BEFORE THE
TENNESSEE REGULATORY AUTHORITY

DIRECT TESTIMONY OF MICHAEL J. VILBERT

ON BEHALF OF TENNESSEE-AMERICAN WATER

CASE NO. 06-_____

CONCERNING

COST OF CAPITAL

NOVEMBER 17, 2006

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I. INTRODUCTION AND SUMMARY

Q1. Please state your name and address for the record.

A1. My name is Michael J. Vilbert. My business address is The Brattle Group, 44 Brattle Street, Cambridge, MA 02138, USA.

Q2. Please describe your job and your educational experience.

A2. I am a Principal of The Brattle Group, ("Brattle"), an economic, environmental and management consulting firm with offices in Cambridge, Washington, London, San Francisco and Brussels. My work concentrates on financial and regulatory economics. I hold a B.S. from the U.S. Air Force Academy and a Ph.D. in finance from the Wharton School of Business at the University of Pennsylvania.

Q3. What is the purpose of your testimony in this proceeding?

A3. I have been asked by Tennessee-American Water ("Tennessee-American" or the "Company") to estimate the cost of equity that the Tennessee Regulatory Authority (the "TRA" or the "Authority") should allow Tennessee-American an opportunity to earn on the equity financed portion of its rate base.

To accomplish this task, I estimate the overall cost of capital for two samples of regulated companies using the discounted cash flow ("DCF") and the risk positioning models. I then evaluate the relative risk of Tennessee-American and the sample companies to determine the recommended cost of equity for a capital structure with 43 percent equity, which is the percent equity in Tennessee-American's proposed capital structure in the filing for this proceeding.

Q4. Please summarize any parts of your background and experience that are particularly relevant to your testimony on these matters.

A4. Brattle's specialties include financial economics, regulatory economics, and the gas and electric industries. I have worked in the areas of cost of capital, investment risk and related matters for many industries, regulated and unregulated alike, in many forums. I have testified or filed cost of capital testimony before the Federal Energy Regulatory Commission, the Arizona Corporation Commission, the Pennsylvania Public Utility Commission, the Public Service Commission of West Virginia, the Canadian National Energy Board, Alberta Energy and Utilities Board, the Ontario Energy Board, and the Labrador & Newfoundland Board of Commissioners of Public Utilities. I have not previously testified before this Authority. Appendix A contains more information on my professional qualifications.

Q5. Please summarize how you approached this task.

A5. I review the evidence from two samples, a sample of regulated water utilities and a sample of natural gas local distribution companies ("gas LDC"). I use the results of the gas LDC sample as a check on the results of the water sample. I give the results from the two samples about equal weight. My analyses considers cost of capital evidence from the risk positioning and discounted cash flow models, but I rely primarily on the risk positioning results because I do not believe that the DCF method is completely reliable at this time.

Specifically, I estimate the cost of equity for the companies in the two benchmark samples using both cost of equity estimation methods. Given the cost of equity estimates for each company and the sample company's market costs of debt and preferred stock, I calculate each firm's overall cost of capital, i.e., its after-tax weighted-average cost of capital ("ATWACC"), using the

company's market value capital structure. For each method of estimating the return on equity, I report the sample average ATWACC and the cost of equity for a capital structure with 43 percent equity. I thus present the cost of equity that is consistent with the sample's market information and Tennessee-American's regulatory capital structure. (By "regulatory capital structure," I mean the capital structure that Tennessee-American utilizes in its application.[1])

This method automatically avoids problems that can arise when an analyst focuses separately on the individual components of the overall cost of capital. The danger with that approach is that the estimated cost of equity may correspond to a very different level of financial risk than would exist at the regulated company's capital structure. The result could be an inconsistency between the allowed return on equity and the regulatory capital structure.

For the water sample, the results of the DCF model are more variable and are less reliable than those based upon the risk positioning model; however, I provide results using the DCF method because it is a method that has been used extensively in the past. In addition, the DCF model results serve as a check on the results from the equity risk positioning approach. For the gas LDC sample, the earnings growth rate forecasts are much less variable and are consistent with the long-term forecast of GDP growth. Therefore, I give some weight to the DCF estimates for the gas LDC sample.

Q6. What is your conclusion on the market-determined cost of capital for Tennessee-American based upon the results from the two samples of regulated companies you selected?

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[1] The capital structure that I use in the analyses that follows in based upon the long-term sources of capital, i.e., long-term debt, preferred equity and common equity. I do not use short-term debt because long-term assets are not generally financed with short-term debt.

A6. The best point estimate of the cost of equity for Tennessee-American is 11¼ percent for a capital structure with 43 percent equity, but it is more correct that the sample results indicate a range for the cost of equity estimates from 10¾ to 11¾ percent. The cost of capital estimates for the water sample are higher than for the gas LDC sample. The midpoint of the range of the overall cost of capital estimates for the water sample is 7½ percent with a range of 7¼ to 7¾ percent. The corresponding cost of equity is 12½ percent with a range of 12 to 13 percent. The midpoint of the gas LDC's overall cost of capital estimates is between 7 and 7¼ percent with a range of 6¾ to 7½ percent. The corresponding cost of equity is about 11¼ percent a with range of 10¾ to 11¾ percent. The full range of cost of equity estimates from samples is 10¾ to 13 percent.

Note, that I specify a plus or minus ½ percent range for the return on equity and specify the point estimate to the nearest ¼ percent because I do not believe that it is possible to estimate the cost of capital more precisely than that.

Q7. How is your testimony organized?

A7. *Section II* formally defines the cost of capital and touches on the principles relating to the cost of capital and capital structure for a business. Appendix B provides additional detail on these points. *Section III* presents the methods used to estimate the cost of capital for the benchmark samples and the associated numerical analyses, and explains the basis of my conclusions for the benchmark samples' returns on equity and overall costs of capital. *Section IV* presents the results of these methods applied to each of the benchmark sample groups, and presents the fair cost of equity implied by these benchmark groups. My conclusions on the cost of equity for Tennessee-American are presented in *Section V*. Appendices B and C support *Sections III* and *IV* with

additional details on the risk positioning and DCF approaches, respectively, including the details of the numerical analyses. Appendix D discusses the effect of debt on the cost of equity.

II. COST OF CAPITAL THEORY

A. The Cost of Capital and Risk

Q8. Please formally define the "Cost of Capital."

A8. The *cost of capital* can be defined as *the expected rate of return in capital markets on alternative investments of equivalent risk.* In other words, it is the rate of return investors require based on the risk-return alternatives available in competitive capital markets. The cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. "Expected" is used in the statistical sense: the mean of the distribution of possible outcomes. The terms "expect"and "expected" in this testimony, as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

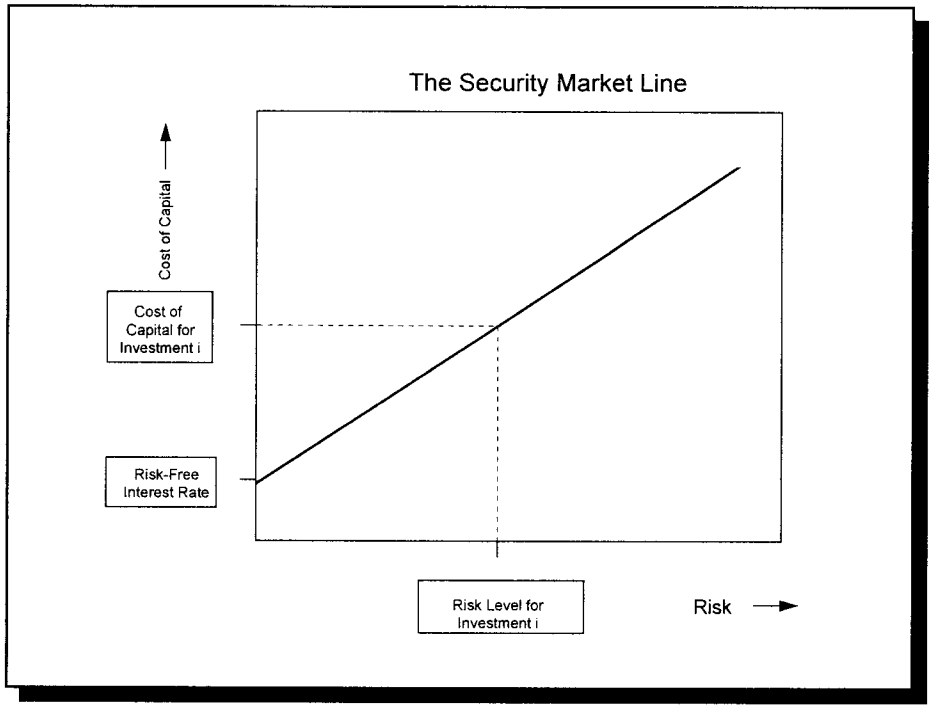

Figure 1

The definition of the cost of capital recognizes a tradeoff between risk and return that is known as the "security market risk-return line," or "security market line" for short. This line is depicted in figure 1. The higher the risk, the higher the cost of capital. A version of figure 1 applies for all investments. However, for different types of securities, the location of the line may depend on corporate and personal tax rates.

Q9. Why is the cost of capital relevant in rate regulation?

A9. It has become routine in U.S. rate regulation to accept the "cost of capital" as the right expected rate of return on utility investment.[2] From an economic perspective, rate levels that give investors a fair opportunity to earn the cost of capital are the lowest levels that compensate investors for the

[2] To the best of my knowledge, the first paper formally to link the cost of capital as defined by financial economics with the right expected rate of return for utilities is Stewart C. Myers, *Application of Finance Theory to Public Utility Rate Cases*, *The Bell Journal of Economics and Management Science*, 3:58-97 (Spring 1972).

risks they bear. Over the long run, an expected return above the cost of capital makes customers overpay for service. Regulatory commissions normally try to prevent such outcomes, unless there are offsetting benefits (e.g., from incentive regulation that reduces future costs). At the same time, an expected return below the cost of capital shortchanges investors. In the long run, such a return denies the company the ability to attract capital, to maintain its financial integrity, and to expect a return commensurate with that of other enterprises attended by corresponding risks and uncertainties. As a result, it may cost consumers more in the long run. Appendix B discusses further the consequences of a systematic failure to give investors a fair opportunity to earn the cost of capital.

Of course, the cost of capital cannot be estimated with perfect certainty, and other aspects of the way the revenue requirement is set may mean investors expect to earn more or less than the cost of capital even if the allowed rate of return equals the cost of capital exactly. However, an authority that on average sets rates so investors expect to earn the cost of capital treats both customers and investors fairly, and acts in the long-run interests of both groups.

B. Business Risk vs. Financial Risk: Capital Structure and the Cost of Equity

Q10. Please explain briefly the difference between business risk and financial risk.

A10. Business risk is the risk of a company from its line of business if it used no debt financing. When a firm uses debt to finance its assets, the business risk of the assets is shared between the debt holders and the equity holders, but the equity holders bear more of the risk because debt holders have a prior claim on the company's cash flows. Equity holders are residual claimants which simply means that equity holders get paid last. The goal of selecting a sample is to select

companies whose business risk is judged to be comparable to the regulated company in the proceeding.

Q11. Please explain why it is necessary to report the cost of equity adjusted for capital structure.

A11. Briefly, rate regulation in north America evolved to focus on the components of the overall cost of capital, and in particular, on what the "right" cost of equity and capital structure should be. Frequently, there is no consideration of whether the financial risk of the sample companies differ among themselves and differ from the regulated company. The cost of equity estimated from the standard models reflects both the business and financial risk of the sample companies. However, the overall cost of capital depends primarily on the business the firm is in, while the costs of the debt and equity components depend not only on the business risk but also on the distribution of revenues between debt and equity. The overall cost of capital is thus the more basic concept. As I explain in Appendix B, the overall cost of capital is constant within a broad middle range, but the distribution of the costs and risks among debt and equity is not. Appendix B sets out the principles and procedures on which I rely.

C. Implications for Analysis

Q12. Please explain the implications of the relationship between capital structure and the cost of equity on your testimony.

A12. An approach that estimates the cost of equity for each of the sample firms without explicit consideration of the market value capital structure underlying those costs risks material errors. The costs of equity of the sample companies at their actual market-value capital structures do not necessarily correspond to the financial risk faced by equityholders in the regulated company, and

thus could lead to an unfair rate of return. I avoid this problem by calculating each sample company's ATWACC using its market value capital structure. Using the sample's average overall cost of capital, I then determine the corresponding return on equity at Tennessee-American's regulatory capital structure. This procedure ensures that the capital structure and the estimated cost of equity are consistent.

In the following analyses, I estimate the cost of equity for each of the sample firms using traditional estimation methods. I use each company's estimated cost of equity along with Tennessee-American's marginal tax rate and each company's cost of debt and market-value capital structure to estimate the sample company's overall cost of capital. I then calculate the sample average overall cost of capital for each equity estimation method for both of the samples. Using the procedure discussed above, I then determine the cost of equity at Tennessee-American's regulated capital structure for each estimation method that is consistent with the sample's overall cost of capital information.

III. COST OF CAPITAL METHODOLOGY

Q13. How is this section of your testimony organized?

A13. As noted in *Section II*, I estimate the cost of capital using two samples of comparable risk companies. This section first covers matters such as sample selection, market-value capital structure determination, and the sample companies' costs of debt. It then covers estimation of the cost of equity for the sample companies and the resulting estimates of the sample's overall after-tax cost of capital. Next, it analyzes these data to reach a conclusion on the overall cost of capital

and the corresponding cost of equity at Tennessee-American's regulatory capital structure for both of the benchmark samples.

A. Use of Proxy Groups

Q14. What preliminary decisions are needed to implement the above principles?

A14. I must select the benchmark samples, calculate the sample companies' market-value capital structures, and determine the sample companies' market costs of debt, preferred equity and common equity.

Q15. Why is it necessary to use two samples?

A15. The overall cost of capital for a part of a company depends on the risk of the business in which the *part* is engaged, *not* on the overall risk of the parent company on a consolidated basis. According to financial theory, the overall risk of a diversified company equals the market-value-weighted average of the risks of its components.

Estimating the cost of capital for Tennessee-American's regulated assets is the subject of this proceeding. The ideal sample would be a number of companies that are publicly traded "pure plays" in the water production, storage, treatment, transmission and distribution lines of business. "Pure play" is an investment term referring to companies with operations only in one line of business. Publicly traded firms, firms whose shares are freely traded on stock exchanges, are ideal because the best way to infer the cost of capital is to examine evidence from capital markets on companies in the given line of business.

In this case, a sample of companies whose operations are concentrated solely in the regulated portion of the water industry would be ideal. Unfortunately, the available sample of pure

"water" companies in the U.S. is relatively small and has certain data problems.[3] My standard selection procedure, for example, requires that data from S&P or Moody's, *Value Line*, I/B/E/S and Compustat be available for included companies. Moreover, the companies must have a high percentage of revenues from regulated operations, no significant merger activity in the previous five years, and no recent dividend cuts or other activity that could cause the growth rates or beta estimates to be biased. If these standards were applied to the companies in the water sample it would leave at most only two companies.[4] Even these two companies have relatively low trading volumes and other data issues that make cost of capital estimation procedures less reliable.[5] A two company sample is simply too small to provide reliable results, so I keep the other companies in my sample.

Q16. But if this is the best available sample of regulated water utilities, what else can be done?

A16. Given the concerns with the water sample, it is prudent to compare the cost of capital estimates from the water sample to estimates from a second sample of regulated companies. Absent such comparison, the expert can have insufficient confidence in the water sample estimates.

A cross-check on the water sample results is provided here by a sample of companies whose operations are concentrated in the natural gas distribution business, which is in a regulated portion of the natural gas industry. The gas LDC sample consists of larger companies with high proportion of revenues from rate regulated activities and has been selected to eliminate, as much as possible, companies with company-specific factors that may affect the cost of capital estimates.

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[3] See *Section IV.A.i* for an expanded discussion of the data issues with the sample companies.

[4] American States Water Co. and California Water Service.

[5] American States Water Co. has had some merger activity and has only one I/B/E/S earnings growth forecast.

Additional details of the sample selection process for each sample are described below as well as in Appendix B.

Q17. If the business risk of the second sample differs from the water sample, would that not invalidate any comparison between the cost of equity estimated for the second sample and the risk a water company?

A17. No. Even though the business and financial risk of the two samples may differ, the analyst can still make use of the information from a secondary sample.

Q18. Please elaborate on the way two samples with different business and financial risks can be compared.

A18. Calculating the overall after-tax weighted average cost of capital for each sample company as described above allows the analyst to estimate the average overall cost of capital for the sample. The ATWACC captures both the business risk and the financial risk of the sample companies in one number. This allows comparison of the cost of capital between two samples on a much more informed basis. If the alternative (more reliable) sample is judged to have slightly different business risk than the water sample, but the results show wide differences in the ATWACC estimates, the analyst should carefully consider the validity of the water sample estimates, whether they are materially higher or lower than the alternative sample's estimates. Of course, the alternative sample could be the source of the error, but this is something that can be further investigated given an observed difference in results. In this case, the results from the water sample and the alternative sample, the gas LDC sample, are generally similar. This gives me confidence that the cost of equity estimates from the water sample are reliable.

Q19. Please compare the characteristics of the water utility sample and the gas LDC sample.

A19. The two samples differ primarily in that they operate in two different (regulated) industries, but they are very similar in terms of the percentage of revenues from regulated operations and the customers they serve. Both samples earn a large percentage of their revenue from regulated activities, serve a mix of residential, industrial, and other customers, and involve pipeline transportation of a storable good. However, the gas LDC sample has fewer of the data and estimation issues identified above for the water sample. Please refer to Appendix B for addition details comparing the two samples.

B. Capital Structure & the Cost of Debt

1. Market-Value Capital Structure

Q20. What capital structure information do you require?

A20. For reasons discussed in Appendix D, explicit evaluation of the market-value capital structures of the sample companies is vital for a correct interpretation of the market evidence on the return on equity. This requires estimates of the market values of common equity, preferred equity and debt, and the current market costs of preferred equity and debt.

Q21. Please describe how you calculate the market values of common equity, preferred equity and debt.

A21. I estimate the capital structure for each sample company by estimating the market values of common equity, preferred equity and debt from the most recent publicly available data. The details are in Appendix B.

Briefly, the market value of common equity is the price per share times the number of shares outstanding. For the risk positioning approach, I use the last five trading days of each year to calculate the market value of equity for the year. I then calculate the average capital structure over the corresponding five-year period used to estimate the "beta" risk measures for the sample companies. This procedure matches the estimated beta to the degree of financial risk present during its estimation period. In the DCF analyses, I use the average stock price over 15 trading days ending on the release date of the I/B/E/S growth rate forecasts utilized in the DCF analysis.[6]

The market value of debt is estimated at its book value, because market and book values of debt do not differ much in the U.S. at this time. The market value of preferred stock for the samples is also set equal to its book value because the market values and book values do not differ much and because the percent of preferred stock in the capital structures of the sample companies is relatively small compared to the debt and common equity components.

2. Market Costs of Debt and Preferred Equity

Q22. How do you estimate the current market cost of debt?

A22. The market cost of debt for each company in the DCF analysis is the current yield reported in the Mergent Bond Record for an index of public utility company bonds corresponding to the sample company's current debt rating (or the five-year average debt rating for the risk positioning models) as classified by S&P or Moody's.[7] Calculation of the after-tax cost of debt uses the Company's estimated marginal income tax rate for 2006 of 39.2 percent.

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[6] September 8, 2006 for both the water utility sample and the gas LDC sample, except for Aqua American whose estimate is from August 17, 2006, and York Water Co. whose last forecast was released April 14, 2006.

[7] For some companies in the water utility sample, no bond ratings was found. The credit rating for these companies was assumed to be an A, comparable to the other utilities in the water sample. Details are in Appendix B.

Q23. How do you estimate the market cost of preferred equity?

A23. For both samples, the cost of preferred equity is set equal to the yield on an index of preferred stock as reported in the Mergent Bond Record corresponding to Moody's rating of each sample company's preferred stock in a manner analogous to that for the cost of debt.

C. Cost of Equity Methods

Q24. How do you estimate the cost of equity for your sample companies?

A24. Recall the definition of the cost of capital from the outset of my testimony: the expected rate of return in capital markets on alternative investments of equivalent risk. My cost of capital estimation procedures address three key points implied by the definition:

1. Since the cost of capital is an *expected* rate of return, it cannot be directly observed; it must be inferred from available evidence.
2. Since the cost of capital is determined *in capital markets* (*e.g.*, the New York Stock Exchange), data from capital markets provide the best evidence from which to infer it.
3. Since the cost of capital depends on the return offered by alternative investments *of equivalent risk*, measures of the risks that matter in capital markets are part of the evidence that needs to be examined.

Q25. How does the above definition help in cost of capital estimation?

A25. The definition of the cost of capital recognizes a tradeoff between risk and expected return, plotted above in Figure 1, the security market line. Cost of capital estimation methods take one of two approaches: (1) they try to identify a comparable-risk sample of companies and to estimate the cost of capital directly; or (2) they establish the location of the security market line and estimate

the relative risk of the security, which jointly determine the cost of capital. In terms of figure 1, the first approach focuses directly on the vertical axis, while the second focuses both on the security's position on the horizontal axis and on the position of the security market line.

The first type of approach is more direct, but ignores the wealth of information available on securities not thought to be of precisely comparable risk. The "discounted cash flow" or "DCF" model is an example. The second type of approach, sometimes known as "equity risk premium approach," requires an extra step, but as a result can make use of information on all securities, not just a very limited subset. The Capital Asset Pricing Model ("CAPM") is an example. While both approaches can work equally well if conditions are right, one may be preferable to the other under other circumstances. In particular, approaches that rely on the entire security market line are less sensitive to deviations from the assumptions that underlie the model, all else equal. I examine both DCF and risk positioning approach evidence for the samples.

1. The Risk Positioning Approach

Q26. Please explain the risk positioning method.

A26. The risk positioning method estimates the cost of equity as the sum of a current interest rate and a company specific risk premium. It is therefore sometimes also known as the "risk premium" approach. This approach may sometimes be applied informally. For example, an analyst or an authority may check the spread between interest rates and what is believed to be a reasonable estimate of the cost of capital at one time, and then apply that spread to changed interest rates to get a new estimate of the cost of capital at another time.

More formal applications of the risk positioning approach take full advantage of the security market line depicted in figure 1: they use information on all securities to identify the

security market line and derive the cost of capital for the individual security based on that security's relative risk. This reliance on the entire security market line makes the method less vulnerable to the kinds of problems that arise for the DCF method, which relies on one stock at a time. The risk positioning approach is widely used and underlies most of the current research published in academic journals on the nature, determinants and magnitude of the cost of capital.

Section I of Appendix B to this testimony provides more detail on the principles that underlie the risk positioning approach. *Section II* of Appendix B provides the details of the risk positioning approach empirical estimates I obtain.

Q27. How are the "more formal" applications of risk positioning approach implemented?

A27. The first step is to specify the current values of the benchmarks that determine the security market line. The second is to determine the security's, or investment's, relative risk. The third is to specify exactly how the benchmarks combine to produce the security market line, so the company's cost of capital can be calculated based on its relative risk. All of these elements and how they relate are usefully formulated in the framework of the CAPM.

a. The Capital Asset Pricing Model

Q28. Please start with the CAPM, by describing the model.

A28. As noted above, the modern models of capital market equilibrium express the cost of equity as the sum of a risk-free rate and a market risk premium. The CAPM is the longest-standing and most widely used of these theories. The CAPM states that the cost of capital for an investment, *s*, (*e.g.*, a particular common stock) is given by the following equation:

$$k_s = r_F + \beta_s \times \text{MRP} \qquad (1)$$

where k_s is the cost of capital for investment s; r_F is the risk-free rate, β_s is the beta risk measure for the investment s; and MRP is the market risk premium.

The CAPM relies on the empirical fact that investors price risky securities to offer a higher expected rate of return than safe securities do. It says that the security market line starts at the risk-free interest rate (that is, that the return on a zero-risk security, the y-axis intercept in Figure 1, equals the risk-free interest rate). It further says that the risk premium over the risk-free rate equals the product of beta and the risk premium on a value-weighted portfolio of all investments, which by definition has average risk.

b. The Empirical Capital Asset Pricing Model

Q29. What other equity risk premium model do you use?

A29. Empirical research has long shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premia than predicted by the CAPM and high-beta stocks tend to have lower risk premia than predicted. A number of variations on the original CAPM theory have been proposed to explain this finding, but this finding can also be used to estimate the cost of capital directly, using beta to measure relative risk without simultaneously relying on the CAPM.

The second model makes use of these empirical findings. It estimates the cost of capital with the equation,

$$k_s = r_F + \alpha + \beta_s \times (\text{MRP} - \alpha) \quad \textbf{(2)}$$

where α is the "alpha" of the risk-return line, a constant, and the other symbols are defined as above. I label this model the Empirical Capital Asset Pricing Model, or "ECAPM."

Q30. Why is it appropriate for you to use the empirical CAPM?

A30. To the best of my knowledge the CAPM has failed every empirical test, but in a way that is addressed by the ECAPM. The ECAPM recognizes the consistent empirical observation that the CAPM underestimates (overestimates) the cost of capital for low (high) beta stocks. In other words, the ECAPM is based on the recognition that the actual slope of the risk-return tradeoff is flatter than predicted and the intercept higher based upon repeated empirical tests of the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact. The difference between the CAPM and the type of relationship identified in the empirical studies is depicted in Figure 2.

