## EXHIBIT (OCS 3.2)

# **TECHNICAL APPENDIX**

# FOR COST OF CAPITAL

# Contents

I.	Comparable Group and Sample Selection	
	a.Comparable Group1b.Sample Selection2	
II.	Constant Growth Discounted Cash Flow ("DCF") Models	
	a. Measuring Cash Flow Returns	3
	b. DCF Estimation of Equity Cost	4
III.	DCF Data Inputs	ſ
	a. <u>Publicly Traded Stock Sample Selection</u>	<u>6</u> 7
	b. <u>Dividends, Prices, and Dividend Yield in the DCF</u>	1
	c. <u>DCF Growth Estimate</u>	7
	1) <u>Historical versus Forecasted Data</u>	/
	ii) Growth Forecasts Earnings per Share	<u>ð</u>
	d Cash Flow and Dividend Timing	<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>
	d. Cash Flow and Dividend Tinning	9
IV.	Alternative DCF Models	
	a. <u>The Non-Constant Growth DCF</u>	10
	b. <u>Two-Stage Non-Constant Growth Model</u>	11
	c. <u>Three-Stage Non-Constant Growth Model</u>	12
V.	Bond Yield Equity Risk Premium	13
VI.	Other Bond Yield Equity Risk Premium Models	14
a.	Capital Asset Pricing Model ("CAPM")	14
b.	Beta and the Security Market Line	15
c.	CAPM Inputs	17
d.	Empirical Capital Asset Pricing Model ("ECAPM")	18

## **Technical Appendix**

## I. <u>COMPARABLE GROUP AND SAMPLE SELECTION</u>

## a. <u>Comparable Group</u>

There are several reasons why the estimate of a cost of capital requires an analysis of a group of comparable risk companies rather than the single firm subject of the analysis:

- 1. A comparable risk group analysis is consistent with the requirements of a fair and reasonable return addressed in the *Hope* and *Bluefield* cases.<sup>1</sup> The return on investment should be commensurate with returns earned by firms with comparable risk. Thus, there is a need to examine firms of comparable risk to identify the fair and reasonable comparable returns being earned. In addition, the equity returns of comparable firms are viewed as opportunity costs of forgone investments in the market that like other investment opportunities, will directly impact the cost of equity of the company being evaluated.
- 2. The reliability of the cost of equity estimate is enhanced when the calculation is based on equity capital estimates from a variety of risk equivalent companies. A group of comparable companies can be employed as a check on a single company analysis. Further, the comparable group analysis, whether employed as a check or the primary analysis, mitigates any distortions resulting from measurement errors in dividend yield and expected growth measures and estimates. For example, the average growth rate estimate based on forecasts of several comparable firms is less likely to deviate from investor expectations of growth than an estimate for a single firm. Moreover, the general assumptions

<sup>&</sup>lt;sup>1</sup> See Bluefield Water Works and Improvement Co. v. Public Service Comm'n, 262 U.S. 679 (1923) and Federal Power Comm'n v. Hope Natural Gas Co., 320 U.S. 591 (1944).

OCS 3D Lawton

underlying the DCF model are more likely to be met for a group of companies than for a single firm.

- 3. An analysis of a comparable group also avoids circularity problems. In the analysis of investor-owned utilities, the stock price (that is, the cost of equity capital) is a direct function of an investor's growth rate expectations, which is also a function of an investor's perception of the regulatory environment. The cost of equity depends in part on the anticipated regulatory environment and actions.
- 4. Extending the sample size of comparable companies beyond a single regulatory influence will mitigate the regulatory circularity problem. Specific conditions concerning a subject utility often require that a comparable company analysis be employed. One of the most common conditions is the lack of market data necessary to perform a DCF analysis. In times of utility consolidation and merger, many utilities are owned and controlled by a single parent holding company.

#### b. Sample Selection

Value Line Investment Survey provides data (both historical and forecasted) of utility companies in both the regulated electric utility and regulated natural gas utility sectors. Thus, the starting point of any comparable group sample selection process is generally the Value Line data base.

