DIRECT TESTIMONY

OF

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FINANCE DEPARTMENT

FINANCIAL ANALYSIS DIVISION

ILLINOIS COMMERCE COMMISSION

CONSUMERS ILLINOIS WATER COMPANY
PROPOSED GENERAL INCREASE IN WATER RATES

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Witness Identification

1. Q. Please state your name and business address.

A. My name is Michael McNally. My business address is 527 East Capitol Avenue, Springfield, IL 62701.

2. Q. What is your current position with the Illinois Commerce Commission ("Commission")?

A. I am presently a Financial Analyst in the Finance Department of the Financial Analysis Division.

3. Q. Please describe your qualifications and background.

A. In May of 1993, I received a Bachelor of Arts degree in Economics from the University of Illinois at Urbana-Champaign. In May of 1999, I received a Master of Business Administration degree, with a concentration in Finance, from the University of Illinois at Urbana-Champaign. I have been employed by the Commission since June 1999 as a Financial Analyst.

4. Q. Please state the purpose of your testimony in this proceeding.

A. The purpose of my testimony is to present the overall cost of capital and to recommend a fair rate of return on rate base for Consumers Illinois Water Company ("Company" or "CIWC"). I will also respond to the direct testimony of CIWC witness Pauline M. Ahern.

Cost Of Capital

5. Q. Please summarize your cost of capital findings.

A. The overall cost of capital for CIWC ranges from 9.14% to 9.39%, with a midpoint estimate of 9.27%, as shown on Schedule 7.01.

6. Q. Why must one determine an overall cost of capital for a public utility?

A. Under the traditional regulatory model, the proper balance of rate payer and shareholder interests occurs when the Commission authorizes a public utility a rate of return on its rate base equal to its overall cost of capital. If the authorized rate of return on rate base exceeds the overall cost of capital, then rate payers bear the burden of excessive prices. Conversely, if the authorized rate of return on rate base is lower than the overall cost of capital, then the utility will be unable to raise capital at a reasonable cost. Ultimately, the utility's inability to raise sufficient capital would impair service quality. Therefore, rate payer interests are served best when the authorized rate of return on rate base equals the overall cost of capital.

In authorizing a rate of return on rate base equal to the overall cost of capital, all costs of service are assumed reasonable and accurately measured. If unreasonable costs continue to be incurred, or if any reasonable cost of service component is measured inaccurately, then the allowed rate of return on rate base will not balance rate payer and investor interests.

7. Q. Please define the overall cost of capital for a public utility.

A. The overall cost of capital for a public utility equals the sum of the costs of the components of the capital structure (i.e., debt, preferred stock, and common equity) after weighting each component by its proportion to total capital.

Capital Structure

8. Q. What capital structure does the Company propose for determining the rate of return on rate base?

A. The Company proposes determining the rate of return on rate base on the basis of a forecasted average 2001 capital structure. The Company's proposed capital structure appears on Schedule 7.01.

9. Q. Did you make any adjustments to the Company's proposed capital structure?

A. Yes. I adjusted the average balance of long-term debt for 2001 and the corresponding unamortized debt expense to reflect an update in the proposed long-term debt issue, shown on line 8 of Schedule D-3, to correspond with the amount authorized by the Commission in ICC Docket No. 00-0422. Consequently, the average total carrying value of long-term debt for 2001 was adjusted as well. The new proposed average face amount outstanding was adjusted from $2,000,000 to $4,500,000; the average unamortized debt expense was adjusted from $66,212 to $362,128; and the average total carrying value of long-term debt was adjusted from $37,471,705 to $39,675,789.

With those adjustments, my proposed capital structure for CIWC comprises 2.87% short-term debt, 47.04% long-term debt, 0.47% preferred stock, and 49.62% common equity. That capital structure is shown on Schedule 7.01.

10. Q. Does capital structure affect the overall cost of capital?

A. Yes. Financial theory suggests capital structure will affect the value of a firm and, therefore, its cost of capital, to the extent it affects the expected level of cash flows that accrue to third parties (i.e., other than debt and stock holders). Employing debt as a source of capital reduces a company's income taxes,[1] thereby reducing the cost of capital; however, as reliance on debt as a source of capital increases, so does the probability of bankruptcy. As bankruptcy becomes more probable, expected payments to attorneys, trustees, accountants and other third parties increase. Simultaneously, the expected value of the income tax shield provided by debt financing declines. Beyond a certain point, a growing dependence on debt as a source of funds increases the overall cost of capital. Therefore, the Commission should not determine the overall rate of return from a utility's actual capital structure if it determines that capital structure adversely affects the overall cost of capital.

An optimal capital structure would minimize the cost of capital and maintain a utility's financial integrity. Unfortunately, determining whether a capital structure is optimal remains problematic because (1) the cost of capital is a

[1] The tax advantage debt has over equity at the corporate level is partially offset at the individual investor level. Debt investors receive returns largely in the form of current income (i.e., interest). In contrast, equity investors receive returns in the form of both current income (i.e., dividends) and capital appreciation (i.e., capital gains). Taxes on capital gains are lower than taxes on interest and dividend income because capital gains tax rates are lower and taxes on capital gains are deferred until realized.

continuous function of the capital structure, rendering its precise measurement along each segment of the range of possible capital structures problematic; (2) the optimal capital structure is a function of operating risk, which is dynamic; and (3) the relative costs of the different types of capital vary with dynamic market conditions. Consequently, one should determine whether the capital structure is consistent with the financial strength necessary to access the capital markets under all conditions, and if so, whether the cost of that financial strength is reasonable.

Towards that end, I compared Staff's proposed capital structure for CIWC to industry standards. For the four quarters ending March 2000, the weighted average common equity ratio for water utilities on *Standard & Poor's Utility Compustat* equaled 39.70%. The common equity ratio component of my proposed capital structure is 49.62%. In addition, Standard & Poor's categorizes debt securities on the basis of the risk that a company will default on its interest or principal payment obligations. The resulting credit rating reflects both the operating and financial risks of a utility.[2] Although no formula exists for determining a credit rating, Standard & Poor's publishes mean and median values of various financial ratios by credit rating. Water utilities that have an A credit rating have a mean total debt ratio of 50.05%, with a standard deviation of 16.37%.[3] The debt ratio component of my proposed capital structure is very close to the industry average at 49.91%. According to Standard & Poor's, an obligor rated 'A' has a strong capacity to meet its financial commitments but to a lesser degree than higher-rated

[2] Standard & Poor's, *Utility & Perspectives*, June 21, 1999, p. 1.
[3] Standard & Poor's, *Global Utilities Rating Service: Financial Statistics Twelve Months Ended September 30, 1999,* March 2000, p. 13.

obligors.[4] The above suggests that CIWC's capital structure is commensurate with a high but not excessive degree of financial strength. Therefore, I conclude my proposed capital structure for CIWC is reasonable for establishing rates.

Cost of Short-Term Debt

11. Q. What is the cost of short-term debt for CIWC?

A. CIWC issues short-term debt in the form of bank loans. The interest rate on those loans equals the thirty or 360-day London Interbank Offered Rate ("LIBOR") rate plus ninety-five basis points.[5] For the cost of short-term debt, I added 95 basis points to the August 9, 2000 thirty-day LIBOR rate, 6.62%, for a total cost of 7.57%.[6]

Cost of Long-Term Debt

12. Q. What is the embedded cost of long-term debt for CIWC?

A. As shown on Schedule 7.02, the embedded cost of long-term debt equals 8.48%. This calculation was based on CIWC Schedule D-3 with the following adjustments made to reconcile the information regarding the proposed new long-term debt issue, shown on line 8, with the Commission Order from Docket No. 00-0422 and to update the accompanying interest

[4] Id., at 4.
[5] CIWC Schedule D-2.
[6] *The Wall Street Journal*, August 10, 2000.

rate to a more current estimate: (1) the average face amount outstanding for 2001 was adjusted from $2,000,000 to $4,500,000; (2) the average unamortized debt expense was adjusted from $66,212 to $362,128, which reflects 4 months amortization in 2000; (3) the average total carrying value of long-term debt was adjusted from $37,471,705 to $39,675,789; and (4) the interest rate applied to the proposed new debt issue was adjusted from 6.12% to 5.85% to reflect the most recent tax-exempt bond yields.[7]

Cost of Preferred Stock

13. Q. What is the embedded cost of preferred stock for CIWC?

A. As shown on Schedule 7.03, the embedded cost of preferred stock equals 5.52%. On this matter, I agree with CIWC.

Cost of Common Equity

14. Q. How did you measure the investor required rate of return on common equity for CIWC?

A. I measured the investor required rate of return on common equity for CIWC with discounted cash flow ("DCF") and risk premium models. Since CIWC does not have market-traded common stock, DCF and risk premium models cannot be applied directly to CIWC; therefore, I applied both models to a

[7] Salomon Smith Barney, *Municipal Market Comment*, August 11, 2000, page 2.

water utility sample and a sample of utility companies comparable in risk to CIWC.[8]

Sample Selection

15. Q. How did you select your water sample?

A. I selected my water sample based on three criteria. First, I began with a list of all domestic companies assigned an industry number of 4941 (i.e., water utilities) within *Standard & Poor's Utility Compustat*. Second, I removed any company which had neither Zacks Investment Research ("Zacks") nor Institutional Brokers Estimate System ("IBES") long-term growth rates. Third, I removed companies that are targets of acquisition. The remaining companies, American States Water Company; American Water Works Company, Inc.; Artesian Resources Corporation; Connecticut Water Service, Inc.; Middlesex Water Company; Pennichuck Corporation; and Philadelphia Suburban Corporation, compose my sample.