Research supports values for a of one to seven percent when using a short-term interest

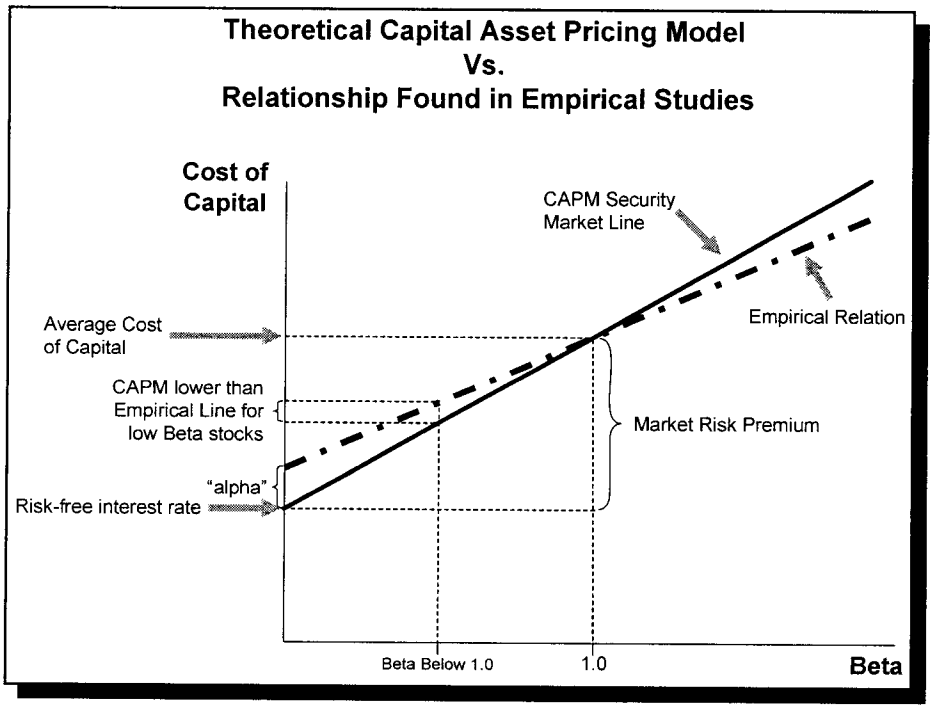

Figure 2

rate. I use baseline values of a of 2 percent for the short-term risk-free rate and 0.5 percent for the long-term risk-free rate. I also conduct sensitivity tests for different values of a. For the short-

term risk-free rate I use values for *a* of 1, 2 and 3 percent. For the long-term risk-free rate, the corresponding values for *a* are 0, 0.5 and 1.5 percent. The use of a long-term risk-free rate incorporates some of the desired effect of using the ECAPM. That is, the long-term risk-free rate version of the security market line has a higher intercept and a flatter slope than the short-term risk-free version which has been extensively tested. Thus, it is likely that I do not need to make the same degree of adjustment when I use the long-term risk-free rate, and these α values are lower than would be justified by the magnitude of the misestimation in the tests of the CAPM. Please see Table No. MJV-B1 in Appendix B for a summary of the empirical evidence on the size of the required adjustment.

2. Discounted Cash Flow Method

Q31. Please describe the discounted cash flow approach.

A31. The DCF model takes the first approach to cost of capital estimation, i.e., to attempt to estimate the cost of capital in one step. The method assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_T}{(1+k)^T} \qquad (3)$$

where "P" is the market price of the stock; "D_i" is the dividend cash flow expected at the end of period i; "k" is the cost of capital; and "T" is the last period in which a dividend cash flow is to be received. The formula just says that the stock price is equal to the sum of the expected future

dividends, each discounted for the time and risk between now and the time the dividend is expected to be received.

Most DCF applications go even further, and make very strong (*i.e.*, unrealistic) assumptions that yield a simplification of the standard formula, which then can be rearranged to estimate the cost of capital. Specifically, if investors expect a dividend stream that will grow *forever* at a steady rate, the market price of the stock will be given by a very simple formula, where "D_1" is the dividend expected at the end of the first period, "g" is the perpetual growth rate, and "P" and "k" are the market price and the cost of capital, as before. Equation (4) is a simplified

$$P = \frac{D_1}{(k-g)} \qquad \textbf{(4)}$$

version of equation (3) that can be solved to yield the well known "DCF formula" for the cost of capital:

$$k = \frac{D_1}{P} + g = \frac{D_0 \times (1+g)}{P} + g \qquad \textbf{(5)}$$

where "D_0" is the current dividend, which investors expect to increase at rate g by the end of the next period, and the other symbols are defined as before. Equation (5) says that if equation (4) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the simple DCF model. Of course, the "simple" model is simple because it relies on very strong (*i.e.*, very unrealistic) assumptions.

Q32. Are there other versions of the DCF models besides the "simple" one?

A32. Yes. I also consider a variant of the DCF model that relies on *slightly* less strong assumptions in that it allows for varying growth rates in the near term before assuming a perpetual growth rate after year ten. This is a variant of the "multistage" DCF method. The DCF models are described in detail in *Section I. A* of Appendix C. (*Section II* of Appendix C provides the details of my empirical DCF results.)

Q33. What are the merits of the DCF approach?

A33. The DCF approach is conceptually sound if its assumptions are met, but can run into difficulty in practice because those assumptions are so strong, and hence so unlikely to correspond to reality. Two conditions are well known to be necessary for the DCF approach to yield a reliable estimate of the cost of capital: the variant of the present value formula that is used must actually match the variations in investor expectations for the growth of dividends, and the growth rate(s) used in that formula must match current investor expectations. Less frequently noted conditions may also create problems (see Appendix C for details).

Q34. Do you agree that estimating the right growth rate is the most difficult part for the implementation of the DCF approach?

A34. Yes. Finding the right growth rate(s) is the usual "hard part" of a DCF application. The original approach to estimation of g relied on average historical growth rates in observable variables, such as dividends or earnings, or on the "sustainable growth" approach, which estimates g as the average book rate of return times the fraction of earnings retained within the firm. But it is highly unlikely that these historical averages over periods with widely varying rates of inflation and costs

of capital will equal current growth rate expectations. This is particularly true for the water sample.

Moreover, the constant growth rate DCF model *requires* that dividends and earnings grow at the same rate for companies that earn their cost of capital on average.[8] It is inconsistent with the theory on which the model is based to have different growth rates in earnings and dividends over the period when growth is assumed to be constant. If the growth in dividends and earnings were expected to vary over some number of years before settling down into a constant growth period, then it would be appropriate to estimate a multistage DCF model. In the multistage model, earnings and dividends can grow at different rates, but *must* grow at the same rate in the final, constant growth rate period. A difference between forecasted dividend and earnings rates therefore is a signal that the facts do not fit the assumptions of the simple DCF model.

IV. Tennessee-American'S COST OF CAPITAL

A. Sample Selection

1. The Water Utility Sample

Q35. How did you select your sample of water utilities?

A35. The goal was to create a sample of companies whose primary business is as a regulated water utility with business risk generally similar to that of Tennessee-American. To construct this sample, I started with the universe of eight water utilities tracked by *Value Line* as of August 2006.

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[8] Why must the two growth rates be equal in a steady-growth DCF model? Think of earnings as divided between reinvestment, which funds future growth, and dividends. If dividends grow faster than earnings, there is less investment and slower growth each year. Sooner or later dividends will equal earnings. At that point, growth is zero because nothing is being reinvested (dividends are constant). If dividends grow slower than earnings, each year a bigger fraction of earnings are reinvested. That makes for ever faster growth. Both scenarios contradict the steady-growth assumption. So if you observe a company with different expectations for dividend and earnings growth, you know the company's stock price and its dividend growth forecast are inconsistent with the assumptions of the steady-growth DCF model.

The companies are American States Water Co., California Water Service Group, Connecticut Water Service Inc., Middlesex Water Co. Aqua America Inc., SJW Corp. Southwest Water Co., and York Water Co. Given the data currently available, the composition of the water sample varies by cost of equity estimation method. In addition, I report results for a subsample of the companies that excludes Southwest Water Company because its percentage of revenues from regulated activities was only 39 percent compared to the next lowest company, Middlesex Water Company, which has 89 percent of revenues from regulated activities. Table 1 below summarizes the composition of the water sample and subsample by estimation method. Details on the sample selection process for the water sample are in Appendix B.

COMPOSITION OF WATER SAMPLE BY ESTIMATION METHOD

	METHODS			
	RISK POSITIONING		DCF	
American States Water Co.	•	○	•	○
California Water Service Gp	•	○	•	○
Connecticut Water Svc Inc	•	○		
Middlesex Water Co	•	○	•	
Aqua America Inc	•	○	•	○
SJW Corp	•	○		
Southwest Water Co	•		•	
York Water Co			•	

Notes:

• - Included in Full Sample

○ - Included in Subsample

Table 1

Q36. Earlier you said that the sample of water utilities had certain data problems. Please elaborate on these problems.

A36. In attempting to apply the DCF model to the sample, two of the eight companies have five-year earnings forecasts from only one Institutional Brokers Estimate System ("I/B/E/S") analyst, and two companies either have no forecast or no current forecast.[9] Similarly, only four of eight companies have long-term growth forecasts from *Value Line*. The result of this lack of data is that the discounted cash flow model only can be applied to six companies. A similar lack of data exists when looking at the companies' bond ratings. Three of the eight companies had neither a Moody's nor a Standard & Poor's ("S&P") bond rating.[10] The result of this lack of data is that the subsample for the DCF analysis consists of only three companies. York Water Co. was dropped from the results of the risk positioning analysis because its cost of equity was estimated to be less than 25 basis points higher than its cost of debt.[11] For each estimation method, the subsample also excludes companies with a partial lack of data.

The size of the companies in the water sample also makes cost of capital estimation difficult. Four of the eight companies have less than $500 million in market value of equity. The stock of these companies also trades infrequently relative to the companies in the gas LDC sample.

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[9] Connecticut Water Services has no earnings forecast and SJW Corporation's most recent reported estimate is from 2003.

[10] For two of the remaining five companies with a Moody's or Standard & Poor's bond rating, the bond rating was only found for some years during the most recent 5-year period. The rating for periods for which no bond rating was found was set equal to the rating for later periods. For companies without a bond rating, an A-rating is used in the analysis. The A-rating is consistent with the average for companies listed as water utilities in *Value Line* and followed by either Moody's or Standard & Poor's. Additionally, interest coverage ratios for the companies without a Moody's or S&P bond rating were computed and were either within or close to the S&P's guidelines for an A-rating. Bond ratings were obtained from www.moodys.com, Compustat, Mergent Bond Record, and S&P's Bond Rating books.

[11] This is typically a sign of a poor cost of equity estimate and is likely a direct result of the numerous data problems that plague York Water Co. A company's cost of equity is always higher than its cost of debt because equity is riskier than debt.

For example, four of the eight water utilities traded an average of less than 35,000 shares per trading day between January 1, 2006 and August 23, 2006. In percentage terms, these companies traded less than 0.3 percent of their shares outstanding. By contrast, each of the gas LDC sample companies had a average trading volume of at least 97,000 shares per day (greater than 130,000 if Laclede Group were excluded), which in percentage terms represented more than 0.45 percent of shares outstanding for each company. Greater trading volume gives the expert more confidence in both the DCF and risk positioning estimates for the sample since there is less likelihood of a delay between the release of important information and the time that this information is reflected in prices. Such delay is well known to cause beta estimates to be statistically insignificant and possibly biased.

In addition to lack of data and the small size of the companies, there are firm-specific events that render the water utility sample less reliable than would be ideal. First, Aqua America (the largest of the companies) has gone through several mergers and acquisitions in recent years. Normally, I would not include companies with significant merger or acquisition activity in a sample because the individual information about the progress of the proposed merger is so much more important for the determination of the company's stock price than day-to-day market fluctuations. In practice, beta estimates for such companies tend to be too low. Second, Southwest Water Co. earns only approximately 40 percent of its revenue from regulated activities. I therefore also report my results for the subsample of companies that does not include Southwest Water Co.

It is because of these weaknesses in the water sample that I also utilize a sample of natural gas LDCs.

2. The Gas Local Distribution Sample

Q37. How do you select your sample of gas local distribution companies?

A37. One reason for use of the gas LDC sample is to generate a sample of regulated companies whose primary source of revenues is in the regulated portion of the natural gas industry to provide a check for the results of the water sample. Therefore, I started with the universe of publicly traded gas distribution utilities covered by *Value Line Investment Survey*, and I required the sample companies to have revenues from regulated natural gas distribution that is 60 percent or more of total revenue for 2005. The final sample includes five companies. Appendix B discusses the selection process for the gas LDC sample in more detail.

B. Cost of Capital Estimates for the Samples

Q38. Please summarize the results of the risk positioning and DCF methodologies in estimating the average cost of capital for the benchmark samples, and the implications for Tennessee-American's cost of equity?

A38. Table 2 summarizes the risk positioning and DCF estimates of the average ATWACC for each of the benchmark samples, along with the implied cost of equity for Tennessee-American at its regulatory capital structure with 43 percent equity.[12]

[12] Note that the percentages of debt, preferred equity and common equity in row three of Table 2 do not appear to sum to 100 percent because of rounding.

COST OF EQUITY ESTIMATES FOR TENNESSEE-AMERICAN FOR
DIFFERENT SAMPLES AND COST OF EQUITY ESTIMATION METHODS

Tennessee-American Water's Capital Structure	*43% Equity*			*1% Preferred*				*55% Debt*	
	METHODS								
	RISK POSITIONING MODEL (Long-Term Risk-Free Rate)			RISK POSITIONING MODEL (Short-Term Risk-Free Rate)				DCF MODEL	
	CAPM	α = 0.5%	α = 1.5%	CAPM	α = 1%	α = 2%	α = 3%	Simple	MultiStage
Water Sample*									
Full Sample[1]									
Cost of Equity	11.8%	12.1%	12.6%	11.8%	12.4%	13.0%	13.6%	13.7%	10.6%
ATWACC	7.3%	7.5%	7.7%	7.4%	7.6%	7.9%	8.1%	8.2%	6.8%
Sub-Sample[2]									
Cost of Equity	11.9%	12.2%	12.8%	12.0%	12.6%	13.1%	13.7%	13.8%	10.8%
ATWACC	7.4%	7.5%	7.8%	7.4%.	7.7%	7.9%	8.2%	8.2%	6.9%
Gas LDC Sample[3,†]									
Cost of Equity	11.1%	11.3%	11.8%	11.2%	11.6%	12.1%	12.6%	11.0%	11.3%
ATWACC	7.0%	7.1%	7.3%	7.1%	7.3%	7.5%	7.7%	7.0%	7.1%

Sources and Notes:

* For the Water Sample, Risk Positioning data is from Table No. MJV-11 and DCF data from Table No. MJV-8.

† For the LDC Sample, Risk Positioning data is from Table No. MJV-21 and DCF data from Table No. MJV-18.

1. For DCF analysis, the full sample consists of American States Water Co., California Water Service Group, Middlesex Water Co., Aqua America Inc., and Southwest Water Co. The Risk Positioning Full sample also includes Connecticut Water Service Inc. and SJW Corp.

2. The Risk Positioning sub-sample excludes Southwest Water Co. from the full sample. The DCF subsample also excludes Southwest Water Co., and Middlesex Water Co.

3. Sample consists of Laclede Group Inc., Northwest Natural Gas Co., South Jersey Industries Inc., Southwest Gas Corp., and WGL Holdings Inc.

Table 2

1. The Water Sample Estimates

Q39. How were the cost of equity estimates derived from the risk positioning approach for the water sample?

A39. Using the long-term interest rate in the two risk positioning models (CAPM and ECAPM), with two values of the ECAPM parameter (0.5% and 1.5%), I obtain three estimates of each sample company's cost of equity. These results are displayed in Table MJV-9, Panel A. Using the short-term risk-free rate in the two risk positioning models with three values of the ECAPM parameter (1%, 2% and 3%), I obtain four estimates of each sample company's cost of equity. These results are displayed in Table MJV-9, Panel B. The cost of equity estimates are combined with the estimates of the company's cost of debt and preferred to calculate the company's ATWACC. These calculations and the resulting sample average ATWACC are presented in Table No. MJV-10, Panels A-G for each of the estimation methods. The sample average ATWACC and cost of equity at Tennessee-American's 43 percent equity capital structure are displayed in Table No. MJV-11. Panel A shows the cost of equity and ATWACC value for all water sample companies, while Panel B shows the results for the subsample of companies with significant revenue from regulated water utility activities and no data issues.[13] These results are summarized in Table 2 above.

Q40. What are the DCF estimates for the water samples?

A40. The data are used in the two versions of the DCF method to get sample company estimates at the sample company's capital structure. The resulting return on equity at Tennessee-American's 43 percent equity capital structure are shown in Table 2, along with the sample average ATWACC

[13] Also excluding York Water Co. as discussed above.

numbers. The results from the simple DCF approach are somewhat higher than from the water sample's risk positioning approach. Table 2 shows a cost of equity of 13.7 percent for the full sample and 13.8 percent for the subsample when using the simple DCF model. The estimates from the multistage DCF model are lower at 10.6 percent for the full sample and 10.8 percent for the subsample. The estimates from the simple DCF exceed the estimates from the risk positioning models, but the estimates from the multistage DCF model are lower than the risk positioning estimates (see Table 2 above).

2. The Gas LDC Sample Estimates

Q41. How were the cost of equity estimates from the risk positioning model for the gas LDC sample companies derived?

A41. As with the water sample, the risk positioning model is used to obtain three cost of equity estimates using the long-term risk-free rate and four cost of equity estimates using the short-term risk-free rate for the gas LDC sample companies.

The cost of equity estimates using the long-term risk-free rate are displayed in Table No. MJV-19, Panel A, and the cost of equity estimates using the short-term risk-free rate are displayed in Table No. MJV-19, Panel B. The cost of equity estimates are combined with the estimates of the company's costs of debt and preferred to calculate the company's ATWACC. These calculations and the resulting sample average ATWACC for each of the estimation methods are presented in Table No. MJV-20, Panels A-G. The sample average ATWACC and cost of equity at Tennessee-American's 43 percent equity capital structure are displayed in Table No. MJV-21. These results are reproduced in Table 2 above. The results from the risk positioning model for the gas LDC sample are about 80 - 90 bps lower than the results for the water sample, but these results

give me a degree of assurance that the risk positioning results of the water sample are reasonable.

Q42. What DCF cost of equity estimates do you obtain for the gas LDC sample?

A42. The growth rate in the DCF method is the weighted average of the growth estimates from I/B/E/S and *Value Line* where the weights are the number of analysts in the I/B/E/S forecasts plus one for the *Value Line* analyst. The resulting costs of equity and ATWACC estimates are also shown in Table 2 above. The gas LDC sample results for the simple DCF model are more than 2 percent lower than for the water sample, but the results for the multistage DCF model are about 0.7 percent higher than for the water sample on average (0.5 percent higher for the subsample). However, the gas LDC results are much more consistent between the DCF model and the risk positioning method than for the water sample. As a result of the consistency of the results and the relative stability of the growth rate estimates, I give some weight to the DCF results for the gas LDC sample. Specifically, the DCF results together with the risk positioning results for the gas LDC sample lead me to round the risk positioning cost of equity estimates for the water sample down to the nearest ¼ percent.

V. CONCLUSIONS

Q43. What conclusions do you draw from the DCF estimates regarding each sample's cost of equity at Tennessee-American's 43 percent equity ratio?

A43. The estimated costs of equity from the simple DCF model for the water sample are substantially higher than the estimates from the risk positioning model for either sample. The simple DCF model relies on company-specific growth rate forecasts but those forecasts vary significantly

among the companies in the water sample. The variation in growth rate forecasts means that these estimates are less reliable because the long-run growth rate forecast drives the results, and there are *no* objective data on the long-run growth rate investors truly expect, *nor* on when the industry is expected to settle down into some sort of stable-growth equilibrium. On the other hand, the earnings growth rate forecasts for the gas LDC sample are much less variable than the estimates for the water sample. This suggests that the DCF estimates for the gas LDC sample are likely to be more reliable than those for the water sample.

The cost of equity estimates that rely on the multistage DCF model are comparable but lower than the risk positioning estimates for both samples. Although I do not rely upon the DCF model results for the water sample, I believe that DCF cost capital estimates provide a useful check on the risk positioning results for the gas LDC sample.

Q44. Do you have any comments regarding the results of the risk positioning models?

A44. The estimated costs of equity displayed in Panel B of Table No. MJV-10 compared to Panel B of Table No. MJV-20 are higher on average for the gas LDC (at 9.4 percent versus 8.9 percent for the water samples). This result is consistent with the increased financial leverage in the LDC sample (59 percent market value equity ratio) compared to the water sample (67 percent market value equity ratio) which demonstrates the importance of considering differences in financial leverage when evaluating the results of cost of capital estimation models. The risk positioning results are summarized above in Table 2. Of those results, the CAPM values deserve the least weight, because this method does not adjust for the empirical finding that the cost of capital is less sensitive to beta than predicted by the CAPM (which my testimony considers by using the ECAPM). Conversely, the ECAPM numbers deserve the most weight, because this method

adjusts for the empirical findings. The cost of equity estimates using the long-term risk free rate and adjusted for a capital structure with a 43 percent equity ratio range from 11.8 to 12.6 percent for the water sample (11.9 to 12.8 percent for the subsample), and 11.1 to 11.8 percent for the gas LDC sample. The estimates based upon the short-term risk-free rate give somewhat wider ranges. The cost of equity estimates range from 11.8 to 13.6 percent for the water sample and 12.0 to 13.7 percent for the water company subsample. The short-term risk positioning cost of equity estimates range from 11.2 to 12.6 percent for the gas LDC sample.

The estimates based upon the short-term risk-free rate are about 80 - 90 basis points higher than the estimates using the long-term risk-free rate, because the yield curve is currently flat or slightly inverted, i.e ., the yield on short-term Treasury bills exceeds the yield on long-term Treasury bonds. Workpaper #2 to Table No. MJV-9 shows that 30-day Treasury bills are yielding 5.10 percent compared to only 5.01 percent for long-term Treasury bonds. The calculations displayed in Workpaper #3, Panel B to Table No. MJV-9 show that the yield on long-term Treasury bonds averages more than 1.50 percent more than the yield on 30-day Treasury bills. The increased yield on short-term Treasury bills reflects the efforts by the Federal Reserve ("Fed") to prevent the rate of inflation from increasing any further. If the Fed believes that inflation is not yet contained, short-term rates are likely to increase further. On the other, if inflation is judged to be under control, short-term rates may decline as fears of recession replace those of inflation. Because of this uncertainty, I give more weight to the estimates using the long-term risk-free rate at this time.

Q45. Given the results of the two models, what is your conclusion regarding the cost of equity for Tennessee-American Water?

A45. Focusing on the middle values in Table 2 for the results from the long-term risk positioning model (ECAPM with $\alpha = 0.5$), the average ATWACC for the full sample is 7.5 percent for the water sample and 7.1 percent for the gas LDC sample. The corresponding costs of equity estimates are 12.1 percent for the water sample (12.2 percent for the water subsample) and 11.3 percent for the gas LDC sample. The results for the more reliable multistage version of the DCF model for the gas LDC sample is 11.3 percent which is also consistent with the risk positioning results for the gas LDC sample. I believe that the higher cost of equity estimates for the water sample should be tempered by the lower results for the gas LDC sample from both the risk positioning and the DCF models because the results of the water sample are more variable.

Based upon the evidence, the best point estimate for the cost of equity for Tennessee-American is 11¼ percent. This result is about ½ percent lower than the average risk positioning result from the long-term risk-free rate version of the model for the water sample but it is consistent with the average result for the gas LDC sample. Although the results for the water sample are higher than for the gas LDC sample, I round the cost of equity estimate down because the gas LDC sample has fewer data issues that may affect the cost of capital estimation models than the water sample. However, it is more correct to say that the estimates from the two samples indicate a range of values. The overall range for the ATWACC is 6¾ to 7¾ percent for both the water and gas LDC sample combined. The corresponding range for the cost of equity is 10¾ to 13 percent for a capital structure with 43 percent equity. The width of this range is due to the uncertainty surrounding the reliability of the estimates from the water sample at this time. Based upon the evidence, the estimate of 11¼ percent is conservative because it is near the bottom of the

range of estimates.

As previously noted, in estimating the cost of equity I round to the nearest ¼ percent (25 basis points) because I do not believe that cost of capital estimates can be made more precisely than that.

Q46. Does this conclude your testimony?

A46. Yes.

TENNESSEE REGULATORY AUTHORITY

COMMONWEALTH OF MASSACHUSETTS

COUNTY OF MIDDLESEX

BEFORE ME, the undersigned authority, duly commissioned and qualified in and for the State and County aforesaid, personally came and appeared Michael J. Vilbert, being by me first duly sworn deposed and said that:

He is appearing as a witness on behalf of Tennessee-American Water Company before the Tennessee Regulatory Authority, and if present before the Authority and duly sworn, his testimony would set forth in the annexed transcript consisting of 35 pages.

Michael J. Vilbert

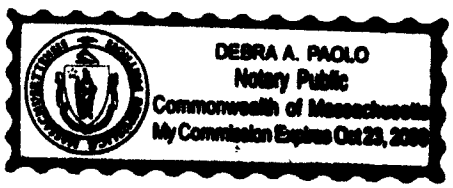
Michael J. Vilbert

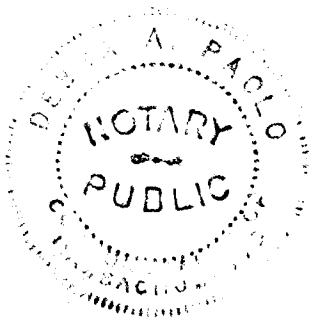
Sworn to and subscribed before me
this 15th day of November 2006.

Debra A. Paolo

Notary Public

My commission expires: October 23, 2009





CASE NO. 06-_____
Tennessee American Water Company
Appendix A to Direct Testimony of Michael J. Vilbert

RESUME

MICHAEL J. VILBERT **Principal**

Michael Vilbert is an expert in cost of capital, financial planning and valuation who has advised clients on these matters in the context of a wide variety of investment and regulatory decisions. He received his Ph.D. in Financial Economics from the Wharton School of the University of Pennsylvania, an MBA from the University of Utah, an M.S. from the Fletcher School of Law and Diplomacy, Tufts University, and a B.S. degree from the United States Air Force Academy. He joined *The Brattle Group* in 1994 after a career as an Air Force officer, where he served as a fighter pilot, intelligence officer, and professor of finance at the Air Force Academy.

REPRESENTATIVE CONSULTING EXPERIENCE

- In a securities fraud case, Dr. Vilbert designed and created a model to value the private placement stock of a drug store chain as if there had been full disclosure of the actual financial condition of the firm. He analyzed key financial data and security analysts reports regarding the future of the industry in order to recreate pro forma balance sheet and income statements under a variety of scenarios designed to establish the value of the firm.

- For pharmaceutical companies rebutting price-fixing claims in antitrust litigation, Dr. Vilbert was a member of a team which prepared a comprehensive analysis of industry profitability. The analysis replicated, tested and critiqued the major recent analyses of drug costs, risks and returns. The analyses helped develop expert witness testimony to rebut allegations of excess profits.

- For an independent electric power producer, Dr. Vilbert created a model that analyzed the reasonableness of rates and costs filed by a natural gas pipeline. The model not only duplicated the pipeline's rates, but it also allowed simulation of a variety of "what if" scenarios associated with cost recovery under alternative time patterns and joint cost allocations. Results of the analysis were adopted by the intervenor group for negotiation with the pipeline.

- For the CFO of an electric utility, Dr. Vilbert developed the valuation model used to support a stranded cost estimation filing. The case involved a conflict between two utilities over the responsibility for out-of-market costs associated with a power purchase contract between them. In addition, he advised and analyzed cost recovery mechanisms that would allow full recovery of the stranded costs while providing a rate reduction for the company's rate payers.