There are a number of financial metrics often employed as screens for selecting risk comparable utility operations in creating a comparable risk group. Such common or typical screens or financial metrics are as follows:

 Each sample company must have an investment grade bond rating from bond rating agencies such as Standard & Poor's ("S&P"), Moody's Investors Service ("Moody's), and Fitch Ratings and maintain financial integrity;

- ii) Each sample company must consistently pay dividends without interruption or cuts;
- Each sample company must not be involved in extraordinary transactions such as merger, acquisition, or other transaction that would substantially affect or cause stock price and or growth estimates to be biased.
- iv) Each sample company must have a high percentage of utility regulated assets. Given a number of utility companies have both regulated and unregulated operations this metric assures a high level of utility operations for comparable risk measures.
  Sometimes this metric may view utility revenues rather than assets, but both metric attempts to measure the comparability of regulated operations.
- v) Each sample company must have an analyst forecast of earnings and in some cases multiple analyst earnings growth forecasts.
- Vi) Other metrics are used to expand or contract the group size depending on the specific facts, circumstances, and risk challenges facing a particular utility.

## II. CONSTANT GROWTH DISCOUNTED CASH FLOW ("DCF") MODELS

## a. Measuring Cash Flow Returns

Classic stock valuation states that the present value of a share of common stock can be determined from the discount rate and expected dividend stream. So, the present value of owning a stock, the price, of all future expected cash flows from the stock is:

$$\mathbf{P}_{0} = \frac{\mathbf{D}_{1}}{1+\mathbf{K}} + \frac{\mathbf{D}_{2}}{(1+\mathbf{K})^{2}} + \frac{\mathbf{D}_{3}}{(1+\mathbf{K})^{3}} + \dots + \frac{\mathbf{D}_{n}}{(1+\mathbf{K})^{n}} + \frac{\mathbf{P}_{n}}{(1+\mathbf{K})^{n}}$$
(1)

5

The value of a share of stock ("present value" or "the price") can be determined from the discount rate and expected dividend stream.<sup>2</sup>

Alternatively, the implied discount rate ("K") can be estimated from the current price and the dividend stream. The cash flows expected by investors holding common stock are dividends and changes in stock price. The following example illustrates the cash flow calculation for a 1 year holding period, assuming a \$2.00 dividend, \$30 purchase price, and \$31 sale price in 1 year.

cash flow = expected dividend + change in stock price = \$2.00 (\$31.00 - \$30.00) = \$3.00

Return is the cash flow from the investment divided by the stock price or investment cost.

## b. DCF Estimation of Equity Cost

Given estimates of the current market value, price, and future dividends the discount rate or rate of return on equity can be estimated. Estimating the cost of capital with the DCF assumes that the market price of a stock is equal to the present value of the dividends that the investor expects to receive. This present value of the dividend stream can be calculated by a standard formula for the present value of a cash flow stream. So, equation (1) above becomes:

$$P_0 = \frac{D_1}{1+K} + \frac{D_2}{(1+K)^2} + \frac{D_3}{(1+K)^3} + \dots \text{ and so on to infinity.}^3$$
(2)

<sup>&</sup>lt;sup>2</sup> Morin, Roger; *New Regulatory Finance*, Public Utilities Reports, Inc. 2006, at 250 - 253.

The value of common stock can be expressed as the present value of a stream of dividends extending to infinity. This can be justified either by assuming that the investor has an infinite time horizon, or by assuming that the expected stock resale price at the end of a limited time horizon  $P_n$  is itself a present value of the expected dividends following year "n" to the new purchaser.

<sup>&</sup>lt;sup>3</sup> Morin, Roger; *New Regulatory Finance*, Public Utilities Reports, Inc. 2006, at 251.

Where: "P<sub>0</sub>" is a measure of the current market price of the stock;
"D<sub>t</sub>" is the dividend cash flow in each period through time;
"K" is the cost of equity capital assumed to remain constant over time.

