from lending money is the same as the cost of borrowing money.
8. The market has perfect divisibility and liquidity (i.e., investors can readily buy or sell any desired fractional interest.

D. Summary of CAPM

The Capital Asset Pricing Model (CAPM) includes an estimate of **systematic risk**, the sensitivity of returns for the subject to returns for the market. The CAPM has several underlying assumptions, which may be met to a greater or lesser extent for the market as a whole or for any particular company or investment.

The following exhibit is a schematic summary of using the CAPM to estimate the cost of equity capital.

**exhibit 1**

<table>
<thead>
<tr>
<th>Risk-free rate</th>
<th>20-year, 5-year, or 30-day Treasury yield as of valuation date</th>
</tr>
</thead>
<tbody>
<tr>
<td>+Equity risk premium</td>
<td>Long-, intermediate-, or short-horizon equity risk premium (corresponding to risk-free yield above)</td>
</tr>
<tr>
<td>{In CAPM, multiply the general equity risk premium by beta.}</td>
<td></td>
</tr>
<tr>
<td>+Size premium</td>
<td>Small stock premium</td>
</tr>
<tr>
<td>±Specific risk</td>
<td>Specific risk difference in subject company relative to companies from which above data are drawn</td>
</tr>
</tbody>
</table>
V. ESTIMATING THE COST OF EQUITY CAPITAL, THE BUILD-UP MODEL

A. The Build-up Model is the Same as CAPM with Beta Assumed to be 1.0

B. Formula for Build-up Model:

\[ E(R_i) = R_f + R_{Pm} + R_s + R_{Pu} \]

where:
- \( E(R_i) \) = Expected (market required) rate of return on security \( i \)
- \( R_f \) = Rate of return available on a risk-free security as of the valuation date
- \( R_{Pm} \) = General equity risk premium for the market
- \( R_s \) = Risk premium for small size
- \( R_{Pu} \) = Risk premium attributable to the specific company or to the industry (\( u \) stands for unsystematic risk)

C. Ibbotson Says Size Premium is Still Premium in Excess of CAPM (see exhibit 2)

exhibit 2
Long-Term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ, with NYSE Market Benchmarks 1926-2003

<table>
<thead>
<tr>
<th>Decile</th>
<th>Beta</th>
<th>Arithmetic Mean Return*</th>
<th>Realized Return in Excess of Riskless Rate**</th>
<th>Estimated Return in Excess of Riskless Rate†</th>
<th>Size Premium (Return in Excess of CAPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Largest</td>
<td>0.94</td>
<td>11.43%</td>
<td>6.21%</td>
<td>6.05%</td>
<td>0.16%</td>
</tr>
<tr>
<td>2</td>
<td>1.09</td>
<td>13.16%</td>
<td>7.94%</td>
<td>6.99%</td>
<td>0.95%</td>
</tr>
<tr>
<td>3</td>
<td>1.16</td>
<td>13.78%</td>
<td>8.55%</td>
<td>7.40%</td>
<td>1.15%</td>
</tr>
<tr>
<td>4</td>
<td>1.19</td>
<td>14.43%</td>
<td>9.20%</td>
<td>7.65%</td>
<td>1.56%</td>
</tr>
<tr>
<td>5</td>
<td>1.23</td>
<td>14.91%</td>
<td>9.68%</td>
<td>7.86%</td>
<td>1.83%</td>
</tr>
<tr>
<td>6</td>
<td>1.26</td>
<td>15.32%</td>
<td>10.09%</td>
<td>8.06%</td>
<td>2.03%</td>
</tr>
<tr>
<td>7</td>
<td>1.32</td>
<td>15.65%</td>
<td>10.42%</td>
<td>8.42%</td>
<td>1.99%</td>
</tr>
<tr>
<td>8</td>
<td>1.37</td>
<td>16.64%</td>
<td>11.42%</td>
<td>8.76%</td>
<td>2.66%</td>
</tr>
<tr>
<td>9</td>
<td>1.44</td>
<td>17.76%</td>
<td>12.53%</td>
<td>9.21%</td>
<td>3.32%</td>
</tr>
<tr>
<td>10- Smallest</td>
<td>1.52</td>
<td>21.73%</td>
<td>16.50%</td>
<td>9.74%</td>
<td>6.76%</td>
</tr>
<tr>
<td>Mid-Cap, 3-5</td>
<td>1.18</td>
<td>14.16%</td>
<td>8.93%</td>
<td>7.56%</td>
<td>1.37%</td>
</tr>
<tr>
<td>Low-Cap, 6-8</td>
<td>1.30</td>
<td>15.67%</td>
<td>10.44%</td>
<td>8.32%</td>
<td>2.13%</td>
</tr>
<tr>
<td>Micro-Cap, 9-10</td>
<td>1.46</td>
<td>18.98%</td>
<td>13.75%</td>
<td>9.32%</td>
<td>4.42%</td>
</tr>
</tbody>
</table>
Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the NYSE total capitalization-weighted index total returns in excess of the 30-day U.S. Treasury bill, January 1926 – December 2003.