- Dr. Vilbert has assisted in the preparation of testimony and the development of estimation models in numerous cost of capital cases for natural gas pipeline, water utility and electric utility clients before the Federal Energy Regulatory Commission ("FERC") and state regulatory commissions. These have spanned standard estimation techniques (e.g., Discounted Cash Flow and Risk Positioning models). He has also developed and applied more advanced models specific to the industries or lines of business in question, *e.g.*, based on the structure and risk characteristics of cash flows, or based on multi-factor models that better characterize regulated industries.

- Dr. Vilbert has valued several large, residual oil-fired generating stations to evaluate the possible conversion to natural gas or other fuels. In these analyses, the expected pre- and post-conversion station values were computed using a range of market electricity and fuel cost conditions.

- For a major western electric utility, Dr. Vilbert helped prepare testimony that analyzed the prudence of QF contract enforcement. The testimony demonstrated that the utility had not been compensated in its allowed cost of capital for major disallowances stemming from QF contract management.

- Dr. Vilbert analyzed the economic need for a major natural gas pipeline expansion to the Midwest. This involved evaluating forecasts of natural gas use in various regions of the United States and the effect of additional supplies on the pattern of natural gas pipeline use. The analysis was used to justify the expansion before the FERC and the National Energy Board of Canada.

- For a Public Utility Commission in the Northeast, Dr. Vilbert analyzed the auction of an electric utilities purchase power agreements to determine whether the outcome

of the auction was in the ratepayers' interest. The work involved the analysis of the auction procedures as well as the benefits to ratepayers of transferring risk of the PPA payments to the buyer.

- Dr. Vilbert led a team tasked to determine whether bridge tolls were "just and reasonable" for a non-profit port authority. Determination of the cost of service for the authority required estimation of the value of the authority's assets using the trended original cost methodology as well as evaluation of the operations and maintenance budgets. Investment costs, bridge traffic information and inflation indices covering a 75 year period were utilized to estimate the value of four bridges and a passenger transit line valued in excess of $1 billion.

- Dr. Vilbert helped a recently privatized railroad in Brazil develop an estimate of its revenue requirements, including a determination of the railroad's cost of capital. He also helped evaluate alternative rate structures designed to provide economic incentives to shippers as well as to the railroad for improved service. This involved the explanation and analysis of the contribution margin of numerous shipper products, improved cost analysis and evaluation of bottlenecks in the system.

- For a utility in the Southeast, Dr. Vilbert quantified the company's stranded costs under several legislative electric restructuring scenarios. This involved the evaluation of all of the company's fossil and nuclear generating units, its contracts with Qualifying Facilities and the prudence of those QF contracts. He provided analysis concerning the impact of securitizing the company's stranded costs as a means of reducing the cost to the rate payers and several alternative designs for recovering stranded costs.

- For a recently privatized electric utility in Australia, Dr. Vilbert evaluated the proposed regulatory scheme of the Australian Competition and Consumer Commission for the company's electric transmission system. The evaluation highlighted the elements of the proposed regulation which would impose uncompensated asymmetric risks on the company and the need to either eliminate the asymmetry in risk or provide additional compensation so that the company could expect to earn its cost of capital.

- For an electric utility in the Southwest, Dr. Vilbert helped design and create a model to estimate the stranded costs of the company's portfolio of Qualifying Facilities and Power Purchase contracts. This exercise was complicated by the many variations in the provisions of the contracts that required modeling in order to capture the effect of changes in either the performance of the plants or in the estimated market price of electricity.

- Dr. Vilbert helped prepare the testimony responding to a FERC request for further comments on the appropriate return on equity for electric transmission facilities. In addition, Dr. Vilbert was a member of the team that made a presentation to the FERC staff on the expected risks of the unbundled electric transmission line of business.

- Dr. Vilbert and Mr. Frank C. Graves, also of *The Brattle Group*, prepared testimony evaluating an innovative Canadian stranded cost recovery procedure involving the auctioning of the output of the province's electric generation plants instead of the plants themselves. The evaluation required the analysis of the terms and conditions of the long-term contracts specifying the revenue requirements of the plants for their entire forecasted remaining economic life and required an estimate of the cost of capital for the plant owners under this new stranded cost recovery concept.

- Dr. Vilbert served as the neutral arbitrator for the valuation of a petroleum products tanker. The valuation required analysis of the Jones Act tanker market and the supply and demand balance of the available U.S. constructed tanker fleet.

PRESENTATIONS

"Utility Distribution Cost of Capital", *EEI Electric Rates Advanced Course, Bloomington, IN*, 2002, 2003.

"Issues for Cost of Capital Estimation," by Bente Villadsen and Michael J. Vilbert, *Edison Electric Institute Cost of Capital Conference*, Chicago, IL, February 2004.

"Not Your Father's Rate of Return Methodology", *Utility Commissioners/Wall Street Dialogue*, NY, May 2004.

"Current Issues in Cost of Capital," *EEI Electric Rates Advanced Course, Madison, WI*, July 2004.

"Cost of Capital Estimation: Issues and Answers," MidAmerican Regulatory Finance Conference, Des Moines, IA, April 7, 2005.

"Cost of Capital - Explaining to the Commission - Different ROEs for Different Parts of the Business," *EEI Economic Regulation & Competition Analysts Meeting*, May 2, 2005.

"Current Issues in Cost of Capital," by Michael J. Vilbert and Bente Villadsen, *EEI Electric Rates Advanced Course, Madison, WI*, 2005.

"Current Issues in Estimating the Cost of Capital," by Michael J. Vilbert, *EEI Electric Rates Advanced Course, Madison, WI*, 2006.

ARTICLES

"Flaws in the Proposed IRS Rule to Reinstate Amortization of Deferred Tax Balances Associated with Generation Assets Reorganized in Industry Restructuring," by Frank C. Graves and Michael J. Vilbert, white paper for Edison Electric Institute (EEI) to the IRS, July 25, 2003.

"The Effect of Debt on the Cost of Equity in a Regulatory Setting," by A. Lawrence Kolbe, Michael J. Vilbert, Bente Villadsen and The Brattle Group, *Edison Electric Institute*, April 2005.

"Measuring Return on Equity Correctly: Why current estimation models set allowed ROE too low," by A. Lawrence Kolbe, Michael J. Vilbert and Bente Villadsen, *Public Utilities Fortnightly*, August 2005.

TESTIMONY

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Direct testimony before the Federal Energy Regulatory Commission on behalf of Central Maine Power in Docket No. ER00-982-000, December 1999.

Direct testimony before the Alberta Energy and Utilities Board on behalf of TransAlta Utilities Corporation for approval of its 2001 transmission tariff, May 2000.

Direct testimony before the Federal Energy Regulatory Commission on behalf of Mississippi River Transmission Corporation in Docket No. RP01-292-000, March 2001.

Written evidence, rebuttal, reply and further reply before the National Energy Board in the matter of an application by TransCanada PipeLines Limited for orders pursuant to Part I and Part IV of the *National Energy Board Act*, Order AO-1-RH-4-2001, May 2001, Nov. 2001, Feb. 2002.

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Direct testimony (with Bill Lindsay) before the Federal Energy Regulatory Commission on behalf of DTE East China, LLC in Docket No. ER02-1599-000, April 2002.

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APPENDIX B: EQUITY RISK PREMIUM APPROACH METHODOLOGY: DETAILED PRINCIPLES AND RESULTS

TABLE OF CONTENTS

Q1. What is the purpose of this appendix?

A1. This appendix reviews the principles behind the equity risk premium methodology, describes the estimation of the parameters used in the models, the sample selection procedures and the details of the cost of capital estimates obtained from this methodology. This appendix intentionally repeats portions of my direct testimony, because I want the reader to be able to have a full discussion of the issues addressed here, rather than having to continually turn back to the corresponding section of the testimony.

I. EQUITY RISK PREMIUM APPROACH METHODOLOGY PRINCIPLES

Q2. How is this section of the appendix organized?

A2. It first reviews the basic nature of the equity risk premium approach. It then discusses the individual components of the model: the benchmark risk premium, the relative risk of the company or line of business in question, the appropriate interest rate, and the combination of these elements in a particular equity risk premium model.

A. THE BASIC EQUITY RISK PREMIUM MODEL

Q3. How does the equity risk premium model work?

A3. The equity risk premium approach estimates the cost of equity as the sum of a current interest rate and a risk premium. (It therefore is sometimes also known as the "risk premium" or the "risk positioning" approach.)

This approach may sometimes be applied informally. For example, an analyst or a commission may check the spread between interest rates and what is believed to be a reasonable estimate of the cost of capital at one time, and then apply that spread to changed interest rates to get a new estimate of the cost of capital at another time.

More formal applications of equity risk premium method implement the second approach to cost of capital estimation. They use information on all securities to identify the security market line (Figure 1 in the body of the testimony) and derive the cost of capital for the individual security based on that security's relative risk. This equity risk premium approach is widely used and underlies most of the current scholarly research on the nature, determinants and magnitude of the cost of capital.

Q4. How are "more formal applications" put into practice?

A4. The essential benchmarks that determine the security market line are the risk-free interest rate and the premium that a security of average risk commands over the risk-free rate. This premium is commonly referred to as the "market risk premium" ("MRP"), *i.e.*, the excess of the expected return on the average common stock over the risk-free interest rate. In the equity risk premium approach the risk-free interest rate and MRP are common to all securities. A security-specific measure of relative risk (beta) is estimated separately and combined with the MRP to obtain the company-specific risk premium.

In principle, there may be more than one factor affecting the expected stock return, each with its own security-specific measure of relative risk and its own benchmark risk premium. For example, the "arbitrage pricing theory" and other "multi-factor" models have been

proposed in the academic literature. These models estimate the cost of capital as the sum of a risk-free rate and several security-specific risk premiums. However, none of these alternative models has emerged in practice as "the" improvement to use instead of the original, single-factor model. I use the traditional single-factor model in this testimony.

Accordingly, the required elements in my formal equity risk premium approach are the market risk premium, an objective measure of relative risk, the risk-free rate that corresponds to the measure of the market risk premium, and a specific method to combine these elements into an estimate of the cost of capital.

B. MARKET RISK PREMIUM

Q5. Why is a risk premium necessary?

A5. Experience (*e.g.*, the U.S. market's October Crash of 1987) demonstrates that shareholders, even well diversified shareholders, are exposed to enormous risks. By investing in stocks instead of risk-free Government bills, investors subject themselves not only to the risk of earning a return well below those they expected in any year but also to the risk that they might lose much of their initial capital. This is why investors demand a risk premium.

I estimate two versions of the Capital Asset Pricing Model ("CAPM"). The first version measures the market risk premium as the risk premium of average risk common stocks over the long-term risk-free rate. The second version measures the risk premium relative to a short-term risk-free rate, which is the usual measure of the "market risk premium" used in capital market theories.

Q6. Please discuss some of the issues involved in selecting the appropriate MRP?

A6. To determine the cost of capital in a regulatory proceeding, the MRP should be used with a *forecast* of the same interest rate used to calculate the MRP (*i.e.*, the short-term Treasury bill rate or the long-term Government rate). For example, it would be inconsistent to utilize a short-term risk-free with an estimate of the MRP derived from comparisons to long-term interest rates. In addition, the appropriate measure of the MRP should be based upon the arithmetic mean not the geometric mean return.[1] The arithmetic mean is the simple average while the geometric mean is the compound rate of return between two periods.

Q7. How do you estimate the MRP?

A7. There is presently little consensus on "best practice" for estimating the MRP. For example, the latest edition of the leading graduate textbook in corporate finance, after recommending use of the arithmetic average realized excess return on the market for many years (which for a while was noticeably over 9 percent), now reviews the current state of the research and expresses the view that the a range between 6 to 8.5 percent is reasonable for the U.S.[2,3]

My written testimony considers both the historical evidence and the results of scholarly studies of the factors that affect the risk premium for average-risk stocks in order to estimate the benchmark risk premium investors currently expect. I consider the historical difference in

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[1] See, for example, Ibbotson Associates, Stocks, Bonds, Bills, and Inflation: Valuation Edition 2006 Yearbook pp. 75-77.

[2] Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance,* McGraw-Hill, 7th edition, 2003, pp. 153-160.

[3] In past editions, the authors expressed the view that they are "most comfortable" with values toward the upper end of that range, but this language does not appear in the 7th edition. Although Professor Myers still holds this view, this language and other sections were dropped to accommodate a request to reduce the length of the text.

returns between the Standard and Poor's 500 Index ("S&P 500") and the risk-free rate, recent academic literature on the MRP and the results of recent surveys to estimate the market risk premium.

Q8. Please summarize the recent literature on the MRP and the conclusions you draw from it?

A8. The new research challenges the conventional wisdom of using the arithmetic average historical excess returns to estimate the MRP. However, after reviewing the issues in the debate, I remain skeptical for several reasons that the market risk premium has declined substantially in the U.S.

First, despite eye-catching claims like "equity risk premium as low as three percent,"[4] and "the death of the risk premium,"[5] not all recent research arrives at the same conclusion. In his presidential address to the American Finance Association in 2001, Professor Constantinides seeks to estimate the unconditional equity premium based on average historical stock returns.[6] (Note that this address was based upon evidence just before the major fall in market value.) He adjusts the average returns downward by the change in price-earnings ratio because he assumes no change in valuations in an unconditional state. His estimates for 1926 to 2000 and 1951 to 2000 are 8.0 percent and 6.0 percent, respectively, over the 3-month T-bill rate. In another published study in 2001, Professors Harris and Marston use the DCF method

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[4] Claus, J. and J. Thomas, (2001), "Equity Risk Premium as Low as Three Percent: Evidence from Analysts' Earnings Forecasts for Domestic and International Stocks," *Journal of Finance* 56:1629-1666.

[5] Arnott, R. and R. Ryan, (2001), "The Death of the Risk Premium," *Journal of Portfolio Management* 27(3):61-84.

[6] Constantinides, G.M. (2002), "Rational Asset Prices," *Journal of Finance* 57:1567-1591.

to estimate the market risk premium for the U.S. stocks.[7] Using analysts' forecasts to proxy for investors' expectation, they conclude that over the period 1982-1998 the MRP over the **long-term risk-free rate** is 7.14 percent. As yet another example, the paper by Drs. Ibbotson and Chen (2003) adopts a supply side approach to estimate the forward looking long-term sustainable equity returns and equity risk premium based upon economic fundamentals. Their equity risk premium **over the long-term risk-free rate** is estimated to be 3.97% in geometric terms and 5.90% on an arithmetic basis. They conclude their paper by stating that their estimate of the equity risk premium is "far closer to the historical premium than being zero or negative."[8]

Professor Ivo Welch surveyed a large group of financial economists in 1998 and 1999. The average of the estimated MRP was 7.1 percent in Prof. Welch's first survey[9] and 6.7 percent in his second survey which was based on a smaller number of individuals. However, a more recent survey by Prof. Welch reported only a 5.5 percent MRP.[10] In characterizing these results Prof. Welch notes that "[T]he equity premium consensus forecast of finance and economics professors seems to have dropped during the last 2 to 3 years, a period with low realized equity premia."[11]

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[7] Robert S. Harris and Felicia C. Marston, The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts, *Journal of Applied Finance* 11 (1) 6-16, 2001.

[8] Ibbotson, R. and P. Chen (2003), "Stock Market Returns in the Long Run: Participating in the Real Economy," *Financial Analyst Journal*, 59(1):88-98. Cited figures are on p. 97.

[9] Ivo Welch (2000), "Views of Financial Economists on the Equity Premium and on Professional Controversies," *Journal of Business*, 73(4):501-537. The cited figures are in Table 2 p. 514.

[10] Ivo Welch, 2001, "The Equity Premium Consensus Forecast Revisited," School of Management at Yale University working paper. The cited figure is in Table 2.

[11] *Ibid.*, p. 8.

The above quotation from Prof. Welch emphasizes the caution that must attend survey data even from knowledgeable survey participants: the outcome is likely to change quickly with changing market circumstances. Regulatory commissions should not, in my opinion, attempt to keep pace with such rapidly changing opinions.

Third, some of the evidence for negative or close to zero market risk premium simply does not make sense. Despite the relatively high valuation levels, stock returns remain much more volatile than Treasury bond returns. I am not aware of any empirical or theoretical evidence showing that investors would rationally hold equities and not expect to earn a positive risk premium for bearing the risk.

Fourth, I am unaware of a convincing theory for why the future MRP should have substantially declined. At the height of the stock market bubble in the U.S., many claimed that the only way to justify the high stock prices would be if the MRP had declined dramatically,[12] but this argument is heard less frequently after the market declined substantially from its tech bubble high. All else equal, a high valuation ratio such as price-earnings ratio implies a low required rate of return, hence a low MRP. However, there is considerable debate about whether the high level of stock prices (despite the burst of the internet bubble in Summer 2000) represents the transition to a new economy or is simply an "irrational exuberance," which cannot be sustained for the long term. If the former case is true, then the MRP may have decreased permanently. Conversely, the long-run MRP may remain the same even if expected market returns in the short-term are smaller.

[12] See Robert D. Arnott and Peter L. Bernstein, "What Risk Premium is 'Normal'?", *Financial Analysts Journal* 58:64-85, for an example.

Another common argument for a lower expected MRP is that the U.S. experienced very remarkable growth in the 20th century that was not anticipated at the start of the century. As a result, the average realized excess return is overestimated meaning the standard method of estimating the MRP would be biased upward. However, one recent study by Profs. Jorion and Goetzmann[13] finds, under some simplifying assumptions, that the so-called "survivorship bias" is only 29 basis points.[14] Furthermore, "[I]f investors have overestimated the equity premium over the second half of the last century, Constantinides (2002) argues that 'we now have a bigger puzzle on our hands'" Why have investors systematically biased their estimates over such a long horizon?[15]

To sum up the above, I cite two passages from Profs. Mehra and Prescott's review of the theoretical literature on equity premium puzzle:[16]

> Even if the conditional equity premium given current market conditions is small, and there appears to be general consensus that it is, this in itself does not imply that it was obvious either that the historical premium was too high or that the equity premium has diminished.
>
> In the absence of this [knowledge of the future], and based on what we currently know, we can make the following claim: over the long horizon the equity premium is likely to be similar to what it has been in the past and the returns to investment in equity will continue to substantially dominate that in T-bills for investors with a long planning horizon.

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[13] Jorion, P., and W. Goetzmann (1999), "Global Stock Markets in the Twentieth Century," *Journal of Finance* 54:953-980.

[14] Dimson, Marsh, and Staunton (2003) make a similar point when they comment on the equity risk premia for 16 countries based on returns between 1900 and 2001: "While the United States and the United Kingdom have indeed performed well, compared to other markets there is no indication that they are hugely out of line." p.4.

[15] Mehra, R., and E.C. Prescott (2003), "The Equity Premium in Retrospect," in *Handbook of the Economics of Finance*, Edited by G.M. Constantinides, M. Harris and R. Stulz, Elsevier B.V, p. 926

[16] *Ibid,* p. 926.

Q9. Is there other scholarly support for the conclusion?

A9. Yes. Another line of research was pursued by Steven N. Kaplan and Richard S. Ruback. They estimate the market risk premium in their article, "The Valuation of Cash Flow Forecasts: An Empirical Analysis."[17] Professors Kaplan and Ruback compare published cash flow forecasts for management buyouts and leveraged recapitalization over the 1983 to 1989 period against the actual market values that resulted from these transactions. One of their results is an estimate of the market risk premium over the long-term Treasury bond yield that is based on careful analysis of actual major investment decisions, not realized market returns. Their median estimate is 7.78 percent and their mean estimate is 7.97 percent.[18] This is considerably higher than my estimate of 6.5 percent. Even if the maturity premium of Treasury bonds over Treasury bills were only 1 percent, well below the best estimate of 1.5 percent the resulting estimate of the market risk premium over Treasury bills is higher than my estimate of 8.0 percent.

Q10. In addition to the scholarly articles and survey evidence you discussed in Section I.B of your Direct Testimony, what other evidence do you consider to estimate the MRP?

A10. I also consider the long-run realized equity premiums reported in Ibbotson Associates *SBBI Valuation Edition 2006 Yearbook*. The data provided cover the period 1926 through 2005. The results are discussed below.

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[17] *Journal of Finance*, 50, September 1995, pp. 1059-1093.

[18] *Ibid*, p. 1082.

Q11. What is the "long-run realized risk premium"in the U.S.?

A11. From 1926 to 2005, the full period reported, Ibbotson Associates data show that the average premium of stocks over Treasury bills is 8.5 percent. I also examine the "post-War" period. The risk premium for 1947-2005 is 8.4 percent.[19] (I exclude 1946 because its economic statistics are heavily influenced by the War years; *e.g.*, the end of price controls yielded an inflation rate of 18 percent. It is not really a "post-War" year, from an economic viewpoint.) These averages often change slightly when another year of data is added to the Ibbotson series. The average premium of stocks over the income returns on long-term Government bonds is 7.1 percent for the 1926 to 2005 period and 7.0 for the 1947 to 2005 period.

Recently there has been a great deal of academic research on the MRP. This research has put practitioners in a dilemma: there is nothing close to a consensus about how the MRP should be estimated, but a general agreement in the academic community seems to be emerging that the old approach of using the average realized return over long periods gives too high an answer.

Q12. What is your conclusion regarding the MRP?

A12. Estimation of the MRP remains controversial. There is no consensus on its value nor even how to estimate it. Given all of the information, I estimate the risk premium for average risk stocks to be 8.0 percent over Treasury bills and 6.5 percent over long-term Government bonds.

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[19] Ibbotson Associates SBBI Valuation Edition 2006 Yearbook, Appendix A.

C. RELATIVE RISK

Q13. How do you measure relative risk?

A13. The risk measure I examine is the "beta" of the stocks in question. Beta is a measure of the "systematic" risk of a stock — the extent to which a stock's value fluctuates more or less than average when the market fluctuates.

Q14. Please explain beta in more detail.

A14. The basic idea behind beta is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification. Beta is a measure of the risks that *cannot* be eliminated by diversification.

Diversification is a vital concept in the study of risk and return. (Harry Markowitz won a Nobel Prize for work showing just how important it was.) Over the long run, the rate of return on the stock market has a very high standard deviation, on the order of 15 - 20 percent per year. But many individual stocks have much higher standard deviations than this. The stock market's standard deviation is "only" about 15 - 20 percent because when stocks are combined into portfolios, some of the risk of individual stocks is eliminated by diversification. Some stocks go up when others go down, and the average portfolio return — positive or negative — is usually less extreme than that of individual stocks within it.

In the limiting case, if the returns on individual stocks were completely uncorrelated with one another, the formation of a large portfolio of such stocks would eliminate risk

entirely. That is, the market's long-run standard deviation would be not 15 - 20 percent per year, but virtually zero.

The fact that the market's actual annual standard deviation is so large means that, in practice, the returns on stocks *are* correlated with one another, and to a material degree. The reason is that many factors that make a particular stock go up or down also affect other stocks. Examples include the state of the economy, the balance of trade, and inflation. Thus some risk is "non-diversifiable". Single-factor equity risk premium models derive conditions in which all of these factors can be considered simultaneously, through their impact on the market portfolio. Other models derive somewhat less restrictive conditions under which several of them might be individually relevant.

Again, the basic idea behind all of these models is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification, because there are a large number of large portfolios whose managers actively seek the best risk-reward tradeoffs available. Of course, undiversified investors would like to get a premium for bearing diversifiable risk, but they cannot.

Q15. Why not?

A15. Well-diversified investors compete away any premium rates of return for diversifiable risk. Suppose a stock were priced especially low because it had especially high diversifiable risk. Then it would seem to be a bargain to well diversified investors. For example, suppose an industry is subject to active competition, so there is a large risk of loss of market share. Investors who held a portfolio of all companies in the industry would be immune to this risk,

because the loss on one company's stock would be offset by a gain on another's stock. (Of course, the competition might make the whole industry more vulnerable to the business cycle, but the issue here is the diversifiable risk of shifts in market share among firms.)

If the shares were priced especially low because of the risk of a shift in market shares, investors who could hold shares of the whole industry would snap them up. Their buying would drive up the stocks' prices until the premium rates of return for diversifiable risk were eliminated. Since all investors pay the same price, even those who are not diversified can expect no premium for bearing diversifiable risk.

Of course, substantial non–diversifiable risk remains, as the October Crash of 1987 demonstrates. Even an investor who held a portfolio of all traded stocks could not diversify against that type of risk. Sensitivity to such market–wide movements is what beta measures. That type of sensitivity, whether considered in a single- or multi-factor model, determines the risk premium in the cost of equity.

Q16. What does a particular value of beta signify?

A16. By definition, a stock with a beta equal to 1.0 has average non-diversifiable risk: it goes up or down by 10 percent on average when the market goes up or down by 10 percent. Stocks with betas above 1.0 exaggerate the swings in the market: stocks with betas of 2.0 tend to fall 20 percent when the market falls 10 percent, for example. Stocks with betas below 1.0 are less volatile than the market. A stock with a beta of 0.5 will tend to rise 5 percent when the market rises 10 percent.

Q17. How is beta measured?

A17. The usual approach to calculating beta is a statistical comparison of the sensitivity of a stock's (or a portfolio's) return to the market's return. Many investment services report betas, including Merrill Lynch's quarterly *Security Risk Evaluation* and the *Value Line Investment Survey*. Betas are not always calculated the same way, and therefore must be used with a degree of caution, but the basic point that a high beta indicates a risky stock has long been widely accepted by both financial theorists and investment professionals.

Q18. Are there circumstances when the "usual approach" should not be used?

A18. There are at least two cases where the standard estimate of beta should be viewed skeptically.

First, companies in serious financial distress seem to "decouple" from their normal sensitivity to the stock market. The stock prices of financially distressed companies tend to change based more on individual news about their particular circumstances than upon overall market movements. Thus, a risky stock could have a low estimated beta if the company was in financial distress. Other circumstances that may cause a company's stock to decouple include an industry restructuring or major changes in a company's supply or output markets.

Second, similar circumstances seem to arise for companies "in play" during a merger or acquisition. Once again, the individual information about the progress of the proposed takeover is so much more important for that stock than day-to-day market fluctuations that, in practice, beta estimates for such companies seem to be too low.

Q19. How reliable is beta as a risk measure?

A19. Scholarly studies have long confirmed the importance of beta for a stock's required rate of return. It is widely regarded as the best single risk measure available. The merits of beta seemed to have been challenged by widely publicized work by Professors Eugene F. Fama and Kenneth R. French.[20] However, despite the early press reports of their work as signifying that "beta is dead," it turns out that beta is still a potentially important explanatory factor (albeit one of several) in their work. Thus, beta remains alive and well as the best single measure of relative risk.