16. Q. How did you select a utility sample comparable in risk to CIWC?

A. According to financial theory, the market-required rate of return on common equity is a function of operating and financial risk. Thus, the method used to select a sample should reflect both the operating and financial characteristics of a firm. I selected a sample using twelve financial and operating ratios: (1) common equity; (2) cash flow to capitalization; (3) cash

[8] Hereafter referred to as *water sample* and *comparable sample*, respectively.

flow to debt; (4) expenditures to net utility plant; (5) fixed asset turnover; (6) free cash flow to capitalization; (7) funds flow interest coverage; (8) net cash flow to expenditures; (9) operating profit margin; (10) operating revenue stability; (11) operating income before income taxes stability; and (12) net income stability. The last three ratios were measured with the coefficient of determination of a least-squares regression of the natural logarithm of the ratios' respective quarterly data against time.[9] The stability ratios were measured over the period 1995-1999. Data from the period 1997-1999 were averaged to normalize the remaining ratios.

I began with all market-traded electric, natural gas, and water companies on *Standard & Poor's Utility Compustat* tape. Among those utilities, 124 had sufficient data to calculate the financial and operating ratios. Next, I conducted a principal components analysis of the financial and operating ratios. Principal components constitute linear combinations of optimally-weighted variables which are uncorrelated with one another.[10,11] For each utility in the data base, the principal components analysis calculates a value for each component, known as a principal components score, which has a mean of zero and a standard deviation of one. From the principal components analysis, I retained four components for risk analysis. After

[9] Dummy variables were added to the regression model to incorporate seasonality.

[10] A principal component can be described mathematically as follows:

$$c_i = b_{i1} \times x_1 + b_{i2} \times x_2 + \ldots + b_{in} \times x_n$$

where c_i ≡ the utility's score on principal component i;
b_{in} ≡ the weight for ratio x_n to create component c_i; and
x_n ≡ the utility's value on ratio n.

[11] The variables are optimally weighted when the resulting principal components explain the maximum amount of variance in the data base.

calculating the scores for each principal component, I rank-ordered the companies in terms of least relative distance from CIWC's target scores. Distance was measured by calculating the difference between each principal component score for each firm and CIWC, summing the squared differences, and taking the square root of the summation. Schedule 7.04 presents CIWC and the 11 utilities the least distance from, and therefore, the most comparable to, CIWC that met two criteria: (1) they have either Zacks or IBES growth rates; and (2) they have neither pending nor recently completed significant mergers, acquisitions, or divestitures. Schedule 7.04 also presents the four principal component scores and the cumulative distance for CIWC and the companies composing the water and comparable samples.

DCF Analysis

17. Q. Please describe DCF analysis.

A. For a utility to attract common equity capital, it must provide a rate of return on common equity sufficient to meet investor requirements. DCF analysis establishes a rate of return directly from investor requirements. A comprehensive analysis of a utility's operating and financial risks becomes unnecessary in DCF analysis since the market price of a utility's stock already embodies the market consensus of those risks.

According to DCF theory, a security price equals the present value of the cash flow investors expect it to generate. Specifically, the market value of common stock equals the cumulative value of the expected stream of future dividends after each is discounted by the investor required rate of return.

18. Q. Please describe the DCF model with which you measured the investor required rate of return on common equity.

A. As it applies to common stocks, DCF analysis is generally employed to determine appropriate stock prices given a specified discount rate. Since a DCF model incorporates time-sensitive valuation factors, it must correctly reflect the timing of the dividend payments that stock prices embody. As such, incorporating stock prices that the financial market sets on the basis of quarterly dividend payments into a model that ignores the time value of quarterly cash flows constitutes a misapplication of DCF analysis.

The companies in both samples pay dividends quarterly; therefore, I applied a constant-growth DCF model that measures the annual required rate of return on common equity as follows:

$$k = \frac{\sum_{q=1}^{4} D_{0,q}(1+g)(1+k)^{1-[x+0.25(q-1)]}}{P} + g.$$

where P ≡ the current stock price;

$D_{0,q}$ ≡ the last dividend paid at the end of quarter q, where q = 1 to 4;

k ≡ the cost of common equity;

x ≡ the elapsed time between the stock observation and first dividend payment dates, in years; and

g ≡ the expected dividend growth rate.

That model assumes dividends will grow at a constant rate, and the market value of common stock (i.e., stock price) equals the sum of the discounted value of each dividend.

19. Q. How did you estimate the growth rate parameter?

A. Determining the market-required rate of return with the DCF methodology requires a growth rate that reflects the expectations of investors. Although the current market price reflects aggregate investor expectations, market-consensus expected growth rates cannot be measured directly. Therefore, I measured market-consensus expected growth indirectly with growth rates forecasted by securities analysts that are disseminated to investors.

I reviewed growth rate estimates available from IBES and Zacks which summarize and publish the earnings growth expectations of financial analysts that the research departments of investment brokerage firms employ. Schedule 7.05 presents the analyst growth rate estimates for the companies in the samples.

20. Q. How were these growth rates incorporated into your DCF analysis?

A. Since market-consensus expected growth is unobservable, any DCF estimate of the investor required rate of return includes an unknown degree of measurement error. To reflect that uncertainty, I grouped growth rate estimates based on the lower and higher observed mean growth rate of each company, which ultimately leads to a range for the cost of common equity.

The growth rate ranges for the companies in the samples are presented in Schedule 7.05.

21. Q. How did you measure the stock price?

A. A current stock price reflects all information that is available and relevant to the market; thus, it represents the market's assessment of the common stock's current value. I measured each company's current stock price with its closing market price from August 9, 2000. Those stock prices appear on Schedule 7.06.

Since stock prices reflect the market's expectation of the cash flows the securities will produce and the rate at which those cash flows are discounted, an observed change in the market price does not necessarily indicate a change in the required rate of return on common equity. Price changes may reflect an investor re-evaluation of the expected dividend growth rate. In addition, stock prices change with the approach of dividend payment dates. Consequently, when estimating the required return on common equity with the DCF model, one should measure the expected dividend yield and the corresponding expected growth rate concurrently.

22. Q. Please explain the significance of the column titled "Next Dividend Payment Date" shown on Schedule 7.06.

A. Estimating year-end dividend values requires measuring the length of time between each dividend payment date and the first anniversary of the stock observation date. For the first dividend payment, that length of time is

measured from the "Next Dividend Payment Date." Subsequent dividend payments occur in quarterly intervals.

23. Q. How did you estimate the next four expected quarterly dividends?

A. Most utilities declare and pay the same dividend per share for four consecutive quarters before adjusting the rate. Consequently, I assumed the dividend rate will adjust during the same quarter it changed during the preceding year. If the utility did not change its dividend during the last year, I assumed the rate would change during the next quarter. The lower and higher expected growth rates were applied to the current dividend rate to estimate the expected dividend rate. Schedule 7.06 presents the current quarterly dividends. Schedule 7.07 presents the expected quarterly dividends.

24. Q. Based on your DCF analysis, what is the estimated required rate of return on common equity for the water sample and the comparable sample?