This mathematical expression in equation 2 in abbreviated form is as follows:

$$\mathbf{P}_0 = \sum_{t=1}^{n} \frac{\mathbf{D}_t}{(1+\mathbf{K})^t} \tag{3}^4$$

The mathematical expression provided in equation (2) and simplified in equation (3) simply states that the stock price " $P_0$ " is equal to the sum of the expected future dividends " $D_t$ " to be received, each dividend discounted by discount rate "K" for the time and risk between now and receipt of future dividends. Knowing the current market price, it is possible to infer the cost of equity that corresponds to that price and forecasted future dividend cash flow stream.

The model expressed in Equation (3) requires an estimate of an infinite stream of dividends. But assigning a specific dividend stream say a constant  $D_t$  (where:  $D_t = D_0(1 + g)^t$  leads to a more operational model as follows:

$$\mathbf{P}_0 = -\frac{\mathbf{D}_1}{(\mathbf{K}-\mathbf{g})} \tag{4}^5$$

An important assumption underlying equation (4) is that the discount rate (K) must be greater than the growth rate, (g). Equation (4) demonstrates that as (g) approaches (K), the

<sup>&</sup>lt;sup>4</sup> Morin, Roger; *New Regulatory Finance*, Public Utilities Reports, Inc. 2006, at 250 - 253.

<sup>&</sup>lt;sup>5</sup> An important assumption underlying equation (4) is that the discount rate (K) must be greater than the growth rate, (g). Equation (4)

demonstrates that as (g) approaches (K), the denominator gets smaller and the ratio or stock price ( $P_0$ ) becomes infinitely large. Moreover, if (g) exceeds (K) price becomes negative an unrealistic result.

denominator gets smaller and the ratio or stock price (P<sub>0</sub>) becomes infinitely large.

Moreover, if (g) exceeds (K) price becomes negative an unrealistic result.

Equation 4 states how current equity price (P<sub>0</sub>) is equal to the value of next year's expected dividend discounted by the market return less or net of growth. Finally, solving equation (4) for the market cost of capital (K) leads to the standard DCF formulation as follows:

$$\mathbf{K} = \frac{\mathbf{D}_1}{\mathbf{P}} + \mathbf{g} \tag{5}$$

An equity investor expects a return equal to the dividend yield plus an expected growth in future dividends.

## III. DCF DATA INPUTS

Inputs required to solve for (K) cost of equity capital are dividends  $(D_1)$ , prices (P), and growth rates (g). All these data inputs are readily available for publicly traded stocks in the market. One must first identify the publicly traded stocks (Sample Selection) and compile the requisite market data for each traded equity.

## a. Publicly traded stock Sample Selection

To identify the cost of equity for a regulated public utility the starting point is to identify similar regulated firms. *Value Line Investment Survey* ("Value Line") identifies and tracks historical and forecasted data for regulated electric, as well as, regulated natural gas companies. While different analysts may look at different metrics or screens for identifying a sample group of companies some general metrics or screens that are common in the selection

process. These general group selection screens include: i) investment grade credit ratings, ii) no dividend cuts or interruptions, iii) no merger, acquisition or unusual market events impacting a particular company's financials, iv) a high percentage of revenue or assets related to the regulated operations.<sup>6</sup> Depending on the specific facts and circumstances, as each analysis is unique, other screens may be employed to select a group of risk comparable companies for the analysis.

#### b. Dividends, Prices, and Dividend Yield in the DCF

Cost of capital analyses are forward-looking efforts comparing current market prices to expected future dividend cash flows. Stock price inputs typically employ an average of recent month or months. Typically, analyst's consider periods ranging from 1- month to 6 – months. The evaluation period should be representative for the particular Company. A short period of price evaluation may be impacted by short-term anomalies and/or market volatility. While a long period may not be representative of current cash-flows and expectations.