D. INTEREST RATE FORECAST

Q20. What interest rates do your procedures require?

A20. Modern capital market theories of risk and return use the short-term risk-free rate of return as the starting benchmark. My measures of the MRP incorporate this approach, since they represent the excess of the expected return on the market over the 30-day U.S. Treasury bill rate and over the long-term U.S. Government bond rate. Accordingly, implementation of my procedures requires use of a forecast of the 30-day Treasury bill rate and the long-term Government bond rate.

[20] See for example, "The Capital Asset Pricing Model: Theory and Evidence", Eugene F. Fama and Kenneth R. French, University of Chicago Working Paper, June 2004.

E. COST OF CAPITAL MODELS

Q21. How do you combine the above components into an estimate of the cost of capital?

A21. By far the most widely used approach to estimation of the cost of capital is the "Capital Asset Pricing Model," and I do calculate CAPM estimates. However, the CAPM is only one equity risk premium approach technique, and I also use another.

Q22. Please start with the CAPM, by describing the model.

A22. As noted above, the modern models of capital market equilibrium express the cost of equity as the sum of a risk-free rate and a risk premium. The CAPM is the longest-standing and most widely used of these theories. The CAPM states that the cost of capital for investment I (*e.g.*, a particular common stock) is given by the following equation:

$$k_i = r_F + \beta_i \times \text{MRP} \qquad \textbf{(B-1)}$$

where k_i is the cost of capital for investment *I*; β_i is the beta risk measure for the investment *I*; and MRP is the market risk premium. The CAPM relies on the empirical fact that investors price risky securities to offer a higher expected rate of return than safe securities do. It says that the security market line starts at the risk-free interest rate (that is, that the return on a zero-risk security, the y-axis intercept in Figure 1 in the body of my testimony, equals the risk-free interest rate). It further says that the risk premium over the risk-free rate equals the

product of beta and the risk premium on a value-weighted portfolio of all investments, which by definition has average risk.

Q23. What other equity risk premium approach model do you use?

A23. Empirical research has long shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premia than predicted by the CAPM and high-beta stocks tend to have lower risk premia than predicted. A number of variations on the original CAPM theory have been proposed to explain this finding. The difference between the CAPM and the type of relationship identified in the empirical studies is depicted in Figure MJV-B1.

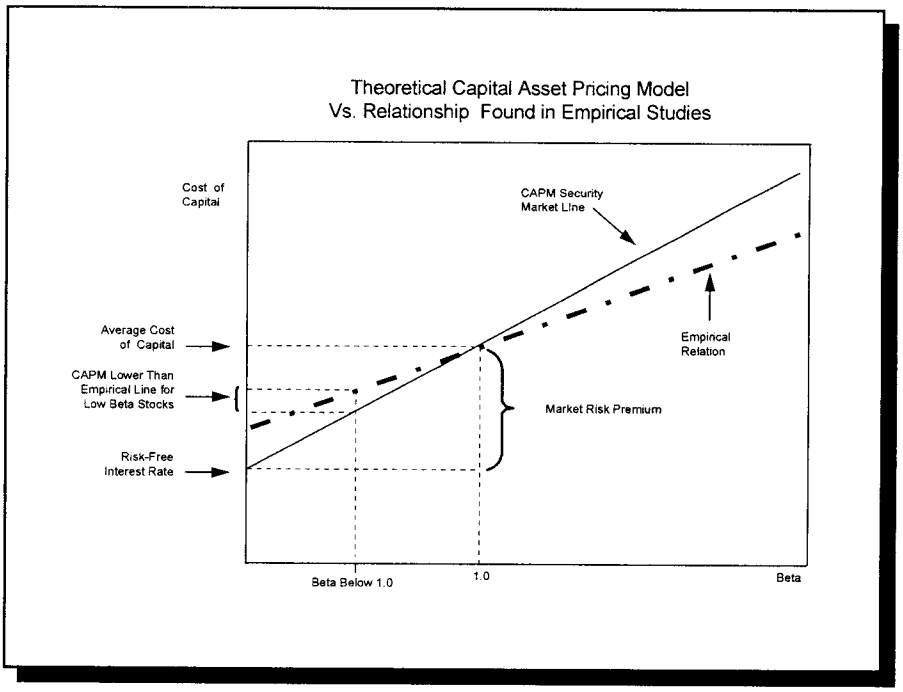

Figure MJV-B1

The second model makes use of these empirical findings. It estimates the cost of capital with the equation,

$$k_i = r_F + \alpha + \beta_i \times (\text{MRP} - \alpha) \qquad \textbf{(B-2)}$$

where α is the "alpha" of the risk-return line, a constant, and the other symbols are defined as above. I label this model the Empirical Capital Asset Pricing Model, or "ECAPM." For the short-term risk-free rate models, I set alpha equal to 1, 2, and 3 percent which are values somewhat lower than that estimated empirically. For low-beta stocks such as regulated utilities, the use of a lower value for alpha leads to a lower estimate of the cost of capital. For the long-term risk-free rate models, I set alpha equal to both 0.5 percent and 1.5 percent, but I rely more heavily on the 0.5 percent results. The use of a long-term risk-free rate

incorporates some of the desired effect of using the ECAPM. That is, the long-term risk-free rate version of the Security Market Line has a higher intercept and a flatter slope than the short-term risk-free version which has been tested. Thus, it is likely that I do not need to make the same degree adjustment when I use the long-term risk-free rate. A summary of the empirical evidence on the magnitude of alpha is provided in Table No. MJV-B1 above.

II. EMPIRICAL EQUITY RISK PREMIUM RESULTS

Q24. How is this part of the appendix organized?

A24. This section presents the full details of my equity risk premium approach analyses, which are summarized in the body of my testimony. This section discusses the sample selection process, calculation of the market value capital structures, and the forecasts of the short-term and the long-term risk-free interest rates. Next, it addresses the beta estimates, and the estimates of the MRP I use in the models. Finally, it reports the CAPM and ECAPM results for the samples' costs of equity, and then describes the results of adjusting for differences between the samples' and Tennessee-American Water Company's ("Tennessee-American") capital structures.

A. PRELIMINARY MATTERS

1. WATER UTILITY SAMPLE

Q25. How do you select your water utility sample companies?

A25. The overall cost of capital for a part of a company depends on the risk of the business in which the *part* is engaged, *not* on the overall risk of the parent company on a consolidated basis.

According to financial theory, the overall risk of a diversified company equals the market value weighted-average of the risks of its components.

Estimating the cost of capital for Tennessee Water's regulated assets is the subject of this proceeding. The ideal sample would be a number of companies that are publicly traded "pure plays" in the water production, storage, treatment, transmission and distribution line of business. "Pure play" is an investment term referring to companies with operations only in one line of business. Publicly traded firms, firms whose shares are freely traded on stock exchanges, are ideal because the best way to infer the cost of capital is to examine evidence from capital markets on companies in the given line of business.

To construct this sample, I started with the universe of companies classified as water utility companies in *Value Line*.[21] Normally, I would apply several selection criteria to eliminate companies with unique circumstances that may affect the cost of capital estimates. For example, I would normally eliminate companies with low annual revenues, no or low bond ratings, lack of I/B/E/S or Compustat data, and all companies with announced dividend cuts or that were involved in significant merger activity over the last five years (2002 to today). However, applying my standard procedures to the eight companies followed by *Value Line* would result in a sample of at most two companies. I therefore try to balance my standard criteria against the need to have a reasonable sample size so as to produce a sample of maximum reliability. For the risk positioning estimates, this results in the use of all eight companies to form a full-sample, as well as the use of seven companies to form a sub-sample

[21] Including both the Standard and the Small and Mid-Cap Editions of *Value Line Investment Survey and Value Line Investment Survey - Plus Edition, August 24, 2006.*

with a high percentage of regulated revenues. [22] For the DCF estimates, only six companies comprise the full sample with three forming a sub-sample.[23]

Table No. MJV-2 and its associated workpapers reports operating revenue shares from different lines of business in 2005 for these companies. (Table No. MJV-1 provides an index to the other tables.)

Q26. Why do you usually eliminate companies currently involved in a merger from your samples?

A26. The stock prices of companies involved in mergers are often more affected by news relating to the merger than to movements in the stock market. In other words, the stock price "decouples" from its normal relationship to the stock market (the economy) which is the basis upon which a company's relative risk is calculated. Instead the stock price of a merger candidate is more affected by the latest speculation on the terms and probability of the merger.

Q27. What are the water sample's data problems?

A27. First, of the eight companies followed by *Value Line*, three companies (Connecticut Water, Middlesex Water, and York Water) have 2005 revenues below $100 million. The stock of

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[22] Southwest Water Company is dropped from the subsample because it only earns an estimated 39 percent of its 2005 revenues from regulated activities. The remaining companies in the subsample earn at least an estimated 89 percent of their 2005 revenues through regulated activities.

[23] For the DCF analysis, the full sample excludes Connecticut Water Service Inc. and SJW Corp because they lack a forecast of EPS growth from either *Value Line* or I/B/E/S. The subsample further excludes Southwest Water Co., again due to a low regulated 2005 revenue percentage, and Middlesex Water Co. and York Water Co. because they lack *Value Line* and I/B/E/S EPS growth rates for 2009-2011. Note, the full sample DCF results for these two companies rely on estimates for the 2009-2011 growth rates extrapolated from the 2007 rates proved by *Value Line*. The resulting companies in the DCF water subsample have at least 96 percent in estimated 2005 revenues coming from regulated activities.

small companies frequently exhibit "thin trading" which means that their stock trades infrequently. Since January of 2006, four of the eight water utilities have traded an average of less than 35,000 shares per trading day.[24] In percentage terms, these companies traded less than 0.3 percent of their shares outstanding. By contrast, each of the gas LDC sample companies had a average trading volume of at least 97,000 shares per day (greater than 130,000 if Laclede Group were excluded), which in percentage terms represented more than 0.45 percent of shares outstanding for each company. Greater trading volume gives the expert more confidence in the estimates since there is less likelihood of a delay between the release of important information and the time that this information is reflected in prices. Such delay is well known to cause beta estimates to be statistically insignificant and possibly biased. Of the four companies with 2005 revenues above $100 million and an average trading volume in excess of 35,000 shares per day, two lack a bond rating for the most recent five years. Indeed, I have not found a bond rating for several of the water companies for some years (see Workpaper #1 Panel A to Table No. MJV-10 for details).

Second, several companies lack long-term earnings forecasts. I do not include Connecticut Water Service Inc. and SJW Corp. in the sample when applying the forward-looking Discounted Cash Flow ("DCF") method because of a lack of recent earnings forecasts. However, I do include both Connecticut Water and SJW Corp. in the risk positioning method because *Value Line* beta forecasts are available for the each. Of the six companies included in the DCF method, two have only one analyst providing a long-term earnings forecast.

[24] These are Connecticut Water, Middlesex Water, SJW Corp., and York Water Co., which traded less than 10,000 shares per day on average.

Third, only two companies have significant revenue, are not thinly traded, have a bond rating and have more than one long-term growth forecast, and one of those has only one long-term I/B/E/S earnings forecast.

Fourth, many companies have significant merger activity over the last five years. Philadelphia Suburban (renamed Aqua America) completed the acquisition of AquaSource for about $195 million in July 2003, and during 2004 Aqua America completed 29 acquisitions. Additionally, American Water Works acquired National Enterprises, Inc., Azurix, and the water and wastewater utility assets of Citizens Utilities. American Water Works, in turn, was acquired by the RWE AG on January 10, 2003. Domestic energy companies have also invested in the water utility business, although presently many of those investments have or will be sold. Allete has sold its assets in Florida and North Carolina; Indianapolis Water Company was sold by NISource; Suez Lyonnaise des Eaux purchased the remaining shares of United Water Resource that it did not already own; and Thames Water purchased E'Town Corporation. California Water Services purchased Ka'anpali Water Corporation in 2003 and Southwest Water Co. acquired a Texas utility consisting of 86 water systems and 11 wastewater systems in 2004.[25] York Water has recently acquired two small water utilities.[26] The large number of mergers, acquisitions and spinoffs is an indication of an industry in flux which will certainly affect the DCF estimates and perhaps the risk positioning estimates as well.

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[25] Sources: *Value Line Investment Survey*, January 30, 2004 and January 28, 2005, *The Business Journal, http://ir.calwatergroup.com,* and company web sites.

[26] Press releases, March 1 and March 21, 2005.

These factors may all potentially affect the cost of equity estimates in ways not completely predictable. Because of the substantial data problems and lack of publicly traded water utilities, I am forced to rely on a sample with significant data problems or a sample with at most two companies (American States Water and California Water Services).[27]

2. GAS LOCAL DISTRIBUTION COMPANY SAMPLE

Q28. How do you select your gas local distribution company sample?

A28. To select this sample, I started with the universe of publicly traded gas distribution utilities covered by *Value Line*. This resulted in an initial group of 16 companies.[28] I then eliminated companies by applying additional selection criteria designed to eliminate companies with unique circumstances which may bias the cost of capital estimates. The final sample consists five gas local distribution ("gas LDC") companies: Laclede Group Inc., Northwest Natural Gas Co., South Jersey Industries Inc., Southwest Gas Corp., and WGL Holdings Inc. Table No. MJV-12 reports operating revenue shares from regulated activities for these companies for 2005. Although this sample is smaller than is ideal, none of the companies in the sample suffer from the issue

Q29. What are the selection criteria you applied?

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[27] Several companies have multiple problems. For example, Connecticut Water has revenues below $100 million, exhibits thin trading and and lacks long-term earnings growth forecasts. Middlesex Water has revenues below $100 million, only one I/B/E/S forecast and no long-term *Value Line* earnings forecast. SJW Corp. exhibits thin trading, has no current I/B/E/S forecasts and lacks a bond rating. Southwest Water earned only 39 percent of its revenues from regulated activities. York Water has revenues below $100 million, exhibits thin trading and has no long-term *Value Line* forecast. In addition York Water has recently acquired two small local utilities.

[28] The 16 companies are from *Value Line Investment Survey's* Standard Edition, August 2006.

A29. I eliminated all companies whose regulated revenues are not greater than 50 percent of total revenues because one goal for this sample was for the sample companies to derive the majority of their revenues from regulated activities. I also eliminated all companies whose bond rating was less than Baa as rated by Moody's (or BBB- as rated by S&P) and companies that had a large merger during the period January 2001 to August 2006. The screen for merger activity is any mention of merger activity in the analyst report section of *Value Line* or sizeable mergers found during a search of the companies' web pages.[29,30] To guard against measurement bias caused by "thin trading," I also restricted the sample to companies with total operating revenues greater than $200 million in 2005. Finally, I require that the companies have historical monthly return data available from Compustat for the relevant period.

Q30. What companies were eliminated from the gas LDC sample because their share of revenue from distribution activities is not above 50 percent?

A30. New Jersey Resources was eliminated from the sample because its revenue share from natural gas distribution is not above 50 percent. Additionally, the percentage of its income from marketing and other wholesale activities increased by 25 percent in 2004.[31]

Q31. Were any other companies eliminated?

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[29] Company web pages were searched in December 2003 for merger and acquisition activities during the 2001-2003 period, in April 2005 for merger and acquisition activities during the period 2004 through March 2005, and in July 2006 for activity going back to April 2005.

[30] For purposes of sample selection, a sizeable merger is defined to be one which would exceed 20 percent of the total capitalization of the company at the time of the merger announcement.

[31] *Value Line Investment Survey*, Natural Gas (Distribution), March 18, 2005.

A31. Yes. AGL Resources, Atmos Energy, Cascade Natural Gas, Keyspan Corp., Peoples Energy, Piedmont Natural Gas, and Southern Union were eliminated for recent or current merger activities. Semco Energy was eliminated both because of its non-investment grade bond rating from Moody's and its recent dividend cuts. Nicor Inc. was eliminated from the sample because of its restatement of earnings for 1999-2001, and because Nicor settled regulatory compliance issues with the Federal Energy Regulatory Commission ("FERC") in 2003.[32] UGI Corp. was eliminated because it primarily sells propane which is non-regulated, as well as its recent acquisition of PG Energy from Southern Union Co.

Q32. Are there any issues with remaining companies in your sample?

A32. Perhaps. South Jersey Industries reported revenue from energy trading activities in its 2001 10-K. Given the turmoil of the energy trading markets, the companies' cost of capital estimates may be more volatile than those of more stable companies. Additionally, WGL Holdings has obtained on average less than 70 percent of its revenue from regulated activities during the past five years.

Q33. Please compare the characteristics of the water utility sample and the gas LDC sample.

A33. Both samples earned a large percentage of their revenue from regulated activities and serve a mix of residential, industrial, and other customers, and involve pipeline transportation of a storable good. However, the gas LDC sample has fewer of the data and estimation issues identified above for the water sample. The following summarizes the water utility and the gas

[32] Nicor announced on Oct. 29, 2002 that its earnings for 1999-2001 would be revised downwards by $15-35 million. March 4, 2003, Nicor released its restated earnings for 1999-2001 along with 2002 earnings.

LDC samples' characteristics in terms of being "pure regulated utilities and low risk" companies.

All companies in the water utility sample and the gas LDC sample are regulated by one or more states. Also, companies in both the water utility and the gas LDC sample have significant investments in water or gas networks and serve a mix of residential, industrial, commercial, and public customers, i.e., their customer mix is comparable.

To determine the risk characteristics of the gas LDC sample, I reviewed several key features of their regulatory environment. Most if not all companies have a fuel adjustment clause that allows them to pass (at least part of) increases in gas purchase costs onto their customers. Some gas LDC companies have tariffs that contain provisions that permit the recovery of (some) environmental remediation costs. Such provisions exist, for example, for South Jersey Industries.[33] Regulatory requirements from federal and local authorities through, for example, the Clean Water Act of 1974 and EPA enforcement, will likely require the water industry to invest substantial amounts in infrastructure going forward.[34]

The water subsample was formed to include only those companies with a higher percent of their revenues from regulated utilities and fewer data problems. As discussed earlier, the composition of the water sample differs for the risk positioning and DCF estimates, but the companies in the water subsample earned at least 97 percent of revenues from regulated

[33] South Jersey Industries, 2004 10-K, p. 6.

[34] Last year, the *Value Line Investment Survey* (Water Utility Industry, January 28, 2005) predicted that updates to the infrastructure of water utilities are likely to grow into hundreds of billions of dollars over the next decade or two.

activities in 2005. Companies in the gas LDC sample earned at least 70 percent of revenue from regulated activities. (See Table No. MJV-2 and Table No. MJV-12).

Q34. What do you conclude from the comparison of the water utility and the gas LDC samples?

A34. The two samples differ primarily in that they operate in two different (regulated) industries, but they are very similar in terms of the percentage of revenues from regulated operations and the customers they serve. The gas LDC sample provides a reasonable comparison sample for the water utility industry but with fewer data issues.

3. OTHER PRELIMINARY MATTERS

Q35. What capital structure information do you require?

A35. For reasons discussed in my testimony and explained in detail in Appendix D explicit evaluation of the market-value capital structures of the sample companies versus the capital structure used for rate making is vital for a correct interpretation of the market evidence. This requires estimates of the market values of common and preferred equity and debt, and the current market costs of preferred equity and debt.

Q36. How do you calculate the market-value capital structures of the sample companies?

A36. I estimate the capital structure for each company by estimating the market values of common equity, preferred equity and debt from publicly available data. The calculations are in Tables

No. MJV-3 (Panels A to H) and MJV-13 (Panels A to E) for the water and gas LDC sample, respectively.

The market value of equity is straightforward: the price per share times the number of shares outstanding. The market value of debt is set equal to its book value because the market value of debt generally does not differ materially from its book value at this time. The market value of preferred equity is also set equal to its book value because preferred equity makes up a very small portion (less than 1 percent) of the five year average market value capital structures of the companies in the two samples.

For purposes of assessing financial risk to common shareholders, I add an adjustment for short-term debt to the debt portion of the capital structure. This adjustment is used only for those companies whose short-term (current) liabilities (net of the current portion of long-term debt) exceed their short-term (current) assets. I add an amount equal to the minimum of the difference between short-term liabilities and short-term assets or the amount of short-term debt. The reason for this adjustment is to recognize that when current liabilities exceed current assets, a portion of the company's long-term assets are being financed, in effect, by short-term debt. The output of these schedules is the market debt-to-value and preferred equity-to-value ratios. Again, Table No. MJV-3 and Table No. MJV-13 report such calculations using the values at year end for the years 2001 through 2005, and for the end of second quarter 2006. The overall cost of capital calculation for the risk positioning estimates rely on the average of the market value capital structure computed for the years 2001 through the second quarter of 2006. The DCF capital structure of each company uses a 15 day average of stock prices as of the relevant I/B/E/S EPS estimate date (either September 8, 2006, August 17, 2006, or April

14, 2006), and balance sheet information as at the end of second quarter 2006 for both the water and gas LDC samples.

Q37. How do you estimate the current market cost of debt?

A37. I use the current yields on indices of comparably rated utility bonds. The cost of debt for each company in the DCF analysis is the current yield reported by *Mergent Bond Record* for an index of bonds rated comparably by Moody's. For the risk positioning method, the cost is the current yield corresponding to the five-year average debt rating for each company. The debt ratings for almost all of the companies in both samples are obtained from S&P, with only SJW Corp.'s rating being obtained from Moody's.[35] Calculation of the after-tax cost of debt uses the Company's estimated marginal income tax rate for 2006 of 39.20 percent.

Q38. How do you estimate the current market cost of preferred equity?

A38. The cost of preferred equity is estimated similarly to the cost of debt. It is set equal to the yield on an index of comparably rated preferred equity. The preferred equity is rated by Moody's.[36]

B. RISK-FREE INTEREST RATE FORECAST

Q39. How do you obtain the forecasts of the risk-free interest rates over the period the utility rates set here are to be in effect?

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[35] A Moody's rating was used for SJW Corp. since no S&P rating was available. See Workpaper #1 to Table No. MJV-10 for details.

[36] If no preferred rating was found, the preferred rating is assumed to be equal to the company's bond rating.

A39. I obtain these forecast rates from the website of the St. Louis Federal Reserve Bank. In particular, I use the yields from the "constant maturity series". This information is displayed in Panels A and B of Workpaper #2 to Table No. MJV-9.

Q40. What values do you use for the short-term and long-term risk-free interest rates?

A40. I use a value of 4.1 percent for the short-term risk-free interest rate and a value of 5.0 percent for the long-term risk-free interest rate as the benchmark interest rates in the equity risk premium analyses. These forecasts are constructed by using historical yield curve data to find the long-run average implied term premia on government securities, and combining these with recent yield curve data. Details of their calculation can be found in the Workpapers to Table No. MJV-9.

C. BETAS AND THE MARKET RISK PREMIUM

1. BETA ESTIMATION PROCEDURES

Q41. How do you calculate beta?

A41. My standard approach is to calculate beta by statistical regression of the excess (positive or negative) of the return on the stock over the risk-free rate against the excess of the return on the S&P 500 index over the risk-free rate for the most recent 60-month period for which data exist.

Q42. Did you use your standard approach to calculate betas for this proceeding?

A42. No. Ordinarily, I estimate betas based upon the most recent 60 months of data for the sample companies, but the relatively recent turmoil and unusual events in the stock market caused a

steep drop in water utility betas and gas LDC betas between January 2000 and April 2005 (see Figures MJV-B2 and MJV-B3).[37] As illustrated by the figures, monthly betas have been recovering for the past one to two years, which is consistent with my belief that the risk of the sample companies has increased given the changes in the water industry and natural gas market. The instability of the 60-month betas estimates over the last few years makes me question their reliability at this time.

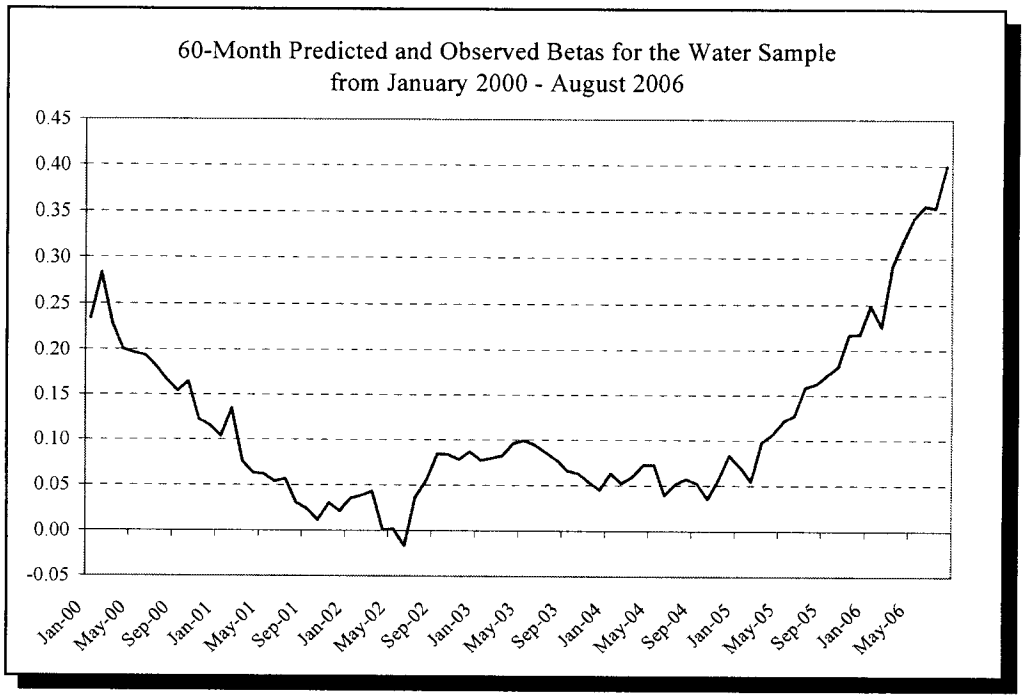

Figure MJV-B2

Q43. In light of decoupling discussed above, how do you estimate the betas for your sample companies?

[37] The stock market events caused the returns of the companies in the two samples to "decouple" from their normal relationship to the returns on the market index during these periods. As evidenced by the figures, the average of the sample companies' estimated betas were very close to zero and some were even negative during the most recent 60 month period. A zero beta implies a risk-free asset, but it is not credible to believe that these companies were risk-free during that period.

A43. I use betas estimated by *Value Line*. Although *Value Line* reports adjusted betas, I undo this process here because I do not believe it is warranted for the sample companies at this time. Therefore, I utilize "unadjusted" *Value Line* betas in my analyses.