A. The DCF analysis estimates the required rate of return on common equity ranges from 9.16% to 9.93% for the water sample and 9.80% to 10.80% for the comparable sample, as shown on Schedule 7.08. Those estimates are derived from the growth rates from Schedule 7.05, the stock price and dividend payment dates from Schedule 7.06, and the expected quarterly dividends from Schedule 7.07.

Risk Premium Analysis

25. Q. Please describe the risk premium model.

A. The risk premium model is based on the theory that the market-required rate of return for a given security equals the risk-free rate of return plus a risk premium associated with that security. A risk premium represents the additional return investors expect in exchange for assuming the risk inherent in an investment. Mathematically, a risk premium equals the difference between the expected rate of return on a risk factor and the risk-free rate. If the risk of a security is measured relative to a portfolio, then multiplying that relative measure of risk and the portfolio's risk premium produces a security-specific risk premium for that risk factor.

The risk premium methodology is consistent with the theory that investors are risk-averse. That is, investors require higher returns to accept greater exposure to risk. Thus, if investors had an opportunity to purchase one of two securities with equal expected returns, they would purchase the security with less risk. Conversely, if investors had an opportunity to purchase one of two securities with equal risk, they would purchase the security with the higher expected return. In equilibrium, two securities with equal quantities of risk have equal required rates of return.

The Capital Asset Pricing Model ("CAPM") is a one-factor risk premium model that mathematically depicts the relationship between risk and return as:

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

where R_j ≡ the required rate of return for security j;

R_f ≡ the risk-free rate;

R_m ≡ the expected rate of return for the market portfolio; and

b_j ≡ the measure of market risk for security j.

In the CAPM, the risk factor is market risk which is defined as risk that cannot be eliminated through portfolio diversification. To implement the CAPM, one must estimate the risk-free rate of return, the expected rate of return on the market portfolio, and a security or portfolio-specific measure of market risk.

26. Q. How did you estimate the risk-free rate of return?

A. I examined the suitability of the yields on three-month U.S. Treasury bills and thirty-year U.S. Treasury bonds as estimates of the risk-free rate of return.

27. Q. Why did you examine the yields on U.S. Treasury bills and bonds as measures of the risk-free rate?

A. The proxy for the nominal risk-free rate should contain no risk premium and reflect similar inflation and real risk-free rate expectations to the security being analyzed through the risk premium methodology.[12] The yields of fixed income securities include premiums for default and interest rate risk. Default

[12] Real risk-free rate and inflation expectations comprise the non-risk related portion of a security's rate of return.

risk pertains to the possibility of default on principal or interest payments. Securities of the United States Treasury are virtually free of default risk by virtue of the federal government's fiscal and monetary authority. Interest rate risk pertains to the effect of unexpected interest rate fluctuations on the value of securities.

Since common equity theoretically has an infinite life, its market-required rate of return reflects the inflation and real risk-free rates anticipated to prevail over the long run. U.S. Treasury bonds, the longest term treasury securities, are issued with terms to maturity of thirty years; U.S. Treasury notes are issued with terms to maturity ranging from two to ten years; U.S. Treasury bills are issued with terms to maturity ranging from ninety-one days to one year. Therefore, U.S. Treasury bonds are more likely to incorporate within their yields the inflation and real risk-free rate expectations that drive, in part, the prices of common stocks than either U.S. Treasury notes or Treasury bills.

However, due to relatively long terms to maturity, U.S. Treasury bond yields also contain an interest rate risk premium that diminishes their usefulness as measures of the risk-free rate. U.S. Treasury bill yields contain a smaller premium for interest rate risk. Thus, in terms of interest rate risk, U.S. Treasury bill yields more accurately measure the risk-free rate.

28. Q. Given that the inflation and real risk-free rate expectations that are reflected in the yields on U.S. Treasury bonds and the prices of common stocks are similar, does it necessarily follow that the inflation and real risk-free rate

expectations that are reflected in the yields on U.S. Treasury bills and the prices of common stocks are dissimilar?

A. No. To the contrary, short and long-term inflation and real risk-free rate expectations, including those that are reflected in the yields on U.S. Treasury bills, U.S. Treasury bonds, and the prices of common stocks, should equal over time. Any other assumption unrealistically implies that the real risk-free rate and inflation are expected to systematically and continuously rise or fall.

Although expectations for short and long-term real risk-free rates and inflation should equal over time, in finite time periods, short and long-term expectations may differ. Short-term interest rates tend to be more volatile than long-term interest rates.[13] Consequently, over time U.S. Treasury bill yields are less biased (i.e., more accurate) but less reliable (i.e., more volatile) estimators of the long-term risk-free rate than U.S. Treasury bond yields. In comparison, U.S. Treasury bond yields are more biased (i.e., less accurate) but more reliable (i.e., less volatile) estimators of the long-term risk-free rate. Therefore, an estimator of the long-term nominal risk-free rate should not be chosen mechanistically. Rather, the similarity in current short and long-term nominal risk-free rates should be evaluated. If those risk-free rates are similar, then U.S. Treasury bill yields should be used to measure the long-term nominal risk-free rate. If not, some other proxy or combination of proxies should be found.

[13] Fabozzi and Pollack, ed., *The Handbook of Fixed Income Securities*, Fourth Edition, Irwin, p. 789.

29. Q. What are the current yields on three-month U.S. Treasury bills and thirty-year U. S. Treasury bonds?

A. Three-month U.S. Treasury bills are currently yielding 6.40%. Thirty-year U.S. Treasury bond futures are currently yielding 5.81%. Both estimates are derived from quotes for August 9, 2000.[14] Schedule 7.09 presents the published quotes and effective yields.

30. Q. Of the U.S. Treasury bill and bond yields, which is currently a better proxy for the long-term risk-free rate?

A. In terms of the gross domestic product ("GDP") price index, WEFA forecasts the inflation rate will average 1.9% annually during the 2000-2019 period.[15] In terms of the consumer price index ("CPI"), the *Survey of Professional Forecasters* ("Survey") forecasts the inflation rate will average 2.7% during the next ten years.[16] In terms of real GDP growth, WEFA forecasts the real risk-free rate will average 3.1% during the 2000-2019 period.[17] The Survey forecasts real GDP growth will average 3.1% during the next ten years.[18] Those forecasts imply a long-term, nominal risk-free rate between 5.0% and 5.9%.[19,20] Therefore, to the extent inflation and real GDP growth expectations

[14] The Federal Reserve Board, *Federal Reserve Statistical Release: Selected Interest Rates, H.15 Daily Update*, http://www.federalreserve.gov/releases/H15/update/, August 10, 2000.

[15] *U.S. Long-Term Economic Outlook*, vol. 1, WEFA Group, Second Quarter 2000, pp. 4.4-4.5.

[16] *Survey of Professional Forecasters*, Federal Reserve Bank of Philadelphia, www.phil.frb.org/files/spf/spfq200.txt. The *Survey* aggregates the forecasts of approximately thirty forecasters.

[17] *U.S. Long-Term Economic Outlook*, vol. 1, WEFA Group, Second Quarter 2000, pp. 4.2-4.3.

[18] *Survey of Professional Forecasters*, Federal Reserve Bank of Philadelphia, www.phil.frb.org/files/spf/spfq200.txt.

[19] Nominal interest rates are calculated as follows:

$$r = (1 + R) \times (1 + i) - 1.$$

coincide with WEFA and *Survey* forecasts, the U.S. Treasury bond yield more closely approximates the long-term risk-free rate. Therefore, I conclude that the U.S. Treasury bond yield is the better proxy for the long-term risk-free rate currently. It should be remembered, however, that the U.S. Treasury bond yield contains an upward bias due to the inclusion of an interest rate risk premium associated with its relatively long term to maturity.

31. Q. How was the expected rate of return on the market portfolio estimated?

A. The expected rate of return on the market was estimated by conducting a DCF analysis on the firms composing the Standard & Poor's 500 Index ("S&P 500"). That analysis used dividends and closing market prices as of June 30, 2000 as reported in the July 2000 edition of *Standard & Poor's Security Owner's Stock Guide*. Growth rate estimates were obtained from the June 2000 edition of *IBES Monthly Summary Data* and June 29 and August 7, 2000 Zacks reports. Firms not paying a dividend as of June 30, 2000 or for which neither IBES nor Zacks growth rates were available were eliminated from the analysis. The resulting company-specific estimates of the expected rate of return on common equity were then weighted using market value data from Salomon Brothers, *Performance and Weights of the S&P 500: Second Quarter 2000*. The estimated weighted average expected rate of return for the remaining 396 firms, composing 74.36% of the market capitalization of the S&P 500, equals 16.24%.