#### c. DCF Growth estimate

#### i) Historical versus Forecast Data

Historical data as an estimate of the future requires an assumption that the past facts, events, and circumstances that underlie the historical results will be repeated in the future making history representative of the future. While historical data is often a relevant starting point, such data may not be relevant for the future. Growth rate forecasts are not without problems as such forecasts often encompass historical data and expected changes. Also, growth forecasts like any forecast is likely to be incorrect. No forecast of the future is

<sup>&</sup>lt;sup>6</sup> Some firms have both regulated and unregulated operations. Including this screen assures the inclusion of companies from the regulated industry are included.

ever perfect. It is important to realize that investors do rely on forecasted information in informing their respective investment decisions. Whether one relies on historical data, forecast estimates or both all such data and information available in the marketplace. For example, Zacks.com, Yahoo finance, and Value Line Investment Survey all provide company specific historical and forecast information. Also, all companies will have historical financial information on their websites and in various filings with the Securities and Exchange Commission ("SEC").

#### ii) Growth Forecasts Earnings Per Share

To estimate future dividend growth rates an analyst will consider readily available forecasts in earnings per share ("EPS"). Given that future dividend payments or dividends per share ("DPS") are paid from future EPS, and given that long-term growth rate in DPS and the long-term growth in EPS are expected to grow at equal rates into perpetuity, the use of EPS growth estimates is reasonable.<sup>7</sup> Company specific 3–5-year EPS forecasted growth estimates are available from Value Line, Yahoo Finance as well as Zacks.

#### iii) Sustainable Growth

Another growth estimate is the Sustainable Growth also called the retention growth method. Under this method, the fraction of earnings called retained earnings (earnings not paid out as dividends – therefore the name retained earnings) when multiplied by the expected return on book equity will produce a growth forecast. Stated as a formula;

$$\mathbf{g} = \mathbf{b} * \mathbf{r} \tag{6}$$

where:

<sup>&</sup>lt;sup>7</sup> Morin, Roger; *New Regulatory Finance*, Public Utilities Reports, Inc. 2006, at 286.

- g: is the growth forecast;
- b: retention rate or 1- (DPS/EPS); and
- r: expected return on book equity or (EPS/BVPS)

This sustainable growth model in equation (6) can be further extended to include external financing impacts on growth. Stated as a formula:

$$g = (b * r) + (s * v)$$
 (7)

where:

- g: is the growth forecast;
- b: retention rate or 1- (DPS/EPS);
- r: expected return on book equity or (EPS/BVPS);
- s: expected growth in shares to finance investment; and
- v: profitability of equity investment measured by the difference of market price and BVPS.

Value Line has all the data necessary to make the sustainable growth estimates in equation (7) on an historical or forecast basis. As noted earlier forecasted data is often more relevant and representative of future expectations.

#### d. CASH FLOW AND DIVIDEND TIMING

One additional adjustment made for growth is what is recognition of the "halfyear" convention. Dividends are paid quarterly throughout the year and then generally increased for the next 4-quarter period versus the one end a year dividend payment assumed in equation (5) above. This half-year convention model assumes that the utility companies are on average half way through the current dividend cycle. The resulting model employing the half-year convention is as follows:

$$K = {D_0(1+0.5g) \over P} + g$$
 (8)

Here in equation (8) the dividend yield is increased by one-half the growth rate to recognize quarterly dividend cash version flows throughout the year. I generally, employ this half- year convention version of the DCF model in my analyses.

### e. Quarterly Timing Adjustment for the DCF Model.

As discussed above, investor cash flows or dividends are typically paid quarterly and increased annually. The DCF model can be adjusted to reflect a quarterly dividend payment as shown in equation (9):

$$K = \frac{D_1 (1+K)^{\frac{3}{4}} + D_2 (1+K)^{\frac{2}{4}} + D_3 (1+K)^{\frac{1}{4}} + D_4}{P_0} + g \qquad (9)^8$$

Depending upon the input sizes the general difference between the annual DCF equation (5) and the quarterly timing version equation (9) is about 30 basis points for equity return (K) estimates.<sup>9</sup>

<sup>&</sup>lt;sup>8</sup> Morin, Roger; *New Regulatory Finance*, Public Utilities Reports, Inc. 2006, at 357.

<sup>&</sup>lt;sup>9</sup> Morin, Roger; *New Regulatory Finance*, Public Utilities Reports, Inc. 2006, at 358.