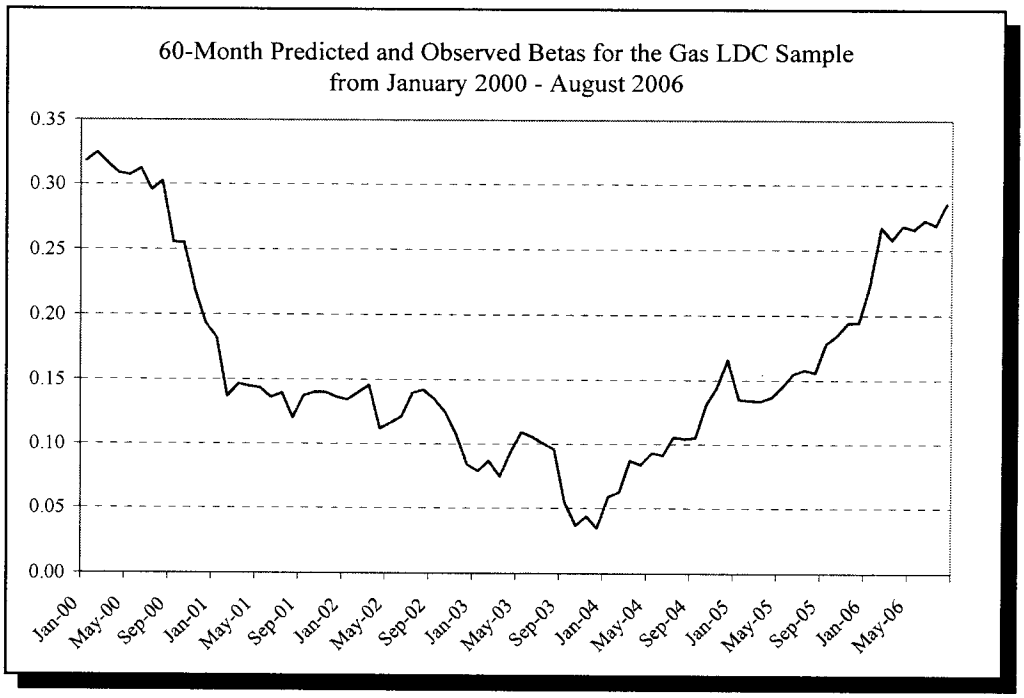

Figure MJV-B3

Q44. Please review the *Value Line* beta adjustment procedure and the reason for using it.

A44. Value Line reports two types of beta, one calculated essentially as just described and one adjusted to compensate for sampling errors in directly estimated betas. The Merrill Lynch adjustment moves betas one-third of the way toward a value of one, the average stock beta. The adjustment is designed as a correction for the tendency of companies with low estimated betas to have negative sampling errors and for the tendency of companies with high estimated betas to have positive sampling errors.

Many practitioners routinely use Merrill Lynch adjusted betas to adjust for sampling error, but that is not the reason I would use adjusted betas. The primary reason I would use adjusted betas is that unadjusted betas potentially underestimate the cost of capital for interest sensitive stocks, such as those regulated on the basis of original cost rate base.

Q45. Why are companies regulated on the basis of original cost rate base sensitive to interest rates?

A45. Under traditional regulation, utilities are more sensitive to interest rate changes than are unregulated companies because utilities are regulated with nominal rates of return on historical-cost rate bases. Shareholders of companies regulated on a book-value rate base receive compensation for inflation in a different way from most companies' shareholders, through an inflation premium in the rate of return rather than through appreciation of asset value. Bondholders get inflation compensation in the same way, through an inflation premium in the interest rate. This similarity makes regulated company returns especially sensitive to fluctuations in the bond market. This in turn affects the estimation of such a company's beta, the stock market measure of risk. Betas measured in the conventional way do not capture the regulated firms' extra sensitivity to interest rates.[38]

Q46. What beta values do you use in your analysis?

[38] For details on this, see Charles River Associates, *Choice of Discount Rates in Utility Planning: A Critique of Conventional Betas as Risk Indicators for Electric Utilities*, prepared for the Electric Power Research Institute, February, 1984. A. Lawrence. Kolbe was a principal investigator on this study, along with James A. Read, Jr.

A46. Neither the water nor gas LDC sample companies currently exhibit any statistically significant interest rate sensitivity, so I use unadjusted betas in my analyses. After reversing the adjustment process discussed above, the current *Value Line* beta estimates range from 0.15 to 0.67 for the water sample and from the 0.52 to 0.75 for the gas LDC sample (See Workpaper #1 to Tables No. MJV-9 and No. MJV-19).

Q47. Do you have any additional support for the betas that you use in your analysis?

A47. Yes. Additional evidence on the current value of the betas is provided by estimates based on weekly return data instead of monthly return data. I have calculated rolling 52-week beta estimates for the water sample companies between January 2001 and September 2006 (see Figure MJV-B4). It is instructive to look at the beta values estimated for the most recent 52 weeks. This period avoids much of the stock market turmoil which has significantly affected the beta estimates using 60 months of stock returns. The figure shows that for the most recent 52-week period (as of September 13, 2006), the sample average 52-week beta estimate for the companies in the water sample is 1.63, which is significantly higher than the unadjusted beta estimates of 0.56 on which I rely (Workpaper #1 to Table No. MJV-9). Although I do not use these 52-week beta estimates in my cost of capital calculations, when combined with the upward trend found in the monthly estimates, they are evidence that the risk of the sample companies is probably higher than is reflected in the betas I do use.

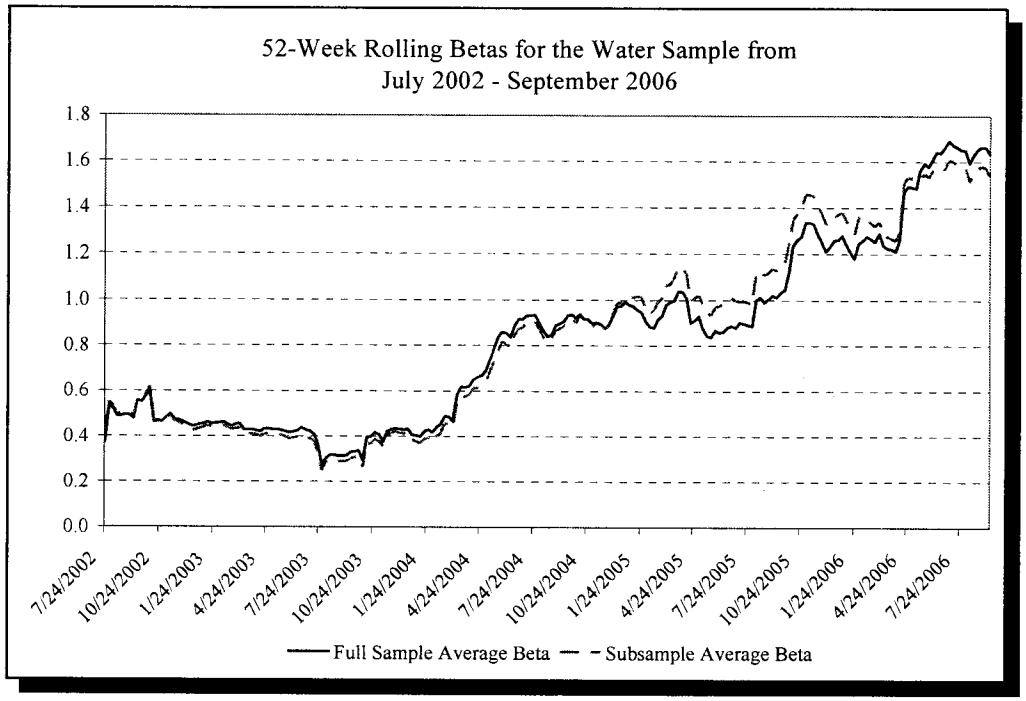

Figure MJV-B4

2. MARKET RISK PREMIUM ESTIMATION

Q48. Given all of the evidence, what MRP do you use in your analysis?

A48. It is clear that market return information is volatile and difficult to interpret, but based on the collective evidence, the MRP I use for the short-term risk-free rate is 8 percent and for the long-term risk-free rate is 6.5 percent.

D. COST OF CAPITAL ESTIMATES

Q49. Based on these data, what are the values you calculate for the overall cost of capital and the corresponding cost of equity for the water utility sample?

A49. Panels A and B of Table No. MJV-9 present the cost of equity results using the equity risk positioning methods. Panel A uses the long-term risk-free rate forecasts while Panel B uses the short-term risk-free rate forecasts. These returns on equity are replicated and the overall cost of capital for the various equity risk positioning methods are reported in Table No. MJV-10, Panels A to G. Panels A through C utilize the long-term risk-free rate while Panels D through G use the short-term risk free rate. Panel A reports the cost of capital estimates using the CAPM results for the long-term risk-free rate, while Panels B and C report these estimates for the ECAPM cost of equity results using ECAPM parameters of 0.5 and 1.5 percent, respectively. Panel D reports the CAPM estimates using the short-term risk free rate, while Panels E, F and G report ECAPM results using ECAPM parameters of 1, 2 and 3 respectively. In each panel, column [8] reports the overall cost of capital for each company. The last two rows of each panel report the sample averages. The first is for all companies in the water sample (average [a]), and the second is for the subsample of companies with significant revenue from regulated water activities and fewer data problems (average [b]).

Q50. What does the water utility sample market data imply about the sample's cost of equity at Tennessee Water's 43 percent equity ratio?

A50. The sample average ATWACCs from each panel of Table No. MJV-10 are reproduced in column [1] of Table No. MJV-11, which then reports the cost of equity for each of the risk positioning methods that is consistent with the sample information and the capital structure of Tennessee-American. Panel A of Table No. MJV-11 reports the results for all sample companies. Panel B of the table summarizes the results for the subsample of companies that have a large percentage of revenues from regulated activities and fewer data problems. The results for the water subsample are generally slightly higher than for the full sample. The sample average ATWACCs and corresponding costs of equity at a 43 percent equity ratio are also displayed in Table 2 of my testimony.

Q51. What cost of equity values do you calculate for the gas LDC sample?

A51. The cost of equity estimates for the gas LDC sample are displayed on Panels A and B of Table No. MJV-19. Panel A uses the long-term risk-free rate, and Panel B uses the short-term risk-free rate.

Q52. What does the gas LDC sample market data imply about the sample's cost of equity at Tennessee Water's 43 percent equity ratio?

A52. The cost of equity and the overall cost of capital for the various equity risk positioning methods are reported in Table No. MJV-20 for the gas LDC sample. Panels A through C utilize the long-term risk-free rate. Panel A again reports the CAPM cost of equity results while Panels B and C report the ECAPM cost of equity results for the 0.5 and 1.5 percent adjustment factors, respectively. Panels D through G to Table MJV-20 utilize the short-term risk-free rate. Panel

D report the CAPM cost of equity results, while Panels E, F and G report the ECAPM overall cost of capital results using 1, 2 and 3 percent adjustment factors. In each panel, column [8] again reports the overall cost of capital for each company. The last line of each panel reports the sample averages.

The sample average ATWACC from each panel of Table No. MJV-20 is reproduced in column one of Table No. MJV-21 which reports the cost of equity estimates for Tennessee-American for each of the risk positioning estimates. As for the water sample, the sample average ATWACCs and corresponding costs of equity at a 43 percent equity ratio are displayed in Table 2 of my testimony.

I discuss the implications of the equity risk positioning results for both samples in the main body of my testimony.

EMPIRICAL EVIDENCE ON THE ALPHA FACTOR IN ECAPM

AUTHOR	RANGE OF ALPHA	PERIOD RELIED UPON
Fischer (1993)	–3.6% to 3.6%	1931-1991
Fischer, Jensen and Scholes (1972)	-9.61% to 12.24%	1931-1965
Fama and McBeth (1972)	4.08% to 9.36%	1935-1968
Fama and French (1992)	10.08% to 13.56%	1941-1990
Litzenberger and Ramaswamy (1979)	5.32% to 8.17%	
Litzenberger, Ramaswamy and Sosin (1980)	1.63% to 5.04%	1926-1978
Pettengill, Sundaram and Mathur (1995)	4.6%	

Sources:

Black, Fischer, "Beta and Return," *The Journal of Portfolio Management*, Fall 1993, 8-18.

Black, Fischer, Michael C. Jensen and Myron Scholes, "The Capital Asset Pricing Model: Some Empirical Tests, from Studies in the theory of Capital Markets," in Jensen, M. (ed.) *Studies in the Theory of Capital Markets*, Praeger, New York, 1972, 79-121.

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Litzenberger, Robert H. and Krishna Ramaswamy, "The Effect of Personal Taxes and Dividends on Capital Asset Prices, Theory and Empirical Evidence," *Journal of Financial Economics*, June 1979, pp. 163-195.

Litzenberger, Robert H. and Krishna Ramaswamy and Howard Sosin, "On the CAPM Approach to Estimation of a Public Utility's Cost of Equity Capital," *The Journal of Finance*, Vol. 35, No. 2, May 1980, pp. 369-387.

Pettengill, Glenn N., Sridhar Sundaram and Ike Mathur, "The Conditional Relation between Beta and Returns," *Journal of Financial and Quantitative Analysis*, Vol. 30, No. 1, March 1995, pp. 101-116.

Table MJV-B1

APPENDIX C: DISCOUNTED CASH FLOW METHODOLOGY: DETAILED PRINCIPLES AND RESULTS

TABLE OF CONTENTS

Q1. What is the purpose of this appendix?

A1. This appendix reviews the principles behind the discounted cash flow or "DCF" methodology and the details of the cost of capital estimates obtained from this methodology. This appendix intentionally repeats portions of my direct testimony, because I want the reader to have access here to a full discussion of the issues addressed, rather than having to continually turn back to the corresponding section of the testimony.

I. DISCOUNTED CASH FLOW METHODOLOGY PRINCIPLES

Q2. How is this section of the appendix organized?

A2. The first part discusses the general principles that underlie the DCF approach. The second portion describes the strengths and weaknesses of the DCF model and why it is generally less reliable for estimating the cost of capital for the sample companies at the present time than the risk positioning method discussed in Appendix B.

A. SIMPLE AND MULTI-STAGE DISCOUNTED CASH FLOW MODELS

Q3. Please summarize the DCF model.

A3. The DCF model takes the first approach to cost of capital estimation discussed with Figure 1 in Section II-A of my testimony. That is, it attempts to measure the cost of equity in one step. The method assumes that the market price of a stock is equal to the present value of the

dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_T}{(1+k)^T} \qquad \text{(C-1)}$$

where "P" is the market price of the stock; "D_i" is the dividend cash flow expected at the end of period i; "k" is the cost of capital; and "T" is the last period in which a dividend cash flow is to be received. The formula just says that the stock price is equal to the sum of the expected future dividends, each discounted for the time and risk between now and the time the dividend is expected to be received.

Most DCF applications go even further, and make very strong (*i.e.*, unrealistic) assumptions that yield a simplification of the standard formula, which then can be rearranged to estimate the cost of capital. Specifically, if investors expect a dividend stream that will grow forever at a steady rate, the market price of the stock will be given by a very simple formula,

$$P = \frac{D_1}{(k-g)} \qquad \text{(C-2)}$$

where "D_1" is the dividend expected at the end of the first period, "g" is the perpetual growth rate, and "P" and "k" are the market price and the cost of capital, as before. Equation C-2 is a simplified version of Equation C-1 that can be solved to yield the well known "DCF formula" for the cost of capital:

$$k = \frac{D_1}{P} + g = \frac{D_0 x (1+g)}{P} + g \qquad \text{(C-3)}$$

where "D_0" is the current dividend, which investors expect to increase at rate g by the end of the next period, and the other symbols are defined as before. Equation C-3 says that if

Equation C-2 holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the simple DCF model.

Q4. Are there other versions of the DCF models besides the "simple" one?

A4. Yes. If Equation C-2 does not hold, sometimes other variations of the general present value formula, Equation C-1, can be used to solve for k in ways that differ from Equation C-3. For example, if there is reason to believe that investors do *not* expect a steady growth rate forever, but rather have different growth rate forecasts in the near term (e.g., over the next five or ten years), these forecasts can be used to specify the early dividends in Equation C-1. Once the near-term dividends are specified, Equation C-2 can be used to specify the share price value at the end of the near-term (e.g., at the end of five or ten years), and the resulting cash flow stream can be solved for the cost of capital using Equation C-1.

More formally, the "multi-stage" DCF approach solves the following equation for k:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_T + P_{TERM}}{(1+k)^T} \quad . \qquad \text{(C-4)}$$

The terminal price, P_{TERM} is estimated as

$$P_{TERM} = \frac{D_{T+1}}{(k - g_{LR})} \qquad \text{(C-5)}$$

where T is the last of the periods in which a near term dividend forecast is made and g_{LR} is the long-run growth rate. Thus, Equation C-4 defers adoption of the very strong perpetual growth assumptions that underlie Equation C-2 — and hence the simple DCF formula, Equation C-3 — for as long as possible, and instead relies on near term knowledge to improve the estimate of k. I examine both simple and multi-stage DCF results below.

Q5. What are the merits of the DCF model?

A5. The DCF approach is conceptually sound if its assumptions are met but can run into difficulty in practice because those assumptions are so strong, and hence so unlikely to correspond to reality. Two conditions are well-known to be necessary for the DCF approach to yield a reliable estimate of the cost of capital: the variant of the present value formula, Equation C-1, that is used must actually match the variations in investor expectations for the dividend growth path; and the growth rate(s) used in that formula must match current investor expectations. Less frequently noted conditions may also create problems.

The DCF model assumes that investors expect the cost of capital to be the same in all future years. Investors may not expect the cost of capital to be the same, which can bias the DCF estimate of the cost of capital in either direction.

The DCF model only works for companies for which the standard present value formula works. The standard formula does *not* work for options (*e.g.*, puts and calls on common stocks), and so it will not work for companies whose stocks behave as options do. Option-pricing effects will be important for companies in financial distress, for example, which implies the DCF model will *understate* their cost of capital, all else equal.

In recent years even the most basic DCF assumption, that the market price of a stock in the absence of growth options is given by the standard present value formula (*i.e.*, by Equation C-1 above), has been called into question by a literature on market volatility as well as the issue of the meaning of the market to book ratio. In any case it is still too early to throw out the standard formula, if for no other reasons than that the evidence is still controversial and no one has offered a good replacement. But the evidence suggests that it must be viewed with

more caution than financial analysts have traditionally applied. Simple models of stock prices may not be consistent with the available evidence on stock market volatility.

Q6. Do you agree that estimating the right growth rate is the most difficult part for the implementation of the DCF approach?

A6. Yes. Finding the right growth rate(s) is indeed the usual "hard part" of a DCF application. The original approach to estimation of *g* relied on average historical growth rates in observable variables, such as dividends or earnings, or on the "sustainable growth" approach, which estimates *g* as the average book rate of return times the fraction of earnings retained within the firm. But it is highly unlikely that historical averages over periods with widely varying rates of inflation, interest rates and costs of capital, such as in the relatively recent past, will equal current growth rate expectations. Moreover, the constant growth rate DCF model *requires* that dividends and earnings grow at the same rate. It is inconsistent for dividends to grow at a rate that differs from the growth in earnings because it would mean that dividends are becoming an ever increasing or decreasing percentage of earnings.

Most cost of capital experts rely on earnings growth rates, not dividend growth rates, for several reasons. First, although the model is derived from dividend growth rates, the more fundamental parameter is earnings growth because dividends are paid from earnings. Second, analyst forecasts of dividend growth rates are generally not available, but earnings growth forecasts are. Third, a better approach than relying on historical information is to use the growth rates currently expected by investment analysts, if an adequate sample of such rates is

available. Analysts' forecasts are superior to time series forecasts based upon single variable historical data as has been documented and confirmed extensively in academic research.[1]

If this approach is feasible and if the person estimating the cost of capital is able to select the appropriate version of the DCF formula, the DCF method should yield a reasonable estimate of the cost of capital for companies not in financial distress and without material option-pricing effects (always subject to recent concerns about the applicability of the basic present value formula to stock prices). However, for the DCF approach to work, the basic stable-growth assumption must become reasonable and the underlying stable-growth rate must become determinable *within the period for which forecasts are available.*

Q7. What is the so called "optimism bias" in the earnings growth rate forecasts of security analysts and what is its effect on the DCF analysis?

A7. Optimism bias is related to the observed tendency for analysts to forecast earnings growth rates that are higher than are actually achieved. This tendency to over estimate growth rates is perhaps related to incentives faced by analysts that provide rewards not strictly based upon the accuracy of the forecasts. To the extent optimism bias is present in the analysts' earnings forecasts, the cost of capital estimates from the DCF model would be too high.

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[1] Lawrence D. Brown and Michael S. Rozeff, 1978, "The Superiority of Analysts Forecasts as Measures of Expectations: Evidence from Earnings," *Journal of Finance*, Vol. XXXIII, No. 1, pp. 1-16. J. Cragg and B.G. Malkiel, 1982, *Expectations and the Structure of Share Prices*, National Bureau of Economic Research, University of Chicago Press. R.S. Harris, 1986, "Using Analysts' Growth Forecasts to Estimate Shareholder Required Rates of Return," *Financial Management*, Spring 1986, pp. 58-67. J. H. Vander Weide and W. T. Carleton, 1988, "Investor Growth Expectations: Analysts vs. History," *Journal of Portfolio Management*, Spring, pp. 78-82. T. Lys and S. Sohn, 1990, "The Association Between Revisions of Financial Analysts Earnings Forecasts and Security Price Changes," *Journal of Accounting and Economics*, vol 13, pp. 341-363.

Q8. Does optimism bias mean that the DCF estimates based upon analysts' earnings forecasts are completely unreliable?

A8. No. The effect of optimism bias is least likely to affect DCF estimates for large, rate regulated companies in stable segments of an industry. Furthermore, the magnitude of the optimism bias (if any) for regulated companies is not clear. Chan, Karceski, and Lakonishok (2000)[2] sort companies on the basis of the size of the I/B/E/S forecasts to test the level of optimism bias. Utilities constitute 25 percent of the companies in lowest quintile, and by one measure the level of optimism bias is 4 percent. However, the 4.0 percent figure does not represent the complete characterization of the results in the paper. Table IX of the paper shows that the median I/B/E/S forecast for the first (lowest) quintile averages 6.0 percent. The realized "Income before Extraordinary Items" is 2.0 percent (implying a four percent upward bias in I/B/E/S forecasts), but the "Portfolio Income before Extraordinary Items" is 8.0 percent (implying a two percent downward bias in I/B/E/S forecasts).

The difference between the "Income before Extraordinary Items" and "Portfolio Income before Extraordinary Items" is whether individual firms or a portfolio are used in estimating the realized returns. The first is a simple average of all firms in the quintile while the second is a market value weighted-average. Although both measures of bias have their own drawbacks according to the authors,[3] the Portfolio Income measure gives more weight to the larger firms in the quintile such as regulated utilities. In addition, the paper demonstrates that "analysts' forecasts as well as investors' valuations reflect a wide-spread belief in the

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[2] L. K.C. Chan, J. Karceski, and J. Lakonishok, 2003, "The Level and Persistence of Growth Rates," *Journal of Finance* 58(2):643-684.

[3] Chan, Karceski, and Lakonishok, *op. cit.*, p. 675.

investment community that many firms can achieve streaks of high growth in earnings."[4] Therefore, it is not clear how severe the problem of optimism bias may be for regulated utilities or even whether there is a problem at all.

Finally, the two-stage DCF model also adjusts for any over optimistic (or pessimistic) growth rate forecasts by substituting the long-term GDP growth rate for the 5-year growth rate forecasts of the analysts in the years after year 5.

Q9. Please describe the two-stage DCF model you use.

A9. The two-stage model I use is presented in equation C-4 above and assumes that the long-term perpetual growth rate for all companies in the two samples is the forecast long-term growth rate of the GDP.[5] This model allows growth rates to differ for each company for each year over the next ten years before settling down to a single long-term growth rate. The growth rate for the first five years is the growth rate for years one through five as provided in analysts' reports. After year five, the growth rate is assumed to converge linearly to the GDP growth rates. In other words, the growth rate in year 6 is adjusted by 1/5th of the difference between each company's 5-year growth rate forecast and the GDP forecast. The growth rate in year 7 is adjusted by an additional 1/5th so that the earning growth rate pattern converges on the long-term GDP growth rate forecast.

Q10. Why do you assume that the long-term growth rate of the sample companies will converge to the long-term growth rate of GDP?

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[4] Chan, Karceski, and Lakonishok, *op. cit.*, p. 663.

[5] See *Blue Chip Economic Indicators*, March 2006.

A10. Recall that the DCF model assumes that dividends grow at a constant rate literally forever. If the growth rate of earnings (and therefore, dividends) were greater than (less than) the long-term growth rate of the economy, mathematically it would mean that the company (and the industry) would become an ever increasing (or decreasing) proportion of the economy. Therefore, the most logical assumption is that the company's earnings grow at the same rate as the economy on average over the long run.

Q11. How well are the conditions needed for DCF reliability being met at present?

A11. The requisite conditions for the sample companies are not fully met at this time. Of particular concern for this proceeding is the uncertainty about what investors truly expect the long-run outlook for the sample companies to be. The longest time period available for growth rate forecasts of which I am aware is five years. The long-run growth rate (*i.e.*, the growth rate after an industry settles into a steady state) drives the actual results one gets with the DCF model. Unfortunately, this implies that unless the company or industry in question is stable, so there is little doubt as to the growth rate investors expect, DCF results in practice can end up being driven by the subjective judgment of the analyst who performs the work.

Uncertainty in an industry implies that a commission may often be faced with a wide range of DCF numbers, none of which can be well grounded in objective data on true long-run growth expectations, *because no such objective data now exist.* DCF for firms or industries in flux is *inherently* subjective with regard to a parameter (the long-run growth rate) that drives the answer one gets.

In short, the unavoidable questions about the DCF model's strong assumptions cause me to view the DCF method as *inherently* less reliable than the risk positioning approach

described above. However, because the DCF method has been widely used in the past and in other forums when the industry's economic conditions were different from today's, I submit DCF evidence in this case. DCF estimates also serve as a check on the values provided by the risk positioning approach methods.

B. CONCLUSIONS ABOUT DCF

Q12. Please sum up the implications of this part of the appendix.

A12. The unavoidable questions about the DCF model's strong assumptions — whether the basic present value formula works for stocks, whether option pricing effects are important for the company, whether the right variant of the basic formula has been found, and whether the true growth rate expectations have been identified — cause me to view the DCF method as *inherently* less reliable than the risk positioning approach.

II. EMPIRICAL DCF RESULTS

Q13. How is this part of the appendix organized?

A13. This section presents the details of my DCF analyses, which are summarized in my direct testimony. The first part describes some preliminary matters, such as sample selection, calculation of sample capital structures, and so on. Then it turns to the details of the DCF estimates themselves.