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where r ≡ nominal interest rate;
R ≡ real interest rate; and
i ≡ inflation rate.

[20] Historically, the realized interest rate return premium averaged 1.4% during the last 75 years (Stocks Bonds, Bills, and Inflation, 2000 Yearbook, *Ibbotson Associates, p. 185)*.

32. Q. How did you measure market risk on a security-specific basis?

A. I measured non-diversifiable risk with beta. When multiplied by the market risk premium, a security's beta produces a market risk premium specific to that security.

The beta for a security or portfolio of securities is estimated with the following model using an ordinary least-squares technique:

$$R_{j,t} - R_{f,t} = a_j + b_j \times (R_{m,t} - R_{f,t}) + e_{j,t}$$

where $R_{j,t}$ ≡ the return on security j in period t;

$R_{f,t}$ ≡ the risk-free rate of return in period t;

$R_{m,t}$ ≡ the return on the market portfolio in period t;

a_j ≡ the intercept term for security j;

b_j ≡ beta, the measure of market risk for security j; and

$e_{j,t}$ ≡ the residual term in period t for security j.

A beta can be calculated for firms with market-traded common stock. For both samples, beta was calculated in three steps. First, the U.S. Treasury bill return is subtracted from the average percentage change in the two samples' stock prices and the percentage change in the S&P 500 to estimate each portfolio's return in excess of the risk-free rate. Second, the excess returns of each of the two samples are regressed against the excess returns of the S&P 500 to estimate a raw beta. The regression analysis employs sixty monthly observations of stock and U.S. Treasury bill return data. Third, an adjusted beta is estimated through the following equation:

$$b_{adjusted} = 0.33743 + 0.66257 \times b_{raw}.$$

33. Q. Why do you use an adjusted beta estimate?

A. I use an adjusted beta estimate for two reasons. First, betas tend to regress towards the market mean value of 1.0 over time; therefore, the adjustment represents an attempt to estimate a forward-looking beta. Second, empirical tests of the CAPM suggest that the linear relationship between risk, as measured by raw beta, and return is flatter than the CAPM predicts. That is, securities with raw betas less than one tend to realize higher returns than the CAPM predicts. Conversely, securities with raw betas greater than one tend to realize lower returns than the CAPM predicts. Adjusting the raw beta estimate towards the market mean value of 1.0 compensates for the observed flatness in the linear relationship between risk and return.[21] Securities with betas less than one are adjusted upwards thereby increasing the predicted required rate of return towards observed realized rates of return. Conversely, securities with betas greater than one are adjusted downwards thereby decreasing the predicted rate of return towards observed realized rates of return.

34. Q. What are the beta estimates for the water sample and the comparable sample?

A. The raw beta for the water sample, estimated over the sixty months ending July 2000, equals 0.17; the adjusted beta equals 0.45. The raw beta for the

[21] Litzenberger, Ramaswamy and Sosin, "On the CAPM Approach to the Estimation of A Public Utility's Cost of Equity Capital," *Journal of Finance*, May 1980, pp. 375-376.

comparable sample, estimated over the same period, equals 0.13; the adjusted beta equals 0.42.

35. Q. What required rate of return on common equity does the risk premium model estimate for the two samples?

A. The risk premium model estimates a required rate of return on common equity of 10.50% for the water sample and 10.19% for the comparable sample. The computation of those estimates appears on Schedule 7.09.

Cost of Equity Recommendation

36. Q. Based on your entire analysis, what is your estimate of the required rate of return on the common equity of CIWC?

A. A thorough analysis of the required rate of return on common equity requires both the application of financial models and the analyst's informed judgment. An estimate of the required rate of return on common equity based solely on judgment is inappropriate. Nevertheless, because techniques to measure the required rate of return on common equity necessarily employ proxies for investor expectations, judgment remains necessary to evaluate the results of such analyses. Along with DCF and risk premium analyses, I have considered the observable 8.13% rate of return the market currently requires on less risky A-rated utility long-term debt.[22] Based on my analysis, in my

[22] *Moody's Long-Term Corporate Bond Yield Averages*, Moody's Investors Service, August 9, 2000, www.moodys.com/economics.nsf/web/econindyd?OpenDocument.

judgment, the investor required rate of return on common equity for CIWC ranges from 9.9% to 10.4%.

37. Q. Please summarize how you formed the range for the investor required rate of return on common equity for CIWC.

A. The models from which the individual company estimates were derived are correctly specified and thus contain no source of bias. Moreover, I am unaware of bias in any of my proxies for investor expectations.[23] Consequently, estimates for a sample as a whole are subject to less measurement error than individual company estimates. I formed a range for the investor-required rate of return on common equity by: 1) averaging the four DCF-derived estimates of the required rate of return on common equity, or 9.92%, and rounding to the nearest tenth of a percent, or 9.9%; and 2) averaging the two risk premium-derived estimates of the required rate of return on common equity, or 10.35%, and rounding to the nearest tenth of a percent, or 10.4%.

38. Q. In past CIWC rate cases Staff has recommended an additional premium be added to reflect the greater operating risk to which CIWC is exposed in comparison to that of the samples used as proxies.[24] Did you include such a premium?

[23] Except as discussed above in regard to U.S. Treasury bond yields as proxies for the long-term risk-free rate.

[24] ICC Docket Nos. 98-0632 and 99-0288.

A. No, I did not. My analysis of the risk of CIWC as compared to that of my two proxy samples, represented by the four factor scores, indicates that the risk of CIWC is equal to, or slightly less than, the risk of both the comparable sample and the water sample.

Overall Cost of Capital Recommendation

39. Q. What is the overall cost of capital for CIWC in this proceeding?

A. As shown on Schedule 7.01, the overall cost of capital for CIWC ranges from 9.14% to 9.39% with a midpoint estimate of 9.27%. The midpoint estimate incorporates a cost of common equity of 10.15%.

Response to Ms. Ahern

40. Q. Please evaluate Ms. Ahern's analysis of CIWC's cost of common equity.

A. Ms. Ahern's analysis contains several errors that lead her to over-estimate CIWC's cost of common equity. Critical errors occur in, or are the result of, her Discounted Cash Flow ("DCF"), Capital Asset Pricing Model ("CAPM"), Risk Premium ("RPM"), and Comparable Earnings ("CEM") analyses. The most significant flaws in Ms. Ahern's analysis of CIWC's cost of common equity are the following:

1. Ms. Ahern's use of historical data in each of her models is problematic.

2. The growth rate Ms. Ahern used in her DCF model is questionable.

3. Ms. Ahern's CAPM analysis suffers from a number of errors, the most critical of which are her flawed derivation of the overall market return ("R_m") and an improper use of adjusted betas used in her "empirical" CAPM model.

4. Ms. Ahern's Risk Premium Model ("RPM") is flawed on several levels.

5. Ms. Ahern's Comparable Earnings Model ("CEM") is theoretically invalid.

6. Ms. Ahern's inclusion of a 0.2% size-based risk premium in her cost of equity is unwarranted.

Historical Data

41. Q. Why is Ms. Ahern's use of historical data in her DCF, CAPM, RPM, and CEM models improper?

A. The use of historical data is problematic. First, historical data improperly favors outdated information that the market no longer considers relevant over the most-recently available information. Second, historical data reflects

conditions that may not continue in the future. In other words, use of average historical data wrongly implies that securities data will revert to a mean. To the contrary, security return movements approximate a random walk, which suggests no tendency of mean reversion.[25] That is, in a random walk, the "future steps or directions cannot be predicted on the basis of past actions."[26] Finally, even if securities data were mean reverting, there is no method for determining the true value of that mean. Consequently, sample means, which depend upon the measurement period used, are substituted. Thus, any measurement period chosen is arbitrary, rendering the results uninformative.

42. Q. What historical data did Ms. Ahern use in her cost of equity analyses?

A. Ms. Ahern used historical data, in part, to estimate the growth rates and dividend yields in her DCF analysis, the spread between the AAA-rated corporate bond yields and A-rated utility bond yields and the equity risk premium in her RPM analysis, the market equity risk premium in her CAPM analysis, and the return on book common equity for the two groups of 18 non-price regulated proxy companies in her CEM analysis.