## IV. <u>ALTERNATIVE DCF MODEL</u>

#### a. THE NON-CONSTANT GROWTH DCF MODEL ALTERNATIVE

The standard DCF model in equation (5) and the quarterly model in equation (9) employ the simplifying assumption of a constant growth rate in perpetuity. There are situations where the analyst is faced with facts, circumstances, and the reality that a constant growth rate is just not appropriate. Given that stock analysts growth forecasts are generally five years into the future, such estimates may not capture the long-term cash flows to be generated. In such cases there are several alternative growth estimates and modeling methods. One simplified growth estimate a short-term and long-term growth estimated and blend the two growth estimates by weighting each given the short-term and long-term facts and circumstances. This blended or weighted growth estimate can then be employed in the standard DCF formula.

#### b. TWO-STAGE NONCONSTANT GROWTH MODEL

One alternative to the constant growth DCF is the two-stage DCF. In such a scenario a short-term growth estimate, say five years, is modeled along with a long-term growth rate for year six and beyond. Employing an Internal Rate of Return model; an investment (stock price) and given the future cash flows, dividends, the return on the investment can be modeled in the short-term and the extended long-term period. A value for return can be estimated employing an internal rate of return ("IRR") of the cash flows. The simplified formula for IRR calculations is as follows:

$$IRR = \frac{CF_1}{1 + IRR} + \frac{CF_2}{(1 + IRR)^2} + \frac{CF_3}{(1 + IRR)^3} + \dots + \frac{CF_N}{(1 + IRR)^T} + CF_0$$
(10)

Where:

$CF_{0:}$	is the initial cash flow to purchase the investment
	(stock price) treated as a negative cash flow in the
	Internal Rate of Return ("IRR") calculations;
$CF_1$ to $CF_N$	represent the investment cash flows through time in
	this case dividends growing at different growth
	rates; and
IRR	the discount rate for each future cash flow.

IRR models are commonly employed financial when evaluating investment decisions and returns. These IRR models are effective for estimating equity returns in the two-stage growth scenario.

#### c. THREE-STAGE NONCONSTANT GROWTH MODEL

Analysts often employ a three-stage nonconstant growth model for estimating equity returns. One key difference between the two-stage model and this three-stage nonconstant growth model is a transition growth stage between the initial short-term growth rate and the third-stage long-term growth rate. So, like the two-stage model a short-term growth estimate is made for the first five years. These short-term growth estimates can be dividend or earnings growth estimates as both are available from market publications like Value Line Investment Survey.

Then a third-stage long-term growth estimate is developed for say years 25 and beyond. This third-stage growth estimate typically employs long-term growth in the economy such as Gross Domestic Product ("GDP") growth. The long-term GDP real rate of growth has been relatively stable over history at a rate of 3.0% to 3.5%. One can get a nominal growth factor by adding the expected impact of inflation from a market index. One such market index for estimating inflation expectations is found in the yields on Treasury Inflation Protected Securities ("TIPS") relative to the yield of Treasury bonds for the

same maturity. These yields are readily available and posted each business day on the Federal Reserve website in the schedule H15 data. Lastly, a second-stage growth estimate covering year 6 through year 25 is estimated. This transitional growth estimate ties the end of Stage-1 to the beginning of Stage-3 growth. The estimate for such a transition is typically calculated as a linear transition between Stage-1 and Stage-2.

## V. BOND YIELD EOUITY RISK PREMIUM

The bond yield equity risk premium analysis starts from the basic premise that debt instruments such as bonds (long-term debt) are less risky and therefore generate lower returns than common equity when both classes of capital (debt and equity) are issued by the same entity. Bondholders have a prior contractual claim to the earnings of the corporation and contractual returns on bonds (interest payments) are not subject to variation, as such bond returns are more predictable than stocks. Therefore, bond issuers offer lower returns reflecting the lower risks. There are numerous studies of capital market investments, all of which show lower returns with lower risks and higher returns with higher risk investments. These financial truisms provide a sound theoretical basis and foundation for the bond yield equity risk premium method for estimating equity costs.

The risk premium approach is useful in that the analysis is based on current market interest rates, that is, the current observable cost of debt capital. The current or forecasted interest rate is then combined with a calculated equity risk premium to develop a final cost of equity estimate. The equity risk premium is the added return necessary to compensate for the added risk required to invest in equities relative to investing in less risky bonds.