In particular, implementation of the simple DCF models described above requires an estimate of the current price, the dividend, and near-term and long-run growth rate forecasts. The simple DCF model relies only on a single growth rate forecast, while the multi-stage DCF model employs both near-term and long-run growth rate forecasts. The remaining parts of this section describe each of these inputs in turn.

A. PRELIMINARY MATTERS

Q14. In the Appendix B discussion of "preliminary matters," you discuss sample selection and the capital structure/cost of capital data you need to complete your risk premium analyses. What, if anything, is different when you use the DCF method?

A14. As mentioned in Appendix B, the companies in the water utility sample to which the DCF approach is applied differ slightly from those used with the risk positioning method due to the availability of earnings forecasts. Note also that the timing of the market value capital structure calculations is different in the DCF method and in the risk positioning method. The risk positioning method relies on the average capital structure over the past five years while the DCF approach uses only current data, so the relevant market value capital structure measure is the most recent that can be calculated. This capital structure is reported in columns [1]-[3] of Table No. MJV-4 for the water utility sample and Table No. MJV-14 for the gas LDC sample.

B. GROWTH RATES

Q15. What growth rates do you use?

A15. For reasons discussed above, historical growth rates today are useless as forecasts of current investor expectations for the water industry or the gas LDC sample. I therefore use rates forecasted by security analysts.

The ideal in a DCF application would be a detailed forecast of future dividends, year by year well into the future, based on a large sample of investment analysts' expectations. I know of no source of such data. Dividends are ultimately paid from earnings, however, and earnings forecasts are available for a few years. Investors do not expect dividends to grow in lockstep with earnings, but for companies for which the DCF approach can be used reliably (*i.e.*, for relatively stable companies whose prices do not include the option-like values described previously), they do expect dividends to track earnings over the long-run. Thus, use of earnings growth rates as a proxy for expectations of dividend growth rates is a common practice.

Accordingly, the first step in my DCF analysis is to examine a sample of investment analysts' forecasted earnings growth rates from the Institutional Brokers Estimate System ("I/B/E/S") and from *Value Line* for both samples. Neither I/B/E/S nor *Value Line* provide analysts' forecast for all companies in the water utility sample. I/B/E/S provides a (recent) long-term growth forecast for only six of the eight water companies and provides no recent forecasts for Connecticut Water Services or SJW Corp. Of the six remaining companies, consensus forecasts for American States Water and Middlesex Water are based on only one analyst's estimate. *Value Line* provides 2007 earnings forecasts for each of the six companies

with long-term I/B/E/S forecasts, but does not provide long-term (2009-2011) growth forecasts for two of these: Middlesex Water Co. and York Water Co.[6] Both I/B/E/S and *Value Line* provide long-term growth rates for all companies in the gas LDC sample. I/B/E/S projected earnings growth rates for the companies in the water utility sample and the gas LDC sample are in Table No. MJV-5 and Table No. MJV-15 for the water utility sample the gas LDC sample respectively.

The growth rate estimates for I/B/E/S and *Value Line* are combined in column [6] of Table No. MJV-5 for the water sample and column [6] of Table No. MJV-15 for the gas LDC sample by weighting the I/B/E/S annual forecasts by the number of analysts making that forecast and treating the *Value Line* forecast as one analyst's forecast.[7]

In the simple DCF, I use this combined long-term (five-year) average growth rate as the perpetual growth rate. In the multistage DCF model, I use the average I/B/E/S and *Value Line* growth rates for the first five years. For years 6-10, the growth rates converge linearly on the forecast GDP growth rate by year 11,[8] and I rely on the long-term GDP growth as an estimate of the perpetual earnings growth rate for all years from year 11 on.[9]

Q16. Do these growth rates correspond to the ideal you mentioned above?

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[6] See Table No. MJV-5 for details.

[7] I treat the *Value Line* forecasts as though they overlap exactly with the forecasts from I/B/E/S. These growth rates underlie my simple and multi-stage DCF analyses.

[8] The growth rates for fiscal years 2012-2016 are shown in columns 4-8, Panel B, Table No. MJV-6 and Panel B, Table No. MJV-16.

[9] I use the long-term GDP growth rate estimate from *Blue Chip Economic Indicators*, March 2006.

A16. No. While forecasted growth rates are the quantity required in principle, the forecasts need to go far enough out into the future so that it is reasonable to believe that investors expect a stable growth path afterwards. As can be seen in Table No. MJV-5 for the water sample and Table No. MJV-15 for the gas LDC sample, the growth rate estimates do not support the view that investors are expecting growth rates equal to the single perpetual growth rate assumed in the simple DCF model. The growth rate forecasts vary substantially in the short-term, and the five-year growth rate forecasts are also quite different from company to company. However, the five-year growth rate forecasts for the gas LDC sample vary much less from company to company than do the five-year growth rate forecasts for the water companies. Similarly, the short-term growth forecast for companies in the gas LDC sample vary much less than do the forecasts for the short-term growth forecast for the water sample companies.

It is clear that much longer detailed growth rate forecasts than currently available from I/B/E/S and *Value Line* would be needed to implement the DCF model in a completely reliable way for these two samples at this time; however, the general stability of the 5-year growth rate forecasts for the gas LDC sample indicates a higher degree of reliability than for the water sample at this time. I submit DCF evidence in this case for both the water utility sample and the gas LDC sample as a check on the equity risk premium approach estimates.

C. DIVIDEND AND PRICE INPUTS

Q17. What values do you use for dividends and stock prices?

A17. Dividend payments are for the 2nd quarter of 2006 as reported by Compustat. This dividend is grown at the estimated growth rate and divided by the price described below to estimate the dividend yield for the simple and multi-stage DCF models.

Stock prices are the average of the closing stock prices for the 15 trading days (approximately three weeks) ending either September 8, 2006, August 17, 2006, or April 14, 2006, depending on the release date of the I/B/E/S forecast for a given company. This time period coincides with the period just prior to the release dates of the I/B/E/S growth forecasts so that the information on growth rates and stock prices are contemporaneous.[10] I do not use a longer period to measure the price because that would be inconsistent with the principles that underlie the DCF formula. The DCF approach assumes the stock price is the present value of future expected dividends. Stock prices six months or a year ago reflect expectations at that time, which are different from those that underlie the current I/B/E/S and *Value Line* forecasts. At the same time, use of an average price over a brief period helps guard against biases which might be found in a particular day's price due to the undue influence of mistaken information, differences in trading frequency, and the like.

The closing stock price is used because it is at least as good as any other measure of the day's outcome, and may be better for DCF purposes. In particular, if there were any single price during the day that would affect investors' decisions to buy or sell a stock, I would suspect that it would be each day's closing price, not the high or low during the day. The daily price changes reported in the financial pages, for example, are from close to close, not from high to high or from low to low.

[10] I/B/E/S growth rate forecasts were released on September 8, 2006 for all companies in both samples except for Aqua America and York Water whose I/B/E/S growth rate forecasts were released on August 17, 2006 and April 14, 2006 respectively.

D. COMPANY-SPECIFIC DCF COST OF CAPITAL ESTIMATES

Q18. What cost of equity estimates do these data yield?

A18. The cost of equity results for the simple and multi-stage DCF models are shown in Table No. MJV-6 for the water utility sample and in Table No. MJV-16 for the gas LDC sample. In both tables, Panel A reports the results for the simple DCF method and Panel B reports the results for the multi-stage DCF method using the long-term GDP growth rate as the perpetual growth rate.

Q19. What information is provided in Table No. MJV-7 and Table No. MJV-17?

A19. In these tables, the capital structure, cost of equity estimates, and cost of debt estimates are combined to obtain the overall cost of capital for each sample company. The results are presented in Table No. MJV-7 for the water utility sample and in Table No. MJV-17 for the gas LDC sample. Panel A relies on the simple DCF cost of equity results, while Panel B relies on the multi-stage DCF cost of equity results.

In the case of the water sample, I also report the average for the subsample of companies that have a large percentage of revenue from regulated activities and long-term (2009-2011) growth estimates from *Value Line*.[11]

Q20. What do the values in Table No. MJV-7 and Table No. MJV- 17 imply about the cost of equity for the sample companies at Tennessee Water's 43 percent equity ratio?

[11] The 2005 revenues from regulated businesses is above 89 percent for the water utility sample and above 60 percent for the gas LDC sample. (See Table No. MJV-2 and Table No. MJV-12.)

A20. The overall after-tax weighted-average cost of capital from these tables for both DCF methods and for the subsample are reported in column [1] of Table No. MJV-8 and Table No. MJV-18. Column [8] of these tables reports the cost of equity consistent with the Tennessee Water's 43 percent equity thicknesses and the samples' average weighted-average cost of capital. The sample average ATWACCs and corresponding costs of equity at a 43 percent equity ratio are also displayed in Table 2 of my direct testimony.

The implications of these numbers are discussed in my direct testimony, along with the findings of the equity risk premium approach.

APPENDIX D: EFFECT OF DEBT ON THE COST OF EQUITY

TABLE OF CONTENTS

Q: **What is the purpose of this Appendix?**

A: In this appendix, I provide details on the effects of debt on the cost of equity. First, I summarize a fairly large body of financial research on capital structure. Second, I provide an extended example to illustrate the effect of debt on the cost of equity.

I. AN OVERVIEW OF THE ECONOMIC LITERATURE

Q: **What is the focus of the economic literature on the effects of debt?**

A: The economic literature focuses on the effects of debt on the value of a firm. The standard way to recognize one of these effects, the impact of the fact that interest expense is tax-deductible, is to discount the all-equity after-tax operating cash flows generated by a firm or an investment project at a weighted average cost of capital, typically known in textbooks as the "WACC." The textbook WACC equals the *market*-value weighted average of the cost of equity and the *after-tax*, *current* cost of debt. However, rate regulation in North America has a legacy of working with another weighted-average cost of capital, the *book*-value weighted average of the cost of equity and the *before-tax*, *embedded* cost of debt. To distinguish the concepts, I refer to the after-tax weighted-average cost of capital as ATWACC.

Q: **How is this section of the appendix organized?**

A: It starts with the tax effects of debt. It then turns to other effects of debt.

A. TAX EFFECTS

Q: **What are the key findings in the literature regarding tax effects?**

A: Three seminal papers are vital for this literature. The first assumes no taxes and risk-free debt. The second adds corporate income taxes. The third adds personal income taxes.

1. Base Case: No Taxes, No Risk to High Debt Ratios

Q: **Please start by explaining the simplest case of the effect of debt on the value of a firm.**

A: The "base case," no taxes and no costs to excessive debt, was worked out in a classic 1958 paper by Franco Modigliani and Merton Miller, two economists who eventually won Nobel Prizes in part for their body of work on the effects of debt.[1] Their 1958 paper made what is in retrospect a very simple point: if there are no taxes and no risk to the use of excessive debt, use of debt will have no effect on a company's operating cash flows (i.e., the cash flows to investors as a group, debt plus equity combined). If the operating cash flows are the same regardless of whether the company finances mostly with debt or mostly with equity, then the value of the firm cannot be affected at all by the debt ratio. In cost of capital terms, this means the overall cost of capital is constant regardless of the debt ratio, too.

In the base case, issuing debt merely divides the cash flows into two pools, one for bondholders and one for shareholders. If the divided pools have different priorities in claims on the cash flows, the risks and costs of capital will differ for each pool. But the risk and

[1] Franco Modigliani and Merton H. Miller (1958), "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48, pp. 261-297.

overall cost of capital of the entire firm, the sum of the two pools, is constant regardless of the debt ratio. Thus,

$$r^*_1 = r_{A1} \qquad \textbf{(D-1a)}$$

where r^*_1 is the overall after-tax cost of capital at any particular capital structure and r_{A1} is the all-equity cost of capital for the firm. (The "1" subscripts distinguish the case where there are no taxes from subsequent equations that consider first corporate and then both corporate and personal taxes.) With no taxes and no risk to debt, the overall cost of capital does not change with capital structure.

This implies that the relationship of the overall cost of capital to the component costs of debt and equity is

$$r_{E1} \times (E/V) + r_D \times (D/V) = r^*_1 \qquad \textbf{(D-1b)}$$

with the overall cost of capital (r^*) on the *right* side, as the *independent* variable, and the costs of equity (r_E) and debt (r_D) on the left side, as *dependent* variables determined by the overall cost of capital and by the capital structure (i.e., the shares of equity (E) and debt (D) in overall firm value (V=E+D)) that the firm happens to choose. Note that if equation (D-1a) were correct, the equation that solved it for the cost of equity would be,

$$r_{E1} = r^*_1 + (r^*_1 - r_D) \times (D/E) \qquad \textbf{(D-1c)}$$

Note also that (D/E) gets exponentially higher in this equation as the debt-to-value ratio increases[2] i.e., the cost of equity increases exponentially with leverage.

2. Corporate Tax Deduction for Interest Expense

Q: **What happens when you add corporate taxes to the discussion?**

A: If corporate taxes exist with risk-free debt (and if only taxes at the corporate level matter, not taxes at the level of the investor's personal tax return), the initial conclusion changes. Debt at the corporate level reduces the company's tax liability by an amount equal to the marginal tax rate times interest expense. All else equal, this will add value to the company because more of the operating cash flows will end up in the hands of investors as a group. That is, if only corporate taxes mattered, interest would add cash to the firm equal to the corporate tax rate times the interest expense. This increase in cash would increase the value of the firm, all else equal. In cost of capital terms, it would reduce the overall cost of capital.

How much the value of the firm would rise and *how far* the overall cost of capital would fall would depend in part on how often the company adjusts its capital structure, but this is a second-order effect in practice. (The biggest effect would be if companies could issue riskless perpetual debt, an assumption Profs. Modigliani and Miller explored in 1963, in the second

[2] For example, at 20-80, 50-50, and 80-20 debt-equity ratios, (D/E) equals, respectively, (20/80) = 0.25, (50/50) = 1.0, and (80/20) = 4.0. The extra 30 percent of debt going from 20-80 to 50-50 has much less impact on (D/E) [i.e., by moving it from 0.25 to 1.0] than the extra 30 percent of debt going from 50-50 to 80-20 [i.e., by moving it from 1.0 to 4.0]. Since the cost of equity equals a constant risk premium times the debt-equity ratio, the cost of equity grows ever more rapidly as you add more and more debt.

seminal paper;[3] this assumption could *not* be true for a real company.) Prof. Robert A. Taggart provides a unified treatment of the main papers in this literature and shows how various cases relate to one another.[4] Perhaps the most useful set of benchmark equations for the case where only corporate taxes matter are:

$$r^*_2 = r_{A2} - r_D \times t_C \times (D/V) \quad \textbf{(D-2a)}$$

$$r_{E2} \times (E/V) + r_D \times (D/V) \times (1 - t_C) = r^*_2 \quad \textbf{(D-2b)}$$

which imply for the cost of equity,

$$r_{E2} = r_{A2} + (r_{A2} - r_D) \times (D/E) \quad \textbf{(D-2c)}$$

where the variables have the same meaning as before but the "2" subscripts indicate the case that considers corporate but not personal taxes.

Note that Equation (D-2a) implies that when only corporate taxes matter, the overall after-tax cost of capital declines steadily as more debt is added, until it reaches a minimum at 100 percent debt (i.e., when D/V = 1.0). Note also that Equation (D-2c) still implies an exponentially increasing cost of equity as more and more debt is added. In fact, except for the subscript, Equation (D-2c) looks just like Equation (D-1c).

However, whether any value is added and whether the cost of capital changes at all also depends on the effect of taxes at the personal level.

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[3] Franco Modigliani and Merton H. Miller (1963), "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review*, 53, pp. 433-443.

[4] Robert A. Taggart, Jr. (1991), "Consistent Valuation and Cost of Capital Expressions with Corporate and Personal Taxes," *Financial Management* 20, pp. 8-20.

3. Personal Tax Burden on Interest Expense

Q: **How do personal taxes affect the results?**

A: Ultimately, the purpose of investment is to provide income for consumption, so personal taxes affect investment returns. For example, in the U.S., municipal bonds have lower interest rates than corporate bonds because their income is taxed less heavily at the personal level. In general, capital appreciation on common stocks is taxed less heavily than interest on corporate bonds because (1) taxes on unrealized capital gains are deferred until the gains are realized, and (2) the capital gains tax rate is lower. Dividends are taxed less heavily than interest, also, under current tax law.[5] The effects of personal taxes on the cost of common equity are hard to measure, however, because common equity is so risky.

Professor Miller, in his Presidential Address to the American Finance Association,[6] explored the issue of how personal taxes affect the overall cost of capital. The paper pointed out that personal tax effects could offset the effect of corporate taxes entirely.

Q: **Is it likely that the effect of personal taxes will completely neutralize the effect of corporate taxes?**

A: I do not believe so, although the likelihood of such a result would be increased if the current federal tax reductions on dividends and capital gains became permanent rather than expiring

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[5] This provision is set to expire at the end of 2008. The House and Senate bills currently disagree on an extension thereof.

[6] Merton H. Miller (1977), "Debt and Taxes," *The Journal of Finance*, 32: 261-276, the third of the seminal papers mentioned earlier.

in 2008. However, personal taxes are important even if they do not make the corporate tax advantage on interest vanish entirely. Capital gains and dividend tax advantages definitely convey some personal tax advantage to equity, and even a partial personal advantage to equity reduces the corporate advantage to debt.

The Taggart paper explores the case of a partial offset, also. With personal taxes, the risk-free rate on the security market line is the after-personal-tax rate, which must be equal for risk-free debt and risk-free equity.[7] Therefore, the pre-personal-tax risk-free rate for equity will generally not be equal to the pre-personal-tax risk-free rate for debt. In particular, $r_{fE} = r_{fD} \times [(1-t_D)/(1-t_E)]$, where r_{fE} and r_{fD} are the risk-free costs of equity and debt and t_E and t_D are the personal tax rates for equity and debt, respectively. In terms of the cost of debt, the Taggart paper's results imply that a formal statement of these effects can be written as:[8]

$$r^*_3 = r_{A3} - r_D \times t_N \times (D/V) \quad \textbf{(D-3a)}$$

$$r_{E3} \times (E/V) + r_D \times (D/V) \times (1-t_C) = r^*_3 \quad \textbf{(D-3b)}$$

which imply

$$r_{E3} = r_{A3} + \{r_{A3} - r_D \times [(1-t_D)/(1-t_E)]\} \times (D/E) \quad \textbf{(D-3c)}$$

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[7] As Prof. Taggart notes (his footnote 9), it is not necessary that a specific, risk-free equity security exist as long as one can be created synthetically, through a combination of long and short sales of traded assets. Such constructs are a common analytical tool in financial economics.

[8] The net all-tax effect of debt on the overall cost of capital, t_N, equals $\{[t_C + t_E - t_D - (t_C \times t_E)] / (1-t_E)\}$, where t_D is the personal tax rate on debt, as before. This measure of net tax effect is designed for use with the cost of debt in Equation (E-3a), which seems more useful in the present context. The Taggart paper works with a similar measure, but one which is designed for use with the cost of risk-free equity in the equivalent Taggart equation.

Suppose, for example, that t_C = 0.35 percent, t_E = 7.7 percent and t_D = 40 percent. Then $[(1-t_D)/(1-t_E)] = 0.65 = (1-t_C)$. That condition corresponds to Miller's 1977 paper, in which the net personal tax advantage of equity fully offsets the net corporate tax advantage of debt. Note also that in that case, $t_N = 0$.[9] Therefore, if the personal tax advantage on equity fully offsets the corporate tax advantage on debt, Equation (D-3a) confirms that the overall after-tax cost of capital is a constant.

However, it is unlikely that the personal tax advantage of equity fully offsets the corporate tax advantage of debt. If taxes were all that mattered (i.e., if there were no other costs to debt), the overall after-corporate-tax cost of capital would still fall as debt was added, just not as fast.

Finally, note that the overall after-tax cost of capital, Equation (D-3b), still uses the corporate tax rate even when personal taxes matter. Equations (D-2b) and (D-3b) both correspond to the usual formula for the ATWACC. Personal taxes affect the way the cost of equity changes with capital structure -- Equation (D-3c) -- but not the formula for the overall after-tax cost of capital given that cost of equity.

B. NON-TAX EFFECTS

Q: **Please describe the non-tax effects of Debt.**

A: If debt is truly valuable, firms should use as much as possible, and competition should drive firms in a particular industry to the same, optimal capital structure for the industry. If debt is

[9] In the above example, $t_N = \{[0.35+0.077-0.4-(0.35\times0.077)] / (1.0-0.077)\} = 0.0/0.923 = 0$.

harmful on balance, firms should avoid it. Neither picture corresponds to what we actually see. A large economic literature has evolved to try to explain why.

Part of the answer clearly are the costs of excessive debt. Here the results cannot be reduced to equations, but they are no less real for that fact. As companies add too much debt, the costs come to outweigh the benefits. Too much debt reduces or eliminates financial flexibility, which cuts the firm's ability to take advantage of unexpected opportunities or weather unexpected difficulty. Use of debt rather than internal financing may be taken as a negative signal by the market.

Even if the company is generally healthy, more debt increases the risk that the company cannot use all of the interest tax shields in a bad year. As debt continues to grow, this problem grows and others may crop up. Management begins to worry about meeting debt payments instead of making good operating decisions. Suppliers are less willing to extend trade credit, and a liquidity shortage can translate into lower operating profits. Ultimately, the firm might have to go through the costs of bankruptcy and reorganization. Collectively, such factors are known as the costs of "financial distress."[10]

The net tax advantage to debt, if positive, is affected by costs such as a growing risk that the firm might have to bear the costs of financial distress. First, the expected present value of these costs offsets the value added by the interest tax shield. Second, since the likelihood of financial distress is greater in bad times when other investments also do poorly, the

[10] See, for example, Section 18.3 of Brealey, Myers and Allen, 2006, *Principles of Corporate Finance*, 8th Edition, McGraw-Hill/Irwin, 2006.

possibility of financial distress will increase the risks investors bear. These effects increase the variability of the value of the firm. Thus, firms that use too much debt can end up with a higher overall cost of capital than those that use none.

Other parts of the answer include the signals companies send to investors by the decision to issue new securities, and by the type of securities they issue. Other threads of the literature explore cases where management acts against shareholder interests, or where management attempts to "time" the market by issuing specific securities under different conditions. For present purposes, the important point is that no theory, whether based on taxes or on some completely different issue, has emerged as "the" explanation for capital structure decisions by firms. Nonetheless, despite the lack of a single "best" theory, there is a great deal of relevant empirical research.

Q: **What does that research show?**

A: The research does not support the view that debt makes a material difference in the value of the firm, at least not once a modest amount of debt is in place. If debt were truly valuable, competitive firms should use as much as possible without producing financial distress, and competitive firms that use less debt ought to be less profitable. The research shows exactly the opposite.

For example, Kester[11] found that firms in the same industry in both the U.S. and Japan do not band around a single, "optimal" capital structure, and the most profitable firms are the ones that use the *least* debt. This finding comes despite the fact that both countries at the time (unlike the U.S. currently) had fully "classical" tax systems, in which dividends are taxed fully at both the corporate and personal level. Wald[12] confirms that high profitability implies low debt ratios in France, Germany, Japan, the U.K., and the U.S. Booth *et al.* find the same result for a sample of developing nations.[13] Fama and French[14] analyze over 2000 firms for 28 years (1965-1992, inclusive) and conclude, "Our tests thus produce no indication that debt has net tax benefits."[15] A paper by Graham[16] carefully analyzes the factors that might have led a firm not to take advantage of debt. It confirms that a large proportion of firms that ought to benefit substantially from use of additional debt, including large, profitable, liquid firms, appear not to use it "enough."

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[11] Carl Kester (1986), "Capital and Ownership Structure: A Comparison of United States and Japanese Manufacturing Concerns," *Financial Management*, 15:5-16.

[12] John K. Wald (1999), "How Firm Characteristics Affect Capital Structure: An International Comparison," *Journal of Financial Research*, 22:161-167.

[13] Laurence Booth *et al.* (2001), "Capital Structures in Developing Countries," *The Journal of Finance* Vol. LVI, pp. 87-130, finds at p. 105 that "[o]verall, the strongest result is that profitable firms use less total debt. The strength of this result is striking ..."

[14] Eugene F. Fama and Kenneth R. French (1998), "Taxes, Financing Decisions and Firm Value," *The Journal of Finance*, 53:819-843.

[15] *Ibid.*, p. 841.

[16] John R. Graham (2000), "How Big Are the Tax Benefits of Debt," *The Journal of Finance*, 55:1901-1942.

This research leaves us with only three options: either (1) apparently good, profit-generating managers are making major mistakes or deliberately acting against shareholder interests, (2) the benefits of the tax deduction on debt are less than they appear, or (3) the non-tax costs to use of debt offset the potential tax benefits. Only the first of these possibilities is consistent with the view that the tax deductibility of debt conveys a material cost advantage. Moreover, if the first explanation were interpreted to mean that otherwise good managers are acting against shareholder interests, either deliberately or by mistake, it would require the additional assumption that their competitors (and potential acquirers) let them get away with it.

Q: **Are there any explanations in the financial literature for this puzzle other than stupid or self-serving managers at the most profitable firms?**

A: Yes. For example, Stewart C. Myers, a leading expert on capital structure, made it the topic of his Presidential Address to the American Finance Association.[17] The poor performance of tax-based explanations for capital structure led him to propose an entirely different mechanism, the "pecking order" hypothesis. This hypothesis holds that the net tax benefits of debt (i.e., corporate tax advantage over personal tax disadvantage) are at most of a second order of importance relative to other factors that drive actual debt decisions.[18] Similarly, Baker and

[17] Stewart C. Myers (1984), "The Capital Structure Puzzle," *The Journal of Finance*, 39: 575-592. See also S. C. Myers and N. S. Majluf (1984), "Corporate Financing Decisions When Firms Have Information Investors Do Not Have," *Journal of Financial Economics* 13:187-222.

[18] See also Stewart C. Myers (1989), "Still Searching for Optimal Capital Structure," *Are the Distinctions Between Debt and Equity Disappearing?*, R.W. Kopke and E. S. Rosengren, eds., Federal Reserve Bank

Wurgler (2002)[19] observe a strong and persistent impact that fluctuations in market value have on capital structure. They argue that this impact is not consistent with other theories. The authors suggest a new capital structure theory based on market timing -- capital structure is the cumulative outcome of attempts to time the equity market.[20] In this theory, there is no optimal capital structure, so market timing financing decisions just accumulate over time into the capital structure outcome. (Of course, this theory only makes sense if investors do not recognize what managers are doing.)