43. Q. Please provide an example of how the use of historical data can distort cost of equity analyses.

[25] Burton G. Malkiel, *A Random Walk Down Wall Street*, Fourth Edition, Norton, 1985, pp. 132 and 146.
[26] Id., at 16, *emphasis added*.

A. First, consider Ms. Ahern's use of historical data[27] in determining the dividend yield (dividend ÷ stock price) in her DCF model. Since stock prices reflect all current information, only the most recent stock price can reflect the most recently available information. Historical stock prices must include observations that cannot reflect the most current information available to the market. For example, if the actual earnings for a company were much higher than anticipated, the market would react to that news and bid up its stock price. Consequently, the pre-earnings announcement stock prices would reflect obsolete information and understate the value of that company's stock.

Ms. Ahern claims that she used historical data to estimate the dividend yield because it "normalizes the recent volatility of the stock market which she believes is not representative [of] the period of time in which rates set in this docket will be in effect."[28] While it is true that measurement error is a problem inherent in cost of common equity analysis and should be reduced whenever possible, introducing old stock prices into an analysis simply substitutes one alleged source of measurement error, volatile stock prices, for another, irrelevant stock prices. Stock prices can be influenced by temporary imbalances in supply and demand; however, any distortions such imbalances might have on the measured cost of common equity can be

[27] Ms. Ahern used an average of the spot, 3 month, 6 month, and 12 month yields (Company Ex. 7, p. 26).

[28] Company response to Staff Data Request MGM 1.10.

reduced through the use of samples, a technique which Ms. Ahern already applies.

The CAPM calls for an estimate of the required rate of return on the market portfolio. Ms. Ahern estimates the required rate of return on the market using, in part, historical earned rates of return.[29] As proxies for current required rates of return, historical earned returns possess several shortcomings. First, the returns an investment generates are unlikely to have equaled investor return requirements due to unpredictable economic, industry-related, or company-specific events. Second, even if an investment's return equaled investor requirements in a given period, both the price of, and the investment's sensitivity to, each source of risk changes over time. Consequently, the past relationship between two investments, such as common equity and debt, is unlikely to remain constant. Third, the magnitude of the historical risk premium depends upon the measurement period used. Unfortunately, no widely-accepted guidelines exist for determining the appropriate measurement period. Thus, historical earned rates of return are not good estimates of the required rate of return, and the use of such data could distort the estimate of a company's cost of equity.

DCF Model

44. Q. How did Ms. Ahern derive the growth rate used in her DCF model?

[29] CIWC Exhibit 7, p. 42, lines 23-26.

A. Ms. Ahern begins with growth rate estimates from seven different sources. Some are based on dividends per share ("DPS"), others on earnings per share ("EPS"); some are historical, others projected; some are from Value Line, others from IBES, and still others she derived herself.[30] She used different combinations of those growth rates to derive two average growth rate estimates. Her final DCF-based cost of equity estimate was the average of the DCF results obtained from using the two average growth rate estimates. The first average growth rate estimate reflects all seven earnings and dividend growth estimates. Specifically, Ms. Ahern's first growth rate estimate is the average of a) the mean of the highest and lowest growth estimates and b) the mean of all seven growth estimates. The second growth estimate comprises the average of the Value Line and IBES forecasts of EPS growth for each company in her samples.[31]

45. Q. Explain why Ms. Ahern's growth rate estimation procedure is questionable.

A. In addition to the short-comings of using historical data discussed previously, Ms. Ahern's growth rate contains two major problems. First, the integrity of the growth rate employed by Ms. Ahern is undermined because of missing data. For both proxy groups, the upper end of the range of estimates she employs (3.3-7.6% for the Water Group and 3.1-6.1% for the Utility Group) is based on average Value Line Projected 1996-1998 to 2002-2004 EPS

[30] CIWC Exhibit 7, Schedule 14, p. 1, columns 1-6 and 8.
[31] CIWC Exhibit 7, Schedule 14, p. 1, Column 7.

Growth Rates.[32] Unfortunately, Value Line estimates are available for only four of the seven Water Group companies and six of the eight Utility Group companies. A comparison of the Value Line Data with the IBES Projected Five Year EPS Growth Rates for the companies in her samples reveals that the companies with missing estimates have among the lowest IBES projected EPS growth rates, leaving only the companies with higher estimates to be averaged. Thus, it appears that the 7.6% and 6.1% upper end estimates of the growth rate ranges are overstated and would be lower if Value Line estimates for all companies were available. Consequently, the midpoint of those ranges appears to be overstated, as well. Likewise, Ms. Ahern's averages of all growth rates for each proxy group are uninformative because they include the Value Line Projected 1996-1998 to 2002-2004 Growth Rates for EPS and DPS, both of which suffer from missing data for lower-growth companies, as described above.

The second problem With Ms. Ahern's growth rate estimate is the inclusion of the "BR+SV" growth estimates (column 8) in her average of all seven growth estimates. Ms. Ahern's BR+SV method of estimating growth is flawed in that 1) it suffers from the same missing data problem discussed previously; 2) it requires the estimation of four variables rather than the single estimate required if growth were estimated directly, which translates into four times the estimating error potential; and 3) Ms. Ahern incorrectly substitutes the average return on <u>all</u> equity investment for "R," which is defined as the return on <u>future</u> investment only. The latter is appropriate since sustainable

[32] CIWC Exhibit 7, Schedule 14, p. 1, Column 5.

growth, which is what "BR+SV" growth rates are supposed to measure, is derived from new investment only. Capacity constraints render growth from existing investment unsustainable.

CAPM Model

46. Q. How did Ms. Ahern derive the overall market return she used in her CAPM models?

A. Ms. Ahern averaged two estimates of R_m to derive her estimate. One estimate is simply the long-term historical total equity earned return rate of 13.3%, as reported by Ibottson Associates.[33] The other estimate is based on projections reported in *The Value Line Investment Survey*.[34] For the Value Line estimate, Ms. Ahern added dividend yield and price appreciation projections in order to estimate R_m. As a proxy for the market portfolio's dividend yield, Ms. Ahern adopted the median of estimated dividend yields (for the next 12 months) of all dividend paying stocks under review in *The Value Line Investment Survey* (2.18%). For the proxy of expected growth in the market portfolio, Ms. Ahern adopted the geometric average of the Value Line 12-month, 6-month, 3-month, and spot 3-5 year estimated median price appreciation potential of all 1700 stocks in the hypothesized economic environment three to five years hence (15.83%). Those two rates were added for an R_m of 18.0%.

[33] CIWC Exhibit 7, p. 42.
[34] CIWC Exhibit 7, Schedule 16, p. 4, note (1).

47. Q. Please explain the errors in those two approaches and how they may corrupt her CAPM results.

A. Ms. Ahern's Ibottson-based estimate is based entirely on historical data, the use of which has several short-comings, as discussed previously. Ms. Ahern's Value Line-based estimate of the required rate of return on the market contains several errors. Selecting the median as her measure of central tendency in market dividend yields and growth rates was Ms. Ahern's first error. The median of a sample is its middle value; that is, the sample contains as many values above the median as it contains below it. The magnitude of the difference between those other values and the median is not considered. For example, the median of a set comprising 1, 3 and 5 equals 3. The median of a set comprising 1, 3 and 10 also equals 3; although, the highest value in the latter set is double that in the former set. In particular, the median fails to properly weight the relative value of the securities composing the market portfolio. The common stocks of larger companies have a greater effect on the market returns because they constitute a greater proportion of the market than those of smaller companies. Nevertheless, the median growth estimate does not afford higher weights to larger companies, and thus over weights the contributions of smaller companies, which tend to have greater growth potential. Ms. Ahern's Value Line-based estimate compounds that problem by improperly drawing the median dividend yield and growth rates from two different samples. The median of estimated dividend yields is an estimate of

dividend paying stocks only. That is, common stocks that do not pay dividends were excluded from the sample from which the median dividend yield was derived. Conversely, the median appreciation projection is an estimate of all stocks in the hypothesized economic environment, dividend paying or not. Obviously the dividend yield of non-dividend paying stocks is 0%. Therefore, the median dividend yield for all common stocks included in *The Value Line Investment Survey* would be lower than that for the subset of common stocks paying dividends. Thus, by adding the higher dividend yield of dividend paying stocks alone to the estimated price appreciation of all stocks, Ms. Ahern overstates the overall return on the market.