The risk premium approach is not without its problems and drawbacks. In practice, there is considerable debate as to the time period to analyze in the determination of the bond/equity return risk spread. Historical debt/equity risk spreads measured over many decades may not be relevant to current capital market requirements.

Others argue that a long-term analysis is necessary, since the goal is to measure investors' long-term expectations. Some analysts prefer to employ forecasted equity returns to estimate risk premiums.

Estimates of an historical equity debt risk premium can be calculated by subtracting the long-term bond yields (such as 30-year U.S. Treasury yields) over some historical period from the contemporaneous authorized utility equity returns over same historical period. The historical equity debt differential is negatively correlated with the level of interest rates. In other words. As interest rates increase the risk premium declines and vice versa when interest rates decline the calculated risk premium increases. This relationship can and should be incorporated in the calculation of current returns by adjusting the historical relationships between debt and equity to reflect current interest rate levels.

The resulting equity risk premium combined with the current measure of 30-years U.S. Treasury Bond determines the bond yield equity risk premium estimate of equity cost. Generally, the equity bond yield risk premium analysis is relatively straightforward with little controversy. Variations of the historical data or use of forecasted rather than historical data are some of the more contentious issues in these modeling efforts.

#### VI. OTHER BOND YIELD RISK PREMIUM MODELS

As stated above, debt instruments such as bonds (long-term debt) are less risky than common equity when both classes of capital are issued by the same entity. Bondholders have less risks and are not subject to return variation or risks faced by equity holders. Below two models are introduced that provide an alternative calculation for equity returns.

a. Capital Asset Pricing Model (CAPM")

Another version of the risk premium method is the capital asset pricing model ("CAPM"). The CAPM states that the cost of capital for an investment is given by the following equation:

$$\mathbf{K} = \mathbf{R}_{\mathbf{f}} + \boldsymbol{\beta} \left( \mathbf{R}_{\mathbf{m}} - \mathbf{R}_{\mathbf{f}} \right)$$
(11)

Where:

 $R_f$ = risk free rate;  $\beta$  =beta;  $R_m$ = market return; and  $(R_m - R_f)$  = market risk premium or ("MRP")

This is the typical model structure employed by most financial analysts in estimating equity returns.

The CAPM as described above is based on two elements of portfolio theory:

 investors demand higher expected returns when there is greater uncertainty about those returns, and ii) investors can reduce the variability of their returns through portfolio diversification.

## b. Beta and the Security Market Line

The effect of portfolio diversification means the relevant measure of risk is an individual security contribution to the risk of the portfolio. Thus, the risk metric beta ( $\beta$ ) measures or captures the sensitivity of the security's returns to the market's returns. As a formula ( $\beta$ ) is calculated as follows:

$$(\beta) = \frac{covariance (Rs, Rm)}{variance (Rm)}$$
(12)

Where:

Rs: is the security return; and

Rm: is the market return.

Beta is generally calculated through statistical tools employing regression analysis of security returns relative to the market returns. In such a regression analysis the dependent variable is an individual security's return over some time period. The independent variable is the return on the market or some index such as the Standard & Poor's 500 index for some time period. The regression or ordinary least squares regression line presented below gives us beta the slope of the line.

$$\mathbf{R}_{\mathbf{s}} = \mathbf{a} + \boldsymbol{\beta}(\mathbf{R}_{\mathbf{m}})_{+} \boldsymbol{\epsilon}$$
(13)

Beta ( $\beta$ ) is the slope of the ordinary least squares line. There are a number of commercial services that calculate beta and Value Line Investment Survey is a popular such service. The Value Line beta calculations are derived from a regression analysis of weekly percent change in a stock relative the weekly change in the market index (New York Stock Exchange Average) over a five-year period. Another way to consider the CAPM is through the lenses of the Security Market Line ("SML") in a graphic portrayal of the CAPM shown below.