Q: **Do inter-firm differences within an industry explain the wide variations in capital structure across the firms in an industry?**

A: No. This view is contradicted by the empirical research. As mentioned before, it has long been found that the most profitable firms in an industry, i.e., those in the best position to take advantage of debt, use the least.[21] Graham (2000) carefully examines differences in firm characteristics as possible explanations for why firms use "too little" debt and concludes that such differences are *not* the explanation: firms that ought to benefit substantially from more

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of Boston.

[19] Malcolm Baker and Jeffrey Wurgler (2002), "Market Timing and Capital Structure," *The Journal of Finance* 57:1-32.

[20] *Ibid.*, p. 29.

[21] For example, Kester, *op. cit.* and Wald, *op. cit.*

debt by all measurable criteria, if the net tax advantage of debt is truly valuable, voluntarily do not use it.[22]

Nor does the research support the view that firms are constantly trying to adjust their capital structures to optimal levels. Additional research on the pecking order hypothesis demonstrates that firms do not tend towards a target capital structure, or at least do not do so with any regularity, and that past studies that seemed to show the contrary actually lacked the power to distinguish whether the hypothesis was true or not.[23] In the words of the Shyam-Sunder - Myers paper p. 242, "If our sample companies did have well-defined optimal debt ratios, it seems that their managers were not much interested in getting there."

II. EXPANDED EXAMPLE

Q: **What topics do you cover in this section?**

A: The discussion in my testimony did not detail the impact of different starting points for the level of debt nor did it address income earned on the investment, interest expense, or taxes.

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[22] While not contradicting Graham's finding that differences in firm characteristics do not explain capital structure differences, Nengjiu Ju, Robert Parrino, Allen M. Poteshman, and Michael S. Weisbach, "Horses and Rabbits? Trade-Off Theory and Optimal Capital Structure," *Journal of Financial and Quantitative Analysis*, June 2005, pp. 1-24, looks at the issue in a different manner. Their paper uses a dynamic rather than static model to analyze the tradeoff between the tax benefits of debt and the risk of financial distress. It finds that bankruptcy costs by themselves are enough to explain observed capital structures, once dynamic effects are considered. This means debt is not as valuable as suggested by the traditional static analysis (of the sort used by Graham).

[23] Lakshmi Shyam-Sunder and Stewart C. Myers (1999), "Testing static tradeoff against pecking order models of capital structure," *Journal of Financial Economics* 51:219-244.

This section covers these topics. First, it discusses how the level of debt affects the cost of equity. Second, it addresses the influence of income and interest on the investment. Third, it explains the impact of taxes on capital structure decisions. The final topic covered in this section is the combined consequence of tax and non-tax effects of debt.

A. DETAILS OF DIFFERENT LEVELS OF DEBT

Q: **Why does more debt mean more risk for equity holders?**

A: Debt magnifies the variability of the equity return. As a simple example, think of an investor who takes money out of her savings and invests $100,000 in real estate. The future value of the real estate is uncertain. If the real estate market booms, she wins. If the real estate market goes down, she loses. Figure E-1 below illustrates this.

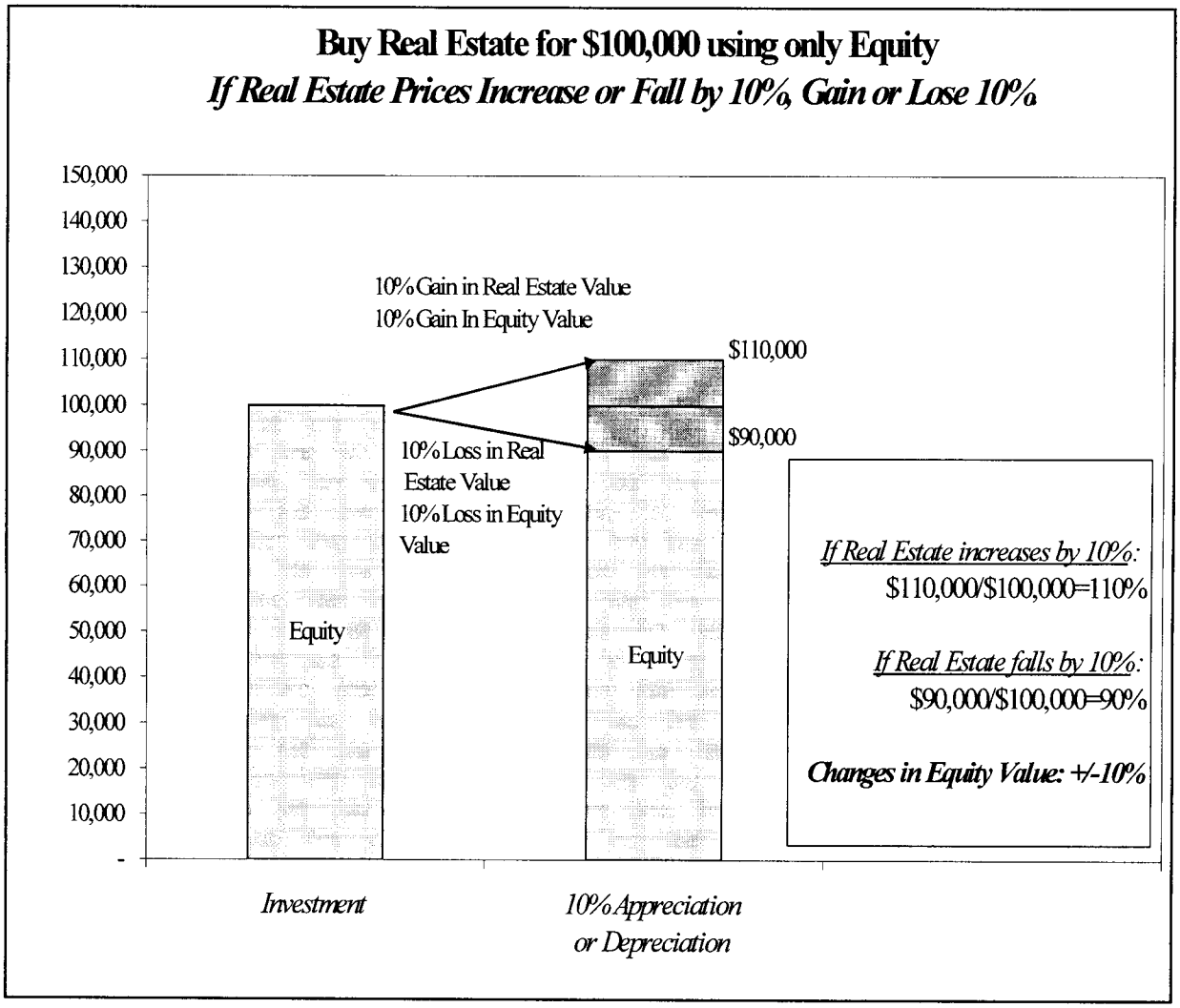

Figure D-1

In the scenario above, the investor financed her real estate purchase through 100 percent equity. Suppose instead that the investor had financed 50 percent of her real estate investment with a mortgage of $50,000. The mortgage lender does not expect to share in any benefits from increases in real estate values. Neither does the mortgage lender expect to share in any

losses from falling real estate values, i.e., the investor carries the entire risk of fluctuating real estate prices. Figure D-2 illustrates this effect.

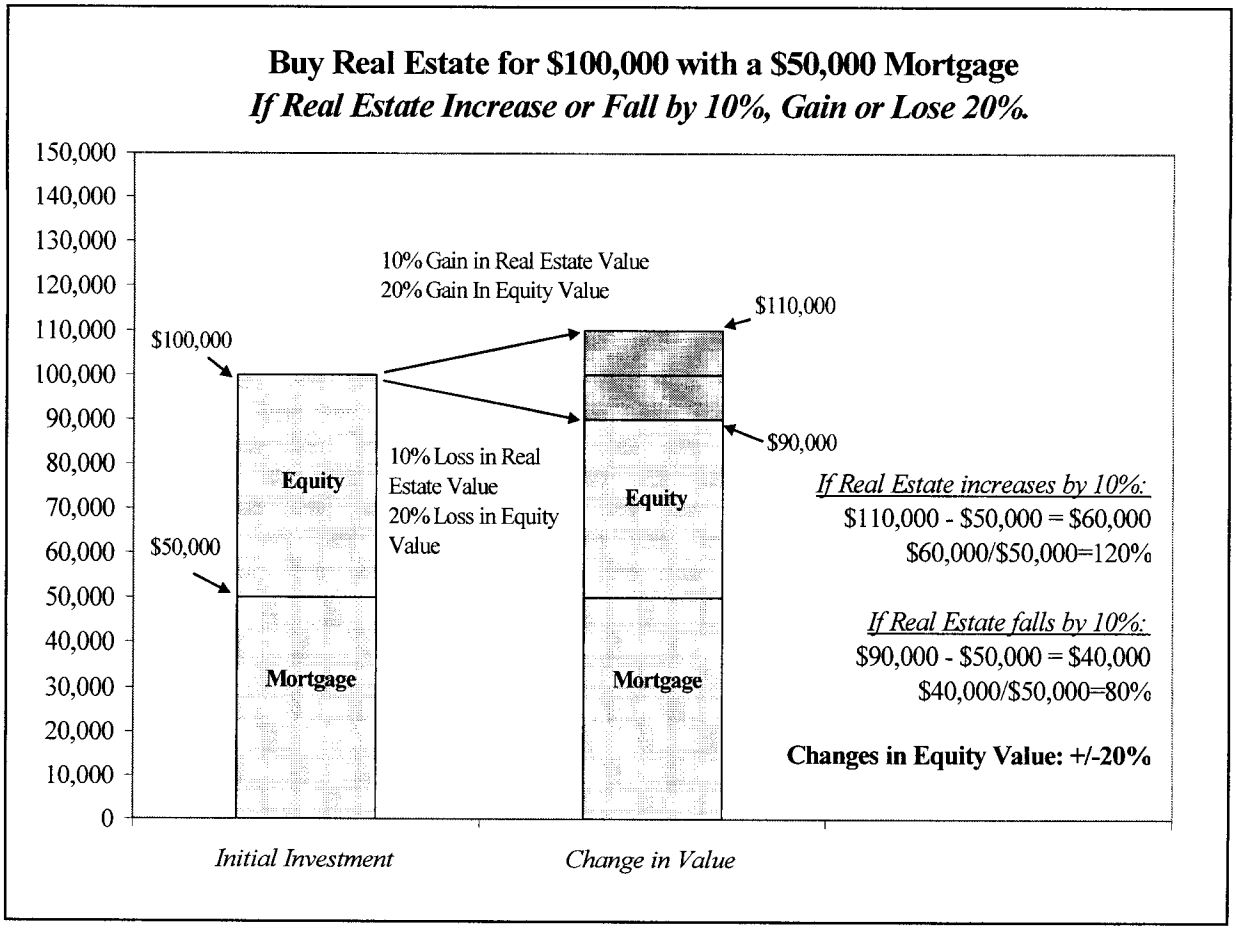

Figure D-2

In Figure D-2 where the investor financed her purchase through 50 percent equity and 50 percent debt, the variability in the investor's equity return is two times greater than that of Figure D-1. The entire fluctuation of 10 percent from rising or falling real estate prices falls

on the investor's $50,000 equity investment. The lesson from the example is obvious, debt adds risk to equity.

Q: **What happens if the investor finances the real estate purchase with different proportions of debt?**

A: The equity return becomes more variable when the mortgage percentage is a greater proportion of the initial price. Table D-1 below calculates the return on equity when real estate prices increase by 10 percent when mortgages are 0 percent, 30 percent, 50 percent, and 70 percent of the initial price.

Table D-1: The Impact of Leverage on the Return on Equity

	100% Equity	70% Equity	50% Equity	30% Equity
Debt	$0	$30,000	$50,000	$70,000
Original Equity Investment	$100,000	$70,000	$50,000	$30,000
Increase in Market Value of Equity	$10,000	$10,000	$10,000	$10,000
Return on Equity Investment	10%	14.3%	20%	33.3%

Note that going from 70 percent equity down to 50 percent equity increases the return on the equity investment by 5.7 percent while going from 50 percent equity to 30 percent equity

increases the return on equity by 13.3 percent. This illustrates a general point; the rate of return on equity increases more quickly at higher levels of debt than at lower levels. Investors demand a higher equity rate of return to bear more risk and debt magnifies equity's risk at an ever increasing rate. Therefore, the required equity rate of return goes up at an ever increasing rate as debt is added. This is not only basic finance theory, it is the everyday experience of anyone who buys a home. The bigger the mortgage, the more percentage risk the equity faces from changes in housing prices.

Q: **Please provide an example that illustrates why market values are relevant.**

A: Suppose in the above example that the investor has invested in real estate 10 years ago. Further assume that depreciation has reduced the book value of the real estate from $100,000 to $75,000 and assume the investor has paid off 40 percent of his $50,000 mortgage. Thus, the investor has a remaining mortgage of $30,000 (= 60% × $50,000). The book value of the investor's equity investment is therefore $45,000 (= $75,000 - $30,000).

What happens now if real estate prices rise or fall 20 percent? To answer that question, we need to know how real estate prices have developed over the past 10 years. If the market value of the real estate now is $200,000 then a 20 percent decrease in the price of real estate ($40,000) is almost equal to the investor's book value equity. However, his market value equity (or net worth) is equal to the value of the real estate minus what he owes on the mortgage. If we assume that the market value of the mortgage equals the unpaid balance ($30,000), then the investor's net worth is calculated as follows:

Net Worth	=	Market Value of Real Estate	-	Remaining Mortgage	
	=	$200,000	-	$30,000	= $170,000

Therefore, the rate of return on equity due to a 20 percent decline in real estate prices is calculated in Table D-2.

Table D-2: Calculating the Rate of Return on Equity

Decline in Real Estate Value	$40,000
Market-Value Equity	$170,000
Rate of Return on Equity	- $40,000/$170,000 = -23.5%

B. THE IMPACT OF INCOME AND INTEREST

Q: **How does earning income from the investment and paying interest on debt affect the results?**

A: In the following explanation, I ignore income taxes which I deal with in Section C. Assume the investor is receiving income, e.g., rent, from the real estate. Specifically, assume the investor receives $500 per month in income after all non-interest expenses ($6,000 per year). Also, assume that the expected appreciation is 5 percent per year, so the expected market value

is $105,000 after one year. Then the expected rate of return from the real estate with all equity financing is:

$$\text{Expected Return on Equity @ 0\% Debt} = \frac{\text{Expected Net Income + Expected Appreciation}}{\text{Initial Investment}}$$

$$= \frac{\$6{,}000 + (\$105{,}000 - \$100{,}000)}{\$100{,}000} = 11\%$$

Now suppose that the mortgage interest rate were 5 percent. Then at a mortgage equal to 50 percent, or $50,000, interest expense would be ($50,000 x 0.05), or $2,500. The expected equity rate of return would be:

$$\text{Expected Return on Equity @ 50\% Debt} = \frac{\text{Expected (Net Income + Appreciation) - Interest Expense}}{\text{Initial } \textit{Equity} \text{ Investment}}$$

$$= \frac{\$6{,}000 + \$5{,}000 - \$2{,}500}{\$50{,}000} = 17\%$$

Notice that the expected return on equity is higher as is the risk carried by equity.

Q: **Can you provide a more general illustration?**

A: Yes. Figure D-3 uses these assumptions at different mortgage levels to plot both (i) the expected rate of return on the equity in the dwelling, and (ii) the realized rate of return on that

equity in a year if the dwelling value increases by 10 percent more than the expected 5 percent rate (i.e., if the value increases by 15 percent) or by 10 percent less than expected (i.e., if it decreases by 5 percent).[24]

The expected rate of return on equity increases at an increasing rate as the investor finances

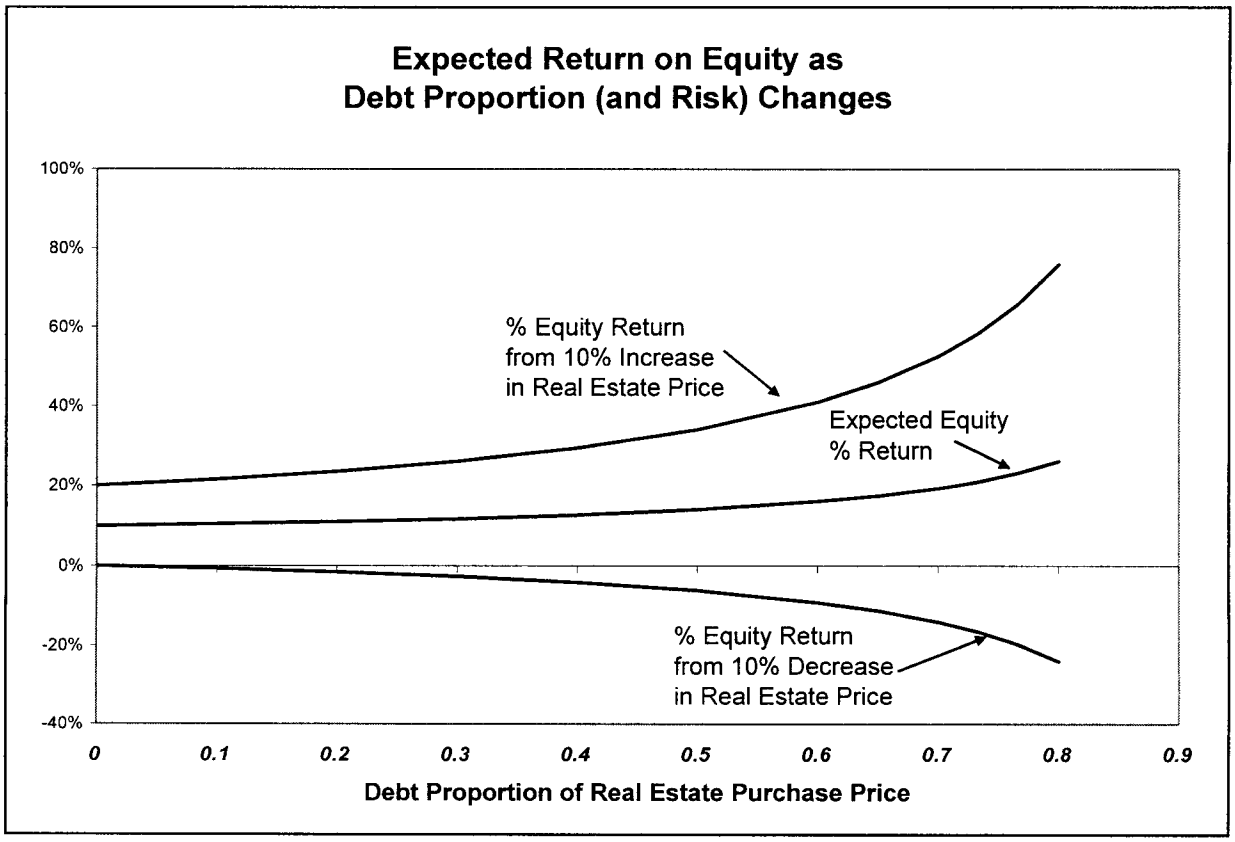

Figure D-3

more and more of the real estate through loans (e.g., with a mortgage). Since equity bears all

[24] For simplicity, the figure assumes the debt's interest rate is independent of the debt proportion. This might not always be true, and in general would not be true for a corporation that issued debt. However, the general shape of the graphs remains the same.

the risk of increases or decreases in real estate values (absent financial distress or bankruptcy), the amount of risk the buyer bears grows at an ever increasing rate as the mortgage percentage also increases.

Q: **What are the implications of this example?**

A: Any time an individual or a company uses debt to finance part an investment, the same risk magnifies. For example, if an investor buys stocks "on margin" -- by borrowing part of the money used to buy the stock -- the expected rate of return will be higher as will the risks the investor carries. As an everyday example, imagine investing your retirement savings in a stock portfolio bought with as much margin as possible. If you were lucky, you could end up living very well in retirement. But you would be taking a lot of risk on the opposite outcome, since your portfolio could decline by more than 100 percent of your initial investment.

The same risk-magnifying effects happen when companies borrow to finance part of their investments.

C. THE EFFECT OF TAXES

Q: **WHAT IS THE IMPACT OF TAXES?**

A: Analyzing the net effect of taxes in capital structure decisions by corporations is an important part of the financial research. (Other parts of that research address such issues as the risk of financial distress or bankruptcy, and the signals corporations send investors by the choice of

how to finance new investments.) The bottom line is that taxes complicate the picture without changing the basic conclusion.

Q: **Please describe the potential impact of taxes.**

A: Interest expense is tax-deductible for corporations. That increases the pool of cash the corporation gets to keep out of its operating earnings (i.e., its earnings before interest expense). With no debt, 100 percent of operating income is subject to taxes. With debt, only the equity part of the operating income is subject to taxes.

All else equal, the extra money kept from operating income increases the value of the corporation. The standard way to recognize that increase in value is to use an after-tax weighted-average cost of capital as a discount rate when valuing a company's operating cash flows.

Q: **Do personal taxes affect the value of debt, too?**

A: Yes, but in the other direction. One offset to debt's tax benefits at the corporate level is its higher tax burden at the personal level. Investors care about the money they get to keep after all taxes are paid, and while the corporation saves taxes by opting for debt over equity, individuals pay more taxes on interest than on capital gains from equity (and for now, on dividends as well).

Q: **Are there factors other than taxes matter?**

A: Absolutely, "all else" does not remain equal as more debt is added. The more debt, the more the non-tax effects of debt offset the tax benefits. Other costs include such effects as a loss of flexibility, the possibility of sending negative signals to investors, and a host of costs and risks associated with the danger of financial distress.

Q: **Does the tradeoff between the tax and non-tax effects of debt mean that firms have well-defined, optimal capital structures?**

A: No, this sort of "tradeoff" model does not explain actual corporate behavior. A substantial body of economic research confirms that real-world corporations act as if, after a moderate amount of debt is in place, the tax benefits of debt are not worth debt's other costs. In country after country and in industry after industry, the most profitable corporations in an industry tend to use the least debt. The research on this point is quite thorough, and the finding that the most profitable companies tend to use the least debt in a given industry is robust. Yet these are the companies with the most operating income to shield from taxes, who would benefit most if interest tax shields were truly valuable net of debt's other costs. They also presumptively are the best-managed on average (else why are they the most profitable?).

This means it is unrealistic to suppose that more debt is always better, or that greater tax savings due to higher interest expense always add value to the firm on balance.

Q: **If the tradeoff model doesn't explain capital structure decisions by firms, is there a model that does?**

A: No single model has (yet) emerged as 'the" explanation of capital structure. However, several alternative models attempt to model the tradeoff (e.g., the "pecking order" hypothesis and "agency cost" explanations).

Q: **What does the absence of an agreed theory of capital structure in the financial literature imply about the overall effect of debt on the value of the firm?**

A: The findings of the financial literature mean that within an industry, there is no well-defined optimal capital structure. The use of some debt does convey some value advantage in most industries, but that advantage is offset by other costs as firms add more debt.[25] The range of capital structures over which the value of the firm in any industry is maximized is wide and should be treated as flat. The location and level of that range, however, does vary from industry to industry, just as the overall cost of capital varies from industry to industry.

Figure E-4 illustrates the picture that emerges from the research. This figure shows the present value of an investment in each of four different industries. For simplicity, the investment is expected to yield $1.00 per year forever. For firms in relatively high-risk industries (Industry 1 in the graph, the lowest line), the $1.00 perpetuity is not worth much and any use of debt decreases firm value. For firms in relatively low-risk industries (Industry 4 in

[25] Note that if debt did increase the value of the firm materially, competition would tend to take that value away, since issuing debt is an easy-to-copy competitive strategy. Prices would fall as firms copied the strategy, lowering operating earnings and passing the net tax advantages to debt through to customers (just as happens under rate regulation). Therefore, if also there were a narrow range of optimal capital structures within an industry, competition would drive all firms in the industry to capital structures within that range. This does not happen in practice, which contradicts one or both of the assumptions, i.e., (1) that debt adds material value on balance, and/or (2) that there is a narrow range of optimal capital structures.

the graph), the perpetuity is worth more and substantial amounts of debt make sense. Industries 2 and 3 are intermediate cases.

The maximum net rate at which taxes can increase value in this figure equals 20 percent of interest expense, representing a balance between the corporate tax advantage to debt and the personal tax disadvantage. The figure plots the maximum possible impact of taxes on value as a separate line, starting at the all-equity value of the lowest-risk industry (Industry 4).

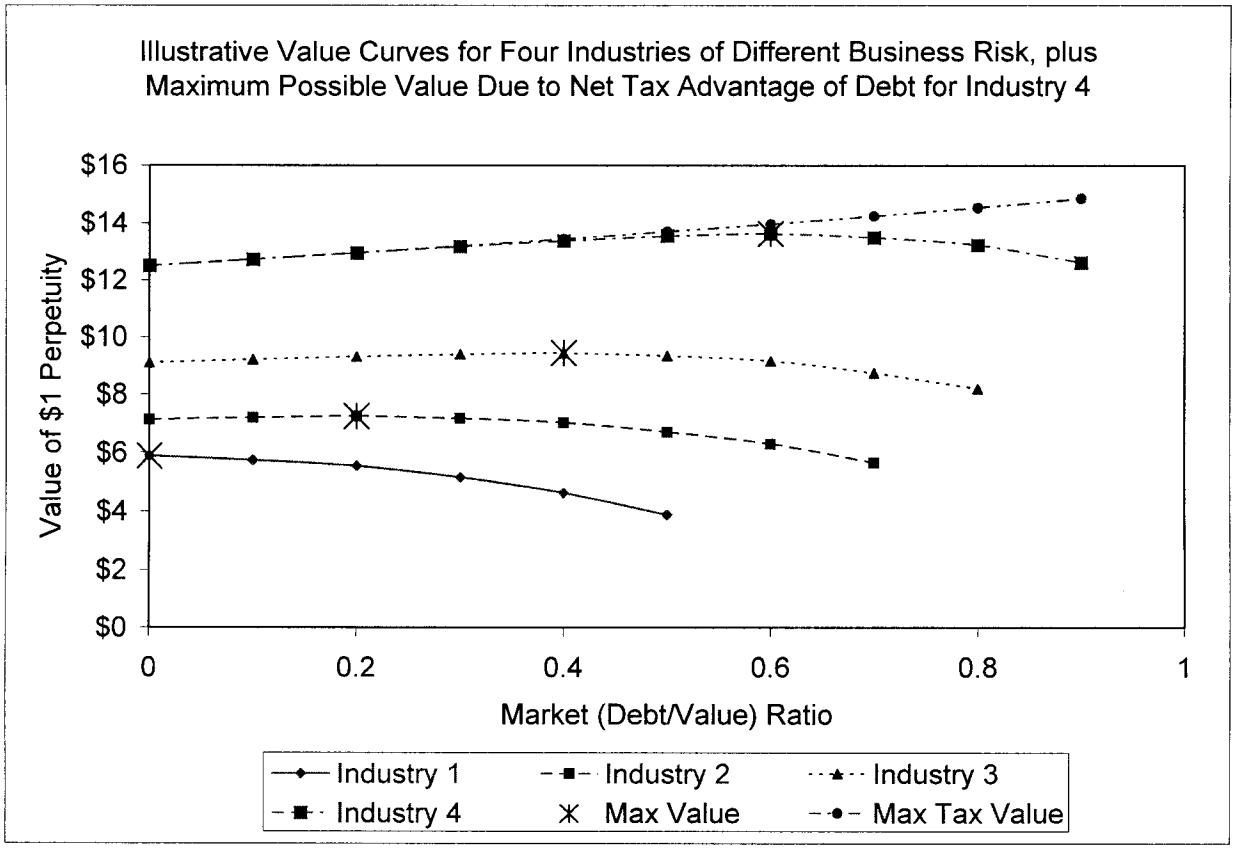

Figure D-4

Figure D-4 identifies a particular point as the maximum value on each of the four curves. However, the research shows that reliable identification of this maximum point, except

in the extreme case where no debt should be used, is impossible. In accord with the research, the graph is prepared so that in none of the industries does a change in capital structure make much difference near the top of the curve. Even Industry 4, which increases in value at the maximum rate as quite a lot of debt is added, eventually must reach a broad range where changes in the debt ratio make little difference to firm value, given the research. For Industry 4, debt makes less than a 2 percent difference in the total value of the firm for debt-to-value ratios between 40 and 70 percent. (While these particular values are illustrative, numbers of this order of magnitude are the only ones consistent with the research.)