48. Q. Please describe the errors in Ms. Ahern's Empirical CAPM analysis.

A. Quantitative research suggests the relationship between risk and return is flatter than the CAPM predicts. The Empirical CAPM attempts to reproduce the observed relationship between risk and realized returns.[35] Since the adjustments to the CAPM that result in the Empirical CAPM are based on empirical testing rather than financial theory, the Empirical CAPM should be applied in a manner that is consistent with the conditions under which it was developed. Specifically, the measure of risk used within the Empirical CAPM must be consistent with that used in the empirical studies from which the model was developed. Ms. Ahern failed in that regard. The basis of Ms. Ahern's Empirical CAPM is a book entitled *Regulatory Finance: Utilities'*

[35] CIWC Exhibit 7, pp. 39-40.

Cost of Capital by Roger A. Morin.[36] That text, in turn, cites another study by Litzenberger, et. al.[37] Litzenberger et. al. adopts raw beta as the measure of risk in its tests of the relationship between risk and realized returns. In contrast, Ms. Ahern applies to both her Traditional and Empirical CAPM models Value Line adjusted betas,[38] rather than the raw betas used in accordance with Litzenberger et. al. Importantly, Litzenberger et. al. suggest that globally adjusted betas,[39] such as those which Value Line publishes, are a solution to the discrepancy between the theoretically predicted and empirically observed relationship between risk and return.[40] In other words, by using adjusted betas, Ms. Ahern has already effectively transformed her "Traditional" CAPM into an empirical CAPM model. Therefore, including an additional beta adjustment in her "Empirical" CAPM model results in inflated estimates of her samples' cost of common equity.

49. Q. Please demonstrate how Ms. Ahern's use of Value Line betas in her Empirical CAPM inflates her estimate of her sample's cost of common equity.

A. Ms. Ahern's Empirical CAPM can be depicted mathematically as follows:[41]

[36] CIWC Exhibit 7, p. 39.
[37] Litzenberger, Ramaswamy and Sosin, "On the CAPM Approach to the Estimation of A Public Utility's Cost of Equity Capital," *Journal of Finance*, May 1980, pp. 369-383.
[38] CIWC Exhibit 7, Schedule 16, pp. 2 and 3.
[39] Litzenberger et. al. refers to betas adjusted in the manner of Merrill Lynch and Value Line as "globally adjusted."
[40] Litzenberger, Ramaswamy and Sosin, "On the CAPM Approach to the Estimation of A Public Utility's Cost of Equity Capital," *Journal of Finance*, May 1980, pp. 375-376.
[41] CIWC Exhibit 7, Schedule 16, p. 4, note (4).

$$R_j = R_f + 0.25 \times (R_m - R_f) + 0.75 \times b_j \times (R_m - R_f)$$

That formula can be restated as follows:

$$R_j = R_f + (0.25 + 0.75 \times b_j) \times (R_m - R_f) \qquad (1)$$

Consequently, the Empirical CAPM effectively substitutes a weighted average beta for security *j*'s raw beta. In Ms Ahern's Empirical CAPM, the weighted average beta effectively equals the sum of 0.25 times the market beta of 1.0, and 0.75 times security *j*'s raw beta. Yet, Value Line betas are already adjusted using the following formula:

$$b_{Value\ Line} = 0.35 + 0.67 \times b_{raw}$$ [42]

Substituting the Value Line adjustment formula into the CAPM produces an Empirical CAPM with slightly different parameters:

$$R_j = R_f + (0.35 + 0.67 \times b_j) \times (R_m - R_f)$$

Substituting Value Line betas into Ms. Ahern's Empirical CAPM in place of raw betas increases the weight (compare equations (1) and (2)) of the market beta (where b=1, i.e., the intercept) and reduces the weight of the raw beta:

$$R_j = R_f + (0.51 + 0.50 \times b_j) \times (R_m - R_f) \qquad (2)$$

Therefore, including Value Line adjusted betas in Ms. Ahern's Empirical CAPM leads to an overstated estimate of the cost of common equity whenever the raw beta is less than one, since the weight of raw beta is being reduced in favor of the market beta of 1.0.

Risk Premium Model

50. Q. Please explain Ms. Ahern's RPM analysis.

A. Ms. Ahern's RPM is essentially an average of two distinct risk premium models for each proxy group.[43] The following formula, derived on Schedule 7.10, depicts Ms. Ahern's RPM model as:

$$R_j = \frac{(R_{A2} + b_j \times RP_1) + (R_{A2} + RP_2)}{2}$$

Each model begins with the same "Adjusted Prospective Bond Yield," R_{A2} (8.3%), which, ostensibly, represents the prospective yield on bonds rated A2 by Moody's, the average credit rating of the proxy group of seven water companies. To R_{A2}, the first model adds the product of the Value Line adjusted Beta for the proxy group of seven water companies, b_j, (0.54) and

[42] Statman, "Betas compared: Merrill Lynch vs. Value Line," *Journal of Portfolio Management*, Winter 1981, pp. 41-44.

[43] For presentation purposes, I will only address the proxy group of seven water companies; however, the proxy group of eight public utility companies is conceptually the same.

the average of the historical and forecasted risk premium estimates, RP_1, (8.9%). The second model adds to R_{A2} an historical risk premium estimate, RP_2, (4.6%). Inputting Ms. Ahern's estimates[44] produces a cost of equity estimate of 13.0% as shown below:

$$R_j = \frac{(8.3\% + 0.54 \times 8.9\%) + (8.3\% + 4.6\%)}{2} = 13.0\%$$

51. Q. Please describe the shortcomings of Ms. Ahern's risk premium model.

A. In addition to the inappropriate use of historical input data, as discussed previously, both of the models incorporated into Ms. Ahern's RPM analysis are also flawed in other respects. The first model in Ms. Ahern's risk premium analysis ($R_{A2} + b_j \times RP_1$) is a CAPM derivation using improper proxies for the risk-free rate. There are two fundamental flaws to this approach. First, Ms. Ahern improperly applied a market risk premium-based beta to a non-market risk premium. Second, she inappropriately incorporated two different long-term corporate bond yields as substitutes for the risk-free rate within the same risk premium model. The second model in Ms. Ahern's risk premium analysis ($R_{A2} + RP_2$) is also flawed, due to the improper derivation of the equity risk premium.

52. Q. Please explain why the application of a market risk premium-based beta to a non-market risk premium is inappropriate.

[44] Company Exhibit 7, Schedule 15, pp.1, 6, and 8.

A. The Value Line betas used by Ms. Ahern were developed by regressing each company's excess returns over the risk-free rate (company-specific risk premium) against the excess returns of the market over the risk-free rate (market risk premium). That is, a Value Line beta is a measure of the relationship between the market risk premium and the risk premium of a given company. Beta measures relative market risk and cannot be assumed to accurately measure any other type of risk. To illustrate, the beta-based risk premium model can be depicted mathematically as follows:

$$R_j = R_{A\text{-}bond} + b_j \times (R_m - R_{A\text{-}bond}) \qquad (3)$$

where $R_j \equiv R_j \equiv$ the required rate of return for security j;
$R_{A\text{-}bond} \equiv R_{A\text{-}bond} \equiv$ the A-rated utility bond rate;
$R_m \equiv R_m \equiv$ the expected rate of return for the market portfolio; and
$b_j \equiv b_j \equiv$ the measure of risk for security j.

The above model is identical to the CAPM except that it substitutes a risky debt rate, $R_{A\text{-}bond}$, for the risk-free rate, R_f, a substitution which has no basis in financial theory. The CAPM can be expressed as:

$$R_j = [(1 - b_j) \times R_f] + (b_j \times R_m)$$

Likewise, the risk premium model can be rewritten as:

$$R_j = [(1 - b_j) \times R_{A\text{-}bond}] + (b_j \times R_m)$$

Comparing the CAPM and the risk premium models above, it is evident that since the cost of risky debt, $R_{A\text{-}bond}$, exceeds the risk-free rate, R_f, this basic risk premium model systematically underestimates the cost of equity for companies with a beta greater than one and <u>overestimates the cost of common equity for all companies with betas less than one</u>, which applies to all the companies in Ms. Ahern's proxy group.

53. Q. Please explain the consequences of incorporating two different long-term corporate bond yields as substitutes for the risk-free rate in a risk premium model.