# TABLE 110Security Market Line



As shown in Table 1, the intercept  $(R_f)$  reflects the risk-free interest rate. The xaxis measures the expected market return  $(R_m)$ . The slope of the Security Market Line ("SML") is the expected market return  $(R_m)$  less the risk-free return  $(R_f)$ . The slope of the SML is the market risk premium or ("MRP").

<sup>&</sup>lt;sup>10</sup> www.wallstreet mojo.com/security-market-line/

#### c. CAPM Inputs:

Generally, the CAPM begins with a theoretically risk-free interest rate such as a 30-year Treasury bond yield. The risk-free rate is often based on historical data such as a spot yield or a recent 3-month average yield as an estimate of the risk-free rate going forward. Some analysts rely on forecasted yields as the best estimate of the risk-free rate going forward.

The risk premium estimate, or equity spread above and beyond the risk-free rate is estimated by historical or even forecasted data. Historical estimates are typically based on long-term historical stock and bond yield returns say 1929 – present. Such data for these long-term estimates is available and updated annually. The difference in the long-term stock and bond returns results in a long-term measure of market risk premium. Other CAPM approaches employ forecasted expected return data to estimate a forward-looking market risk premium. In the end, an MRP estimate should be consistent with the historical or expected ranges of MRP's of 5% - 8% found in a number of studies in the financial literature.<sup>11</sup>

The market risk premium is adjusted by the stock beta.<sup>12</sup> The risk-free return measure is combined with the market risk premium adjusted for the measure of beta to arrive at a CAPM result.

<sup>&</sup>lt;sup>11</sup>Morin, Roger; New Regulatory Finance, Public Utility Reports, Inc. (2006). See Chapter 5.

<sup>&</sup>lt;sup>12</sup> Beta is a measure of the volatility of the specific stock movement relative to that of a market measure such as the S&P 500. A beta below 1.0 means that a specific stock is less volatile than the market measure, while a beta above 1.0 indicates a specific stock is more volatile than the market measure.

Like the equity bond yield risk premium discussed above, the CAPM is subject to measurement uncertainties. First, the problem of how to measure the equity risk premium and the time period for which the premium is analyzed are subject to considerable debate. This problem and associated criticisms is generic to all variants of the risk premium model. Second, measures of beta are sometimes unstable from period to period and measures of the MRP from time to time may be unstable.

#### d. Empirical Capital Asset Pricing Model (ECAPM")

A variant of the CAPM is the Empirical Capital Asset Pricing Model (ECAPM"). The ECAPM is quite similar to the CAPM described above with the difference being an adjustment for the beta estimate in the model. A low-beta stocks tend to have higher risk premiums than predicted by the CAPM, while high-beta stocks tend to have tend to have lower risk premiums than predicted by the CAPM. Empirical evidence indicates that the intercept in Table 1, is actually above the risk-free rate and the actual slope is lower than predicted by the CAPM.<sup>13</sup>

The ECAPM employs the following equation to correct for the potential bias estimates of the CAPM:

$$K = R_f + 0.25(R_m - R_f) + 0.75\beta(R_m - R_f)$$
(14)

Where:

Rf is the risk-free rate the same as in CAPM;
0.25(Rm-Rf) is the adjustment to the intercept term; and
0.75B(Rm-Rf) is the adjustment to the MRP.

<sup>&</sup>lt;sup>13</sup> Morin, Roger; *New Regulatory Finance*, Public Utilities Reports, Inc. 2006, at 175.

The risk-free rate (the intercept) is adjusted upward by an amount equal to (0.25 \* MRP). The second part of the equation is adjusted by (0.75 \* beta \* MRP). There is no definitive study identifying the size of the adjustment factor in this example the adjustment is 1.0 segmented into two parts: 0.25 and 0.75. The size of the alpha adjustment of 1.0 is based on studies research.<sup>14</sup> An adjustment or alpha of 1.0 or even 2.0 is conservative in size relative to other studies, but the adjustment recognizes that low-beta utility stocks (beta's under unity) under project CAPM earnings.

<sup>&</sup>lt;sup>14</sup> Morin, Roger; *New Regulatory Finance*, Public Utilities Reports, Inc. 2006, at 190.