** Historical riskless rate is measured by the 78-year arithmetic mean income return component of 20-year government bonds (5.23 percent).

† Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the NYSE deciles (102 (11.63 percent) minus the arithmetic mean income return component of 20-year government bonds (5.23 percent) from 1926-2003.

D. The Industry Adjustment

1. An attempt to reflect CAPM in the build-up model.
2. Ibbotson offers industry adjustment factors for up to 3-digit SIC codes.
3. The industry adjustments reflect weighted averages of the betas of the stocks making up the “industry.”
4. Names of companies in the industry are available at the Ibbotson website (www.ibbotson.com).
5. If the companies are a reasonable match for your subject, this may be a useful adjustment. If not, it may be very misleading.
VI. ESTIMATING THE COST OF EQUITY CAPITAL, THE DCF MODEL

A. The Assumption Underlying DCF Model is that the Stock Price Reflects Expected Total Return.

B. The DCF Model is a Rewrite of the Present Value Model.

1. Present Value Model (Gordon Model)

\[ PV = \frac{NCF_0 (1 + g)}{k - g} \]

where:
- \( PV \) = Present value
- \( NCF_0 \) = Net cash flow in period 0, the period immediately preceding the valuation date
- \( k \) = Discount rate (cost of capital)
- \( g \) = Expected long-term sustainable growth rate in net cash flow to investor

2. PV Model rewritten

\[ k = \frac{NCF_0 (1 + g)}{PV} \]

3. Example

   a. Dividend. Dividend for the latest 12 months was $3.00 per share.
   b. Growth. Analysts’ consensus estimate is that the long-term growth in dividend will be 5%.
   c. Present value. Current stock price is $36.00 per share.
C. Multi-stage DCF Model

\[ k = \frac{\$3.00(1 + 0.05)}{\$36.00} + 0.05 \]
\[ = \frac{\$3.15}{\$36.00} + 0.05 \]
\[ = 8.8 + 0.05 \]
\[ = 13.8 \]

\[ PV = \sum_{n=1}^{5} \frac{NCF_0(1+g_1)^n}{(1+k)^n} + \sum_{n=6}^{10} \frac{NCF_5(1+g_2)^{n-5}}{(1+k)^n} + \frac{NCF_{10}(1+g_3)}{(1+k)^{10}} \]

where:
- \( NCF_0 \) = Net cash flow (or dividend) in the immediately preceding year
- \( NCF_5 \) = Expected net cash flow (or dividend) in the fifth year
- \( NCF_{10} \) = Expected net cash flow (or dividend) in the tenth year
- \( g_1, g_2, \) and \( g_3 \) = Expected growth rates in \( NCF \) (or dividends) through each of stages 1, 2, and 3, respectively
- \( k \) = Cost of capital (discount rate)