A. The first of the two models averaged in Ms. Ahern's risk premium analysis differs slightly from the basic risk premium model (3) presented above, in that it substitutes two different long-term corporate bond yields for the risk-free rate within the same model. The following general model was employed by Ms. Ahern in her risk premium analysis:

$$R_j = R_{A2} + b_j \times (R_m - R_{Other})$$

A fundamental tenet of financial theory states that investors require identical returns from two securities with identical risk. A closer look at the above model verifies that whenever R_{Other} is not equal to R_{A2}, then the model violates that principle. To illustrate, consider a company, *j*, whose risk is equal to that of the market ($b_m = b_j = 1$). Financial theory posits that the expected return on company *j* stock should equal that of the market. Substituting a beta of one into the above formula produces:

$$R_j = R_{A2} + (R_m - R_{Other})$$

When $R_{A2} = R_{Other}$, the above formula will reduce to $R_j = R_m$, which conforms to the aforementioned tenet of financial theory. However, when $R_{A2} \neq R_{Other}$, then $R_j \neq R_m$. That is, the estimated return for security *j* does not equal the estimated return on the market, even although they both have the same risk level ($b_m = b_j = 1$). Ms. Ahern used an R_{A2} of 8.3% and an R_{other} of 5.9% and 7.7% (average = 6.8%), with an R_m of 13.3% and 18.0% (average = 15.65%) in her first model. This would result in an estimated return (R_j) of 17.15% for a company with a beta of one (the same as the market), although the estimated market return (R_m) is only 15.65%. Clearly, the first of the two models Ms. Ahern averaged in her RPM analysis is theoretically untenable. In fact, as long as R_{A2} is greater than R_{Other}, this model will overestimate the cost of equity for companies with a beta less than one, which includes every company in her proxy groups.

54. Q. Please explain how the equity risk premium in the second model in Ms. Ahern's risk premium analysis ($R_{A2} + RP_2$) was improperly derived.

A. To estimate the risk premium for her second model (RP_2), Ms. Ahern selected the historical measurement period of 1928-1999.[45] First, Ms. Ahern calculated a market equity risk premium by subtracting the Salomon Brothers Long-Term High Grade Corporate Bond Index yield from the S&P Public Utility Index (11.0% - 5.9% = 5.1%). Next, Ms. Ahern estimated the spread between the Salomon Brothers Long-Term High Grade Corporate Bond Index yield and A rated public utility bonds, to reflect the average rating of the

[45] Company Exhibit 7, Schedule 15, p. 8.

proxy group of seven. To do so, she subtracted the arithmetic mean yields on Aaa and Aa rated bonds (used as a proxy for the Salomon Brothers Long-Term High Grade Corporate Bond Index yield) from the yield on A rated public utility bonds (6.58% - 6.12% = 0.46%, which she rounded to 0.5%). Finally, she calculated an adjusted equity risk premium by subtracting the spread between the Salomon Brothers Long-Term High Grade Corporate Bond Index yield and A rated public utility bonds (0.5%) from the equity risk premium (5.1%).

The adjusted equity risk premium in the second of the two models averaged in Ms. Ahern's RPM analysis is inappropriate for three reasons. First, it uses historical data, which, as discussed previously, is inappropriate. Second, it overstates the equity risk premium by substituting a derived 6.4% return on A-rated utility bonds for an observable 6.6% return (rounded from 6.58%). That is, she subtracted a derived 6.4% estimate from the 11.0% equity index return, yielding 4.6%, rather than subtracting the directly observable 6.6%, which would have produced a 4.4% equity risk premium. Third, it is based upon S&P's Public Utility Index, which Ms. Ahern has not demonstrated to be comparable in risk to CIWC.

Comparable Earnings Model

55. Q. Please describe the shortcomings of Ms. Ahern's comparable earnings analysis.

A. In addition to the use of historical data, Ms. Ahern's CEM suffers several other shortcomings. First, the return estimated by the comparable earnings

analysis can be significantly distorted by accounting practices. Accounting returns between two companies may not be directly comparable, particularly if those companies are from different industries. Specifically, the accounting return between a company which follows regulatory accounting rules may not be directly comparable to the return of an unregulated company. Differences in accounting practices can have a significant impact on accounting rate of return. Since Ms. Ahern's comparison group consists of 18 non-utility companies, the comparability of earnings to the water and utility proxy groups being considered is highly questionable. Second, Ms. Ahern's comparable earnings analysis relies on the notion that a combination of realized and expected returns on book value ("accounting earnings") is an appropriate estimate for required returns, the fallacies of which are discussed below. Third, the two comparable earnings proxy samples have higher average Value Line betas, and are thus riskier, than the samples they are supposed to represent. The CEM sample representing the Water Group has a beta of 0.64, while the Water Group's beta is 0.53. The CEM sample representing the Utility Group has a beta of 0.67, while the Utility Group's beta is 0.57.[46] Thus, even if accounting earnings were representative of investor requirements, which they are not, the comparable earnings model would overstate the cost of the equity estimates for both of Ms. Ahern's proxy groups. All of the above indicate that the comparable earnings model is not an appropriate method for estimating the rate of return for CIWC.

56. Q. Please explain why returns on book value are inappropriate estimates for investor-required returns.

[46] CIWC Exhibit 7, Schedule 17, pp. 1-2.

A. The cost of common equity is the market-required rate of return demanded by investors. In contrast, Ms. Ahern's CEM is not a market-based methodology.[47] The returns Ms. Ahern uses are based on the return on net worth reported in Value Line, rather than the return on market value.[48] The comparable earnings method incorrectly implies that the rate of return on book common equity is equivalent to current investor-required rates of return. There is simply no basis for that implication since the accounting return that the comparable earnings method measures may be more or less than the return investors require from an investment. For example, if the expected return is 20% while the investor-required rate of return is only 10%, investors will bid up the price in the marketplace until the expected returns on market equity equal the required 10% return. The market price of a common stock does not achieve equilibrium until the expected rate of return on the common stock equals the investor required rate of return. In contrast, the return on book value has no such adjustment mechanism since the denominator, book value, is unresponsive to market forces.

Size-based Risk Premium

57. Q. Is Ms. Ahern's adjustment for a size-based risk premium appropriate?

A. No. First, Ms. Ahern's size-based risk premium has no theoretical basis. Rather, it is based on an empirical study that is not applicable to CIWC. Second, Ms. Ahern inappropriately applied her size-based risk premium to

[47] Despite Ms. Ahern's claim that her CEM model is market-based because "the selection of non-price regulated firms of comparable risk is based upon statistics derived from the market prices paid by investors," (CIWC Exhibit 7, p. 44) the CEM model cannot be considered market-based, as the returns estimated by her model are based on book values, which are unresponsive to market forces.

her overall analysis rather than applying it to the CAPM and RPM analyses before averaging in the DCF. Regardless, should a size-based risk premium be adopted, it should be based on the size of CIWC's parent company, Philadelphia Suburban Corporation ("PSC").[49]

58. Q. Why should the parent company be the basis for a size adjustment?

A. Although CIWC raises its own debt and preferred stock, it obtains common equity financing from its parent company, PSC. The merging of PSC and Consumers Water Company created the second largest water company in the United States based on market capitalization. Being a part of a much larger organization should enhance the ability of CIWC to access the market on reasonable terms. When utilities combine, reductions in costs resulting from efficiencies should be passed on to customers in the form of lower rates. Such economies of scale are often advanced to justify utility combinations. Financial capital costs are also subject to economies of scale. If the risk inherent in a utility common stock is a function of that utility's size, then the larger size of PSC should translate into a decreased cost of common equity, in comparison to that of a company the size of CIWC. If a risk premium were based on the size of CIWC, rate payers would be denied the benefits associated with the combined entity's stronger financial profile.

59. Q. Please explain the significance of the absence of a theoretical basis for a size-based risk premium.

[48] CIWC Exhibit 7, p. 47.

A. Since a size-based risk premium has no theoretical basis, to the extent that a correlation between firm size and return exists, that relationship is likely the result of some other factor or factors that are related to both size and return, such as liquidity or information costs. Relatively illiquid securities impose costs on the investor since he or she may be unable to sell them at a fair price on a timely basis. The securities of smaller companies tend to be less liquid than those of larger companies since the potential breadth of the market for the former is usually more limited. In addition, gathering information regarding the expected cash flows and risks of a security imposes costs that an investor must recover through the returns that the security generates. If fewer sources of information regarding smaller companies exist, then obtaining information might be more expensive.

If the securities of PSC are less liquid or the availability of information regarding PSC is more restricted than the average security, then adding a size-based premium to a risk premium or CAPM analysis of CIWC's cost of common equity might be proper. However, Ms. Ahern has not provided any theoretical or empirical evidence to demonstrate that a size premium is warranted for <u>utilities</u>. The study reported in Ibbotson Associates, which forms the basis of Ms. Ahern's size-based risk premium adjustment,[50] is not restricted to utilities. Rather, it is based on the stocks listed on the New York Stock Exchange.[51] In addition, the Brigham text that Ms. Ahern also cites in support of her sized-based premium adjustment[52] does not specifically refer

[49] PSC and Consumers Water Company completed their merger in March of 1999.
[50] CIWC Exhibit 7, p. 12 and Company response to Staff Data Request MGM 1.09.
[51] Ibbotson Associates, *SBBI 2000 Yearbook*, pp. 129.
[52] CIWC Exhibit 7, p. 12 and Company response to Staff Data Request MGM 1.08.

to utility stocks either. Thus, the entire basis of Ms. Ahern's size-based risk premium is questionable at best.

Utilities, unlike most stocks listed on the New York Stock Exchange, are subject to uniform reporting requirements. Furthermore, their rates and conditions of service are publicly reported. Therefore, the cost of obtaining information regarding smaller utilities in general, and CIWC in particular, is unlikely to be as high as that of unregulated companies that are similar in size; hence, the application of a size-based premium to a utility is highly questionable. In fact, in direct contrast with Ms. Ahern's claims, a study by Annie Wong, reported in the *Journal of the Midwest Finance Association*, specifically found no justification for a size-based premium for utilities.[53]

Even for non-utilities, evidence of the existence of a size-based risk premium is not very strong. Ibbotson Associates data shows that out of a 1926-1999 study period, small stocks consistently out-performed large stocks only during the 1963-1983 period.[54] Fernholz found that a statistical property he termed the "crossover effect" was the primary cause of the difference between large and small company stock returns. The "crossover effect" measures the effect on rate of return of those stocks that switch from one size portfolio to another.[55] Fernholz states that as random price changes affect the size of stocks, some stocks cross over from one size portfolio to another. When a stock that starts in the large stock portfolio experiences a

[53] Wong, "Utility Stocks and the Size Effect: an Empirical Analysis," *Journal of the Midwest Finance Association*, 1993, pp. 95-101.

[54] Ibbotson Associates, *SBBI 2000 Yearbook* , pp. 38-39.

[55] Fernholz, "Crossovers, Dividends, and the Size Effect," *Financial Analysts Journal*, May/June1998, pp. 73-75.

random negative price change that moves it into the small stock portfolio, its resulting negative return is assigned to, and therefore reduces, the return on the large stock portfolio. Conversely, when that same stock experiences a random positive price change that moves it back into the large stock portfolio, its resulting positive return is assigned to, and therefore increases, the return on the small stock portfolio.[56] The combination of portfolio construction and random (i.e., non-systematic) price movements creates a biased source of measurement error. Thus, the "small stock effect" may be less a market return phenomenon than a modeling problem. That is, the "small stock effect" may be nothing more than a statistical anomaly.

In another study of domestic stocks listed on the NYSE and AMEX, Jensen, Johnson and Mercer, (hereinafter "Jensen") found that small stock premiums appear to be related to monetary policy. Specifically, changes in monetary policy play a prominent role in determining the magnitude of small stock premiums. During expansive monetary periods, defined as months following a reduction in the Federal Reserve discount rate, Jensen found that small stock returns were significantly greater than large stock returns. Conversely, during restrictive monetary periods, defined as months following an increase in the discount rate, Jensen found that small stock returns were not significantly greater than large stock returns.[57] Nevertheless, the applicability of the Jensen results to small utility stocks is doubtful. First, since the Jensen study was based on largely non-utility companies, its findings that small stocks outperformed large stocks during "expansionary" monetary periods is

[56] Fernholz, "Crossovers, Dividends, and the Size Effect," *Financial Analysts Journal*, May/June1998, p. 73.

[57] Jensen, Johnson, and Mercer, "The Inconsistency of Small-Firm and Value Stock Premiums," *Journal of Portfolio Management*, p. 35.

not surprising. During monetary expansions, as the supply of loanable funds increases, investors are more likely to invest in speculative, small company stocks. However, during monetary contractions, as the supply of loanable funds decreases, investors are more likely to switch from speculative investments to safer ones – the well-known "flight to quality." It is counter-intuitive to claim that investors would consider the smaller firms in the regulated utility sector to be speculative investments; and Ms. Ahern has not supported that premise. Moreover, the Jensen study did not control its measurement of the small stock premium for risk as measured by beta or other means.[58] Therefore, the study does not support Ms. Ahern's size-based risk premium adjustment.

Even if a size-based risk premium exists for utilities, which it does not, Ms. Ahern's estimates of the size of the premium are questionable. First, Ms. Ahern's size-based risk premiums are based on historical returns whose shortcomings as proxies for expected returns were previously addressed.

Second, as noted previously, Ms. Ahern's historical size-based risk premium is based on the realized returns of the stocks listed on the New York Stock Exchange. That implies that small utility stocks are similar to small industrial stocks, a very questionable premise that Ms. Ahern did not verify. Ibbotson Associates issued a similar warning against applying its results outside stocks listed on the New York Stock Exchange.[59]

[58] Jensen, Johnson, and Mercer, "The Inconsistency of Small-Firm and Value Stock Premiums," *Journal of Portfolio Management*, pp. 30 and 34.
[59] Ibbotson Associates, *SBBI 2000 Yearbook*, p. 139.

Finally, Ms. Ahern's application of a size-based risk premium, on the basis of Ibbotson Associates' historical size-based risk premiums, is probably inconsistent with the manner in which Ibbotson Associates measured the historical size-based risk premiums. While Ms. Ahern adds a size-based premium to her CAPM-based risk premium analysis, which is based on adjusted Value Line betas, the studies I have reviewed on the effect of size on returns employ raw betas.[60] Since the Ibbotson Associates size-based risk premiums are a function of raw beta, Ms. Ahern should have used the same type of betas as Ibbotson Associates.

60. Q. Ms. Ahern applied her size-based risk premium to her final composite estimate of CIWC's cost of equity.[61] Is that appropriate?

A. No. By applying her size-based risk premium to her final composite estimate of CIWC's cost of equity, Ms. Ahern effectively applied it to her DCF results as well. However, additional risk premiums are never added to DCF-based cost of common equity estimates for market and financial risks since those risks are already reflected in the stock price parameter of DCF analysis. The alleged existence of a size-based risk premium stems from a belief that stock price movements are related to firm size. If the size-based risk premium exists, it would be reflected in the stock price parameter of DCF analysis. Therefore, no adjustment to the DCF analysis for the size effect would be necessary. Conversely, if the DCF-derived estimates of the cost of common equity did not reflect a risk premium associated with firm

[60] Wong, "Utility Stocks and the Size Effect: an Empirical Analysis," *Journal of the Midwest Finance Association*, 1993, p. 96; Ibbotson, Kaplan and Peterson, "Estimates of Small-Stock Betas Are Much Too Low," *Journal of Portfolio Management*, Summer 1997, p. 106.

[61] CIWC Exhibit 7, p. 6.

size, it could only be due to an absence of such a premium in stock prices. If stock prices did not reflect a size premium, then Ibbotson Associates and other researchers never would have detected a phenomenon in stock returns that resembles a size premium.

61. Q. If the alleged size-based risk premium is already reflected in stock prices, why might it be appropriate to add it to a CAPM-based analysis?

A. The alleged existence of a size-based risk premium stems from a supposed failure of the risk component of the CAPM, beta, to adequately explain the returns of smaller companies.[62] According to portfolio theory, unexpected variation in market returns (i.e., market risk) is the only source of risk that is priced. Therefore, beta reflects only that portion of stock return variation that can be attributed to variation in the returns of the market portfolio as a whole. The alleged existence of a size-based risk premium implies that small company stocks exhibit return variation that investors consider relevant in valuing common stocks but that market-wide common stock return variation cannot explain.

In summary, although the relationship between firm size and return has been studied from various angles, no theoretical or empirical support has been found for the notion that investors require higher rates of return from relatively small utility stocks than they do from relatively large utility stocks, contrary to the claims of Ms. Ahern. In fact, there is evidence specifically refuting such claims.

[62] Ibbotson Associates, *SBBI 2000 Yearbook*, p. 141.

1024 62. Q. Does this conclude your direct testimony?

1025 A. Yes, it does.