D. Both Single-stage and Multi-stage DCF Estimates of Industry Costs of Equity Capital are Available in Ibbotson’s *Cost of Capital Yearbook*. 
VII. THE EQUITY RISK PREMIUM (ERP)

A CRITICAL AND CONTROVERSIAL COMPONENT OF THE COST OF EQUITY

A. Although Cost of Capital is Forward-Looking, Most Estimates of ERP are Based on Historical Data

B. Ibbotson’s ERPs Based on Average Actual Excess Returns (Stocks Over Govt. Bonds)

1. Arithmetic or geometric mean
2. S&P 500 or NYSE index measure for stocks
3. 30-day, 5 year or 20 year maturity for govt. bonds
4. 1926-present or any number of years in between.

C. Estimates Based on Academic and Commercial Research Range All the Way from 2% to 9%

D. My Best Estimate: About 5.75%

1. This is Ibbotson’s arithmetic average ERP since 1926 less about 1.25%
2. Explained in my editor’s column “Valuers Should Lower Equity Risk Premium Component of Discount Rate,” Shannon Pratt’s Business Valuation Update, November 2003, reprint attached as exhibit 3
VIII. COMMON ERRORS IN ESTIMATION AND USE OF COST OF CAPITAL

A. Confusing Discount Rates with Capitalization Rates

B. Using the Firm’s Cost of Capital to Evaluate a More or Less Risky Acquisition or project

C. Mistaking Historical Rates of Return for Expected Rates of Return

D. Mismatching the Discount Rate with the Economic Income Measure

   1. Using a Safe Rate to Discount or Capitalize a Risky Return
   2. Applying a Discount Rate in Real Terms to an Economic Income Projection in Normal (Current) Terms
   3. Applying Costs of Capital Derived from After-tax Returns to Pretax Returns
   4. Subtracting a Short-term Supergrowth Rate from the Discount Rate to Get a Capitalization Rate
   5. Applying a Discount Rate Applicable to Net Cash Flow to Net Income

E. Performing an Excess Earnings Method Valuation That Results in an Unrealistic Cost of Capital

F. Projecting Growth Beyond That Which the Capital Being Valued Will Support

G. Internally Inconsistent Capital Structure Projection

H. Assumptions That Produce a Standard of Value Other Than That Specified in the Valuation Engagement
I. Incorrect or Inadequately Supported Data in Estimating the Cost of Equity
IX. SOURCES OF INFORMATION


   2. *Cost of Capital Yearbook*, annual
   3. Cost of Capital website (www.Ibbotson.com)

C. Roger Grabowski’s References

D. General
   www.BVLibrary.com, papers and court case decisions searchable by key word, author, and expert.
X. SUMMARY

A. The Cost of Capital is the Expected Rate of Return that the Market Requires on Investments of Comparable Risk

B. It is the Discount Rate (Total Required Rate of Return, Including Dividends and Appreciation)

C. It is Market Driven

D. It is Forward Looking

E. It is Based on Market Value, Not Book Value

F. It Can Be Applied to Common Equity or Overall Invested Capital (In Which Case, it is the WACC)

G. Components of the Cost of Equity Capital
   1. Risk-free rate
   2. Equity risk premium
   3. In CAPM, ERP modified by beta
   4. Size premium
   5. Specific company risk premium

H. 3 Conventional Ways to Estimate the Cost of Common Equity
   1. The Capital Asset Pricing Model (CAPM)
   2. The Build-up Method
   3. The “DCF” Method

I. All Methods Have Many Variations and Controversies

J. There are Many Common Errors in Estimation and Use of Cost of Capital – BE AWARE OF THEM AND DON’T MAKE THEM YOURSELF!
K. Primary Sources of Information

L. Cost of Capital is a Critical, Complicated, and Ever-Changing Element of Business Valuation – KEEP ON TOP OF CURRENT ENVIRONMENT AND RESEARCH!