Q: **What does this imply for the overall cost of capital?**

A: Figure D-5 plots the after-tax weighted-average costs of capital ("ATWACCs") that correspond to the value curves in Figure D-4. This picture just turns Figure D-4 upside down.[26] All the same conclusions remain, except that they are stated in terms of the overall cost of capital instead of the overall firm value. In particular, except for high-risk industries, the overall cost of capital is essentially flat across a broad middle range of capital structures for each industry, which is the only outcome consistent with the research. For Industry 4, for example, the ATWACC changes by less than 15 basis points for debt-to-value ratios between 40 and 70 percent.

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[26] Note that the actual estimated ATWACC at higher debt ratios will tend to underestimate the ATWACC that corresponds to the value curves in Figure E-4, which are depicted in Figure E-5, and so will tend to overestimate the value of debt to the firm. The reason is that some of the non-tax effects of excessive debt, such as a loss of financial flexibility, may be hard to detect and not show up in cost of capital measurement.

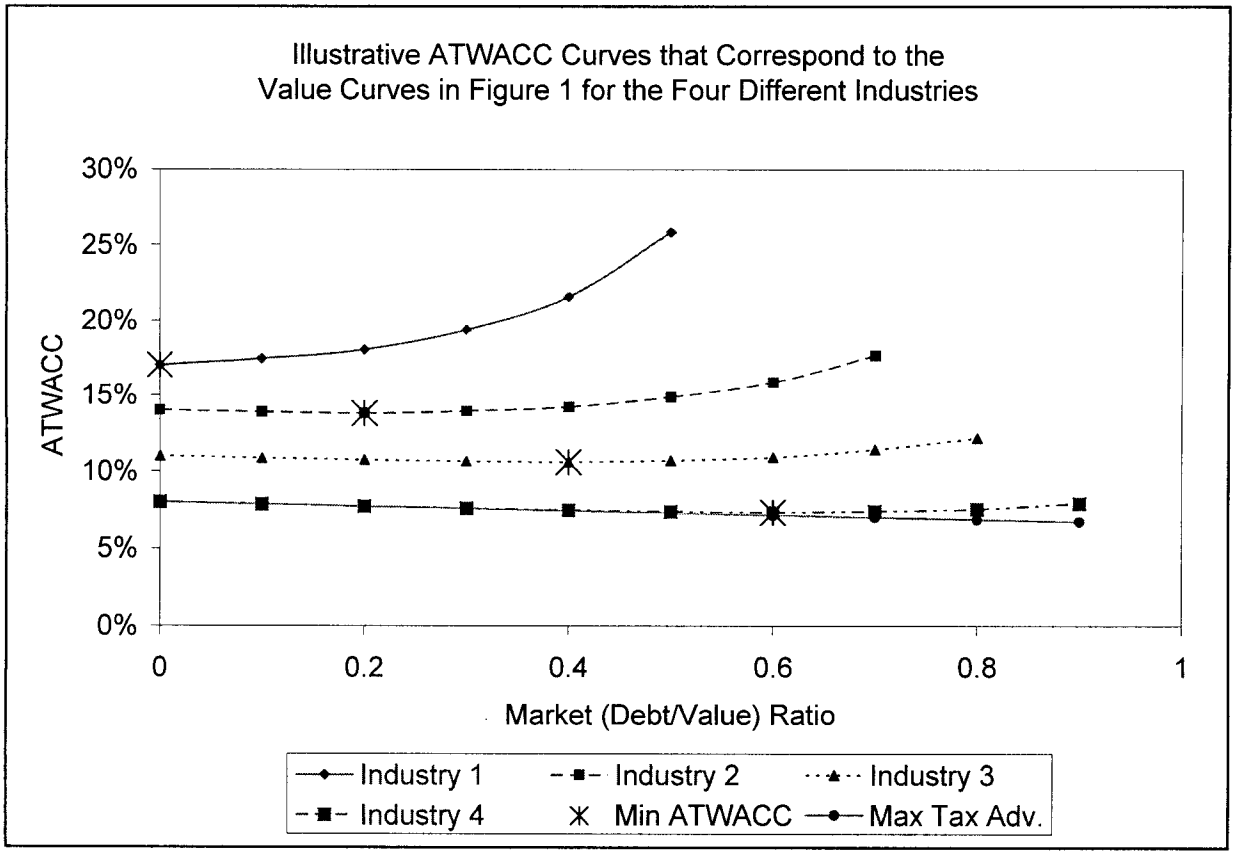

Figure D-5

Q: **How does this discussion relate to estimation of the right cost of equity for ratemaking purposes?**

A: When an analyst estimates the cost of equity for a sample of companies, s/he does so at the sample's actual market-value capital structure. That is, the sample evidence corresponds to ATWACCs that are already out somewhere in the broad middle range in which changes in the debt ratio have little or no impact on the overall value of the firm or the ATWACC.

An analyst therefore should assume the ATWACCs for the sample companies are literally flat. This assumption always provides the exact tradeoff between the cost of equity and capital structure at the literal minimum of the company's ATWACC curve. The research shows that this minimum is actually a broad, flat region, as depicted above. If the company happens to be somewhat to one side or the other of the literal minimum within this region, the recommended procedure may lead to a small understatement or overstatement of the amount that the cost of equity will change as capital structure changes. The degree of this under- or overstatement, however, is very small compared to the inherent uncertainty in estimating the cost of equity in the first place. Otherwise, the financial research would have found very different results about the existence of a narrowly defined optimal capital structure.

D. COMBINED EFFECTS

Q: **Please summarize the implications for the combined impact of the tax and non-tax effects of debt.**

A: The most profitable firms do not behave as if the precise amount of debt they use makes any material difference to value, and competition does not force them into an alternative decision, as it would if debt were genuinely valuable. The explanation that fits the facts and the research is that within an industry, there is no well-defined optimal capital structure. Use of some debt does convey an advantage in most industries, but that advantage is offset by other costs as firms add more debt. The range of capital structures over which the value of the firm in any industry is maximized is wide and should be treated as flat. The location and level of that

range, however, does vary from industry to industry, just as the overall cost of capital varies from industry to industry. To conclude that more debt does add more value, once the firm is somewhere in the normal range for the industry, is to conclude that corporate management in general is either blind to an easy source of value or otherwise incompetent (and that their competitors let them get away with it).

The finding that there is no narrowly defined optimal capital structure implies that analysts should estimate the ATWACCs for a sample of companies in a given industry and treat the average ATWACC value as independent of capital structure (at least within a broad middle range of capital structures). The right cost of equity for a rate-regulated company in the same industry is the number that yields the same ATWACC at the capital structure used to set the revenue requirement, since that is the cost of equity that (estimation problems aside) the sample companies would have had if their market-value capital structures had been equal to the regulatory capital structure.

Table No. MJV-1

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Table No. MJV-2

2006 Water Sample

Percentage of Revenue from Regulated Activities

Company	State	2005 [1]
American States Water Co	CA	99%
California Water Service Gp	CA	96%
Connecticut Water Svc Inc	CT	91%
Middlesex Water Co	NJ	89%
Aqua America Inc	PA	97%
SJW Corp	CA	95%
Southwest Water Co	CA	39%
York Water Co	PA	92%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-2; Panels A - H.

Workpaper #1 to Table No. MJV-2

2006 Water Sample: Breakdown of Revenues

Panel A: American States Water Co ($MM)

		% Total 2005	2005
Operating Revenues			
Water			
GSCW Water		84%	198.5
GSCW Electric		12%	27.2
CCWC Water		3%	7.0
Total Regulated Revenue	[1]		232.7
Other (Includes FBWS)	[2]	1%	3.5
Total Operating Revenues	[3]		236.2
Estimated % Regulated Revenues	[1] / [3]		**99%**

Sources and Notes:

American States Water Co's 2005 10-K, Note 14 - Business Segments.

FBWS, found in the "other" revenue segment, is assumed to be a non-regulated entity.

Workpaper #1 to Table No. MJV-2

2006 Water Sample: Breakdown of Revenues

Panel B: California Water Service Gp ($MM)

	% Total 2005	2005
Operating Revenues		
Residential	69%	222.6
Business	18%	57.0
Industrial	4%	14.2
Public Authorities	5%	15.0
Other	4%	11.9
Total Operating Revenues		320.7
Estimated % Regulated Revenues		**96%**

Sources and Notes:

California Water Service Gp's 2005 10-K, Ten-Year Financial Review.

On page 6 of the 10-K, there is a note saying that 96% of net operating revenues is from the California Water Operations. The "majority" of the business is regulated (p. 64)."

Workpaper #1 to Table No. MJV-2
2006 Water Sample: Breakdown of Revenues
Panel C: Connecticut Water Svc Inc ($MM)

		% Total 2005	2005
Operating Revenues			
Water Activities		91%	47.5
Total Regulated Revenue	[1]		47.5
Real Estate Transactions		1%	0.5
Services and Rentals		8%	4.1
Total Non - Regulated Revenue	[2]		4.6
Total Operating Revenues	[3]		52.1
Estimated % Regulated Revenues	[1] / [3]		**91%**

Sources and Notes:
Connecticut Water Svc Inc's 2005 10-K, Note 14 - Segment Reporting.

Workpaper #1 to Table No. MJV-2

2006 Water Sample: Breakdown of Revenues

Panel D: Middlesex Water Co ($MM)

		% Total 2005	2005
Operating Revenues			
Regulated	[1]	89%	66.3
Non-Regulated	[2]	11%	8.4
Inter-segment Elimination			(0.1)
Total Operating Revenues	[3]		74.6
Estimated % Regulated Revenues	[1] / [3]		**89%**

Sources and Notes:
Middlesex Water Co's 2005 10-K, Note 8 - Business Segment Data.

Workpaper #1 to Table No. MJV-2

2006 Water Sample: Breakdown of Revenues

Panel E: Aqua America Inc ($MM)

		% Total 2005	2005
Operating Revenues			
Residential Water *		59%	295.5
Commercial Water *		15%	73.5
Industrial Water *		4%	18.4
Other Water *		10%	50.8
Wastewater *		8%	42.2
Total Regulated Revenue	[1]		480.3
Other	[2]	3%	16.5
Total Operating Revenues	[3]		496.8
Estimated % Regulated Revenues	[1] / [3]		**97%**

Sources and Notes:

*Aqua America Inc's 2005 10-K, page 5:

"...[W]e had other non-regulated revenues that were primarily associated with operating ...and data processing service fees of $16,484 in 2005...". This is assumed to be the segment called "Water and Wastewater Operating Contracts and Other" (page 8 of 2005 10-K).

Workpaper #1 to Table No. MJV-2

2006 Water Sample: Breakdown of Revenues

Panel F: SJW Corp ($MM)

		% Total 2005	2005
Operating Revenues			
Regulated	[1]	95%	171.6
Non Regulated	[2]	5%	8.5
Total Operating Revenues	[3]		180.1
Estimated % Regulated Revenues	[1] / [3]		**95%**

Sources and Notes:

SJW Corp's 2005 10-K, Note 15 - Non-regulated Businesses.

Workpaper #1 to Table No. MJV-2

2006 Water Sample: Breakdown of Revenues

Panel G: Southwest Water Co ($MM)

		% Total 2005	2005
Operating Revenues			
Services Group	[1]	61%	124.3
Utility Group	[2]	39%	78.9
Total Operating Revenues	[3]		203.2
Estimated % Regulated Revenues	[2] / [3]		**39%**

Sources and Notes:

Southwest Water Co 2005 10-K, Note 12 - Segment Information:

"While state and federal agencies issue regulations regarding standards of water quality, safety, environmental and other matters which affect our Services Group operations, the pricing of the services provided by our Services Group is not subject to government regulation." p. 1.

Workpaper #1 to Table No. MJV-2

2006 Water Sample: Breakdown of Revenues

Panel H: York Water Co ($MM)

		% Total 2005	2005
Operating Revenues			
Residential		62%	16.7
Commercial and Industrial		30%	8.0
Total Regulated Revenue	[1]		24.7
Other	[2]	8%	2.1
Total Operating Revenues	[3]		26.8
Estimated % Regulated Revenues	[1] / [3]		**92%**

Sources and Notes:
York Water Co 2005 10-K, p. 17.
It is assumed that Other is not regulated.

Table No. MJV-3

Market Value of the 2006 Water Sample

Panel A: American States Water Co

($MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$274	$274	$264	$251	$212	$213	$200	[a]
Shares Outstanding (in millions) - Common	17	17	17	17	15	15	15	[b]
Price per Share - Common	$37.45	$34.97	$31.28	$25.87	$25.11	$23.38	$24.32	[c]
Market Value of Common Equity	$636	$594	$526	$433	$382	$355	$368	[d] = [b] x [c].
Market to Book Value of Common Equity	2.32	2.16	1.99	1.72	1.80	1.66	1.84	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$2	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$2	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$69	$69	$69	$53	$58	$52	$88	[h]
Current Liabilities	$77	$77	$78	$86	$96	$80	$64	[i]
Current Portion of Long-Term Debt	$1	$1	$1	$1	$1	$13	$1	[j]
Net Working Capital	($7)	($7)	($8)	($32)	($37)	($14)	$25	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$27	$27	$27	$45	$56	$35	$20	[l]
Adjusted Short-Term Debt	$7	$7	$8	$32	$37	$14	$0	[m] = See Sources and Notes.
Long-Term Debt	$268	$268	$268	$240	$230	$301	$315	[n]
Book Value of Long-Term Debt	$269	$269	$269	$241	$231	$315	$316	[o] = [n] + [j].
Market Value of Long-Term Debt	$269	$269	$269	$241	$231	$315	$316	[p] = [o].
Market Value of Debt	$276	$276	$277	$273	$267	$329	$316	[q] = [p] + [m].
MARKET VALUE OF FIRM								
	$912	$870	$803	$707	$649	$684	$686	[r] = [d] + [g] + [q]
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69.72%	68.26%	65.47%	61.32%	58.83%	51.90%	53.64%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	0.27%	[t] = [g] / [r].
Debt - Market Value Ratio	30.28%	31.74%	34.53%	38.68%	41.17%	48.10%	46.08%	[u] = [q] / [r].

Sources and Notes:
Compustat as of September 11, 2006.
Capital Structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.
The DCF Capital structure is calculated using 2nd Quarter,
2006 balance sheet information and a 15-trading day
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2006 Water Sample

Panel B: California Water Service Gp

($MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$290	$290	$294	$288	$245	$199	$197	[a]
Shares Outstanding (in millions) - Common	18	18	18	18	17	15	15	[b]
Price per Share - Common	$36.80	$34.72	$38.56	$37.18	$27.76	$23.96	$25.77	[c]
Market Value of Common Equity	$677	$639	$709	$683	$470	$364	$391	[d] = [b] x [c].
Market to Book Value of Common Equity	2.33	2.20	2.41	2.37	1.92	1.83	1.99	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$3	$3	$3	$3	$3	$3	$3	[f]
Market Value of Preferred Equity	$3	$3	$3	$3	$3	$3	$3	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$51	$51	$52	$70	$44	$43	$40	[h]
Current Liabilities	$105	$105	$77	$57	$64	$92	$79	[i]
Current Portion of Long-Term Debt	$1	$1	$1	$1	$1	$1	$5	[j]
Net Working Capital	($53)	($53)	($23)	$14	($19)	($48)	($33)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$6	$36	$22	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$6	$36	$22	[m] = See Sources and Notes.
Long-Term Debt	$274	$274	$274	$275	$272	$250	$203	[n]
Book Value of Long-Term Debt	$275	$275	$275	$276	$273	$251	$208	[o] = [n] + [j].
Market Value of Long-Term Debt	$275	$275	$275	$276	$273	$251	$208	[p] = [o].
Market Value of Debt	$275	$275	$275	$276	$280	$288	$230	[q] = [p] + [m].
MARKET VALUE OF FIRM	$955	$917	$988	$962	$753	$655	$625	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	70.86%	69.65%	71.78%	70.97%	62.41%	55.54%	62.63%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.36%	0.38%	0.35%	0.36%	0.46%	0.53%	0.56%	[t] = [g] / [r].
Debt - Market Value Ratio	28.77%	29.97%	27.86%	28.67%	37.13%	43.93%	36.81%	[u] = [q] / [r].

Sources and Notes:
Compustat as of September 11, 2006.
Capital Structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.
The DCF Capital structure is calculated using Year End,
2005 balance sheet information and a 15-trading day
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2006 Water Sample

Panel C: Connecticut Water Svc Inc

($MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$95	$95	$94	$88	$83	$80	$71	[a]
Shares Outstanding (in millions) - Common	8	8	8	8	8	8	8	[b]
Price per Share - Common	$23.16	$21.60	$24.75	$26.47	$27.71	$25.85	$29.79	[c]
Market Value of Common Equity	$191	$178	$202	$213	$221	$205	$228	[d] = [b] x [c].
Market to Book Value of Common Equity	2.02	1.88	2.15	2.42	2.65	2.57	3.22	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$1	$1	$1	$1	$1	$1	$1	[f]
Market Value of Preferred Equity	$1	$1	$1	$1	$1	$1	$1	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$19	$19	$26	$15	$11	$10	$9	[h]
Current Liabilities	$9	$9	$13	$16	$15	$15	$13	[i]
Current Portion of Long-Term Debt	$2	$2	$2	$0	$0	$0	$2	[j]
Net Working Capital	$12	$12	$15	($0)	($4)	($5)	($1)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$5	$5	$5	$6	$10	$7	$2	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$4	$5	$1	[m] = See Sources and Notes.
Long-Term Debt	$77	$77	$77	$66	$65	$65	$64	[n]
Book Value of Long-Term Debt	$80	$80	$80	$67	$65	$65	$66	[o] = [n] + [j].
Market Value of Long-Term Debt	$80	$80	$80	$67	$65	$65	$66	[p] = [o]
Market Value of Debt	$80	$80	$80	$67	$69	$70	$67	[q] = [p] + [m].
MARKET VALUE OF FIRM	$271	$258	$283	$281	$290	$276	$296	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	70.32%	68.84%	71.50%	75.79%	76.06%	74.38%	77.01%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.31%	0.33%	0.30%	0.30%	0.29%	0.31%	0.29%	[t] = [g] / [r].
Debt - Market Value Ratio	29.37%	30.83%	28.20%	23.91%	23.65%	25.31%	22.71%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Connecticut Water Svc Inc 2nd 2006 Quarter Capital Structure Data was taken from the company's 10-Q.

Capital Structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using Year End,

2005 balance sheet information and a 15-trading day

Prices are reported in Workpaper #1 to Table No. MJV-6.

[j] and [l]: Connecticut Water Svc Inc did not report their Current portion of Long-Term Debt and their Notes Payable for Q2, 2006 (DCF Capital Structure). The numbers are set to those for 2005.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2006 Water Sample

Panel D: Middlesex Water Co

($MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$101	$101	$100	$95	$80	$77	$72	[a]
Shares Outstanding (in millions) - Common	12	12	12	11	11	10	10	[b]
Price per Share - Common	$19.82	$17.53	$17.60	$19.27	$20.54	$16.02	$17.01	[c]
Market Value of Common Equity	$230	$204	$204	$219	$217	$166	$173	[d] = [b] x [c].
Market to Book Value of Common Equity	2.28	2.02	2.05	2.30	2.73	2.17	2.39	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$4	$4	$4	$4	$4	$4	$4	[f]
Market Value of Preferred Equity	$4	$4	$4	$4	$4	$4	$4	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$18	$18	$17	$16	$14	$20	$25	[h]
Current Liabilities	$31	$31	$21	$28	$28	$30	$26	[i]
Current Portion of Long-Term Debt	$2	$2	$2	$1	$1	$1	$0	[j]
Net Working Capital	($11)	($11)	($3)	($11)	($12)	($9)	($1)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$4	$4	$4	$11	$13	$18	$13	[l]
Adjusted Short-Term Debt	$4	$4	$3	$11	$12	$9	$1	[m] = See Sources and Notes.
Long-Term Debt	$127	$127	$128	$115	$97	$87	$88	[n]
Book Value of Long-Term Debt	$129	$129	$130	$116	$98	$88	$88	[o] = [n] + [j].
Market Value of Long-Term Debt	$129	$129	$130	$116	$98	$88	$88	[p] = [o].
Market Value of Debt	$133	$133	$133	$127	$111	$97	$89	[q] = [p] + [m].
MARKET VALUE OF FIRM	$368	$341	$341	$350	$332	$267	$266	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	62.64%	59.73%	59.88%	62.53%	65.41%	62.20%	65.02%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	1.08%	1.16%	1.16%	1.16%	1.22%	1.52%	1.53%	[t] = [g] / [r].
Debt - Market Value Ratio	36.28%	39.11%	38.96%	36.31%	33.36%	36.28%	33.45%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Capital Structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using Year End,

2005 balance sheet information and a 15-trading day

Prices are reported in Workpaper #1 to Table No. MJV-6.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2006 Water Sample

Panel E: Aqua America Inc

($MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$875	$875	$812	$747	$658	$493	$472	[a]
Shares Outstanding (in millions) - Common	131	131	129	127	123	113	114	[b]
Price per Share ($) - Common	$22.42	$22.52	$27.08	$18.14	$16.56	$12.35	$13.95	[c]
Market Value of Common Equity	$2,945	$2,959	$3,492	$2,306	$2,045	$1,398	$1,589	[d] = [b] x [c].
Market to Book Value of Common Equity	3.37	3.38	4.30	3.09	3.11	2.84	3.37	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$1	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$1	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$106	$106	$90	$90	$84	$71	$70	[h]
Current Liabilities	$241	$241	$263	$217	$232	$227	$203	[i]
Current Portion of Long-Term Debt	$25	$25	$25	$50	$39	$34	$15	[j]
Net Working Capital	($110)	($110)	($149)	($77)	($109)	($121)	($118)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$139	$139	$139	$85	$96	$115	$110	[l]
Adjusted Short-Term Debt	$110	$110	$139	$77	$96	$115	$110	[m] = See Sources and Notes.
Long-Term Debt	$907	$907	$878	$784	$697	$583	$517	[n]
Book Value of Long-Term Debt	$932	$932	$903	$835	$736	$617	$531	[o] = [n] + [j].
Market Value of Long-Term Debt	$932	$932	$903	$835	$736	$617	$531	[p] = [o].
Market Value of Debt	$1,042	$1,042	$1,042	$912	$833	$732	$641	[q] = [p] + [m].
MARKET VALUE OF FIRM	$3,987	$4,001	$4,534	$3,218	$2,877	$2,130	$2,232	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	73.87%	73.96%	77.03%	71.67%	71.06%	65.62%	71.22%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	0.01%	0.05%	[t] = [g] / [r].
Debt - Market Value Ratio	26.13%	26.04%	22.97%	28.33%	28.94%	34.37%	28.73%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Capital Structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using Year End,

2005 balance sheet information and a 15-trading day

Prices are reported in Workpaper #1 to Table No. MJV-6.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2006 Water Sample

Panel F: SJW Corp

($MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$201	$201	$196	$185	$166	$153	$149	[a]
Shares Outstanding (in millions) - Common	18	18	18	18	18	18	18	[b]
Price per Share ($) - Common	$29.01	$23.91	$23.79	$18.44	$14.75	$13.15	$14.20	[c]
Market Value of Common Equity	$530	436.92	434.72	336.84	269.57	240.24	259.49	[d] = [b] x [c].
Market to Book Value of Common Equity	2.64	2.18	2.22	1.82	1.62	1.57	1.74	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$34	$34	$32	$28	$27	$19	$20	[h]
Current Liabilities	$50	$50	$21	$15	$15	$24	$24	[i]
Current Portion of Long-Term Debt	$0	$0	$0	$0	$0	$0	$0	[j]
Net Working Capital	($16)	($16)	$11	$13	$12	($5)	($4)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$11	$12	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$5	$4	[m] = See Sources and Notes.
Long-Term Debt	$149	$149	$145	$144	$140	$110	$110	[n]
Book Value of Long-Term Debt	$149	$149	$146	$144	$140	$110	$110	[o] = [n] + [j].
Market Value of Long-Term Debt	$149	$149	$146	$144	$140	$110	$110	[p] = [o].
Market Value of Debt	$149	$149	$146	$144	$140	$115	$114	[q] = [p] + [m].
MARKET VALUE OF FIRM								
	$679	$586	$580	$481	$409	$355	$373	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	78.03%	74.54%	74.91%	70.07%	65.85%	67.65%	69.53%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[t] = [g] / [r].
Debt - Market Value Ratio	21.97%	25.46%	25.09%	29.93%	34.15%	32.35%	30.47%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Capital Structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

2005 balance sheet information and a 15-trading day

average closing price ending on I/B/E/S Tearsheet dates as

Prices are reported in Workpaper #1 to Table No. MJV-6.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2006 Water Sample

Panel G: Southwest Water Co

($MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$152	$152	$145	$126	$79	$61	$54	[a]
Shares Outstanding (in millions) - Common	23	23	21	20	16	14	14	[b]
Price per Share ($) - Common	$12.99	$11.93	$14.53	$12.36	$10.89	$9.02	$9.20	[c]
Market Value of Common Equity	$298	$273	$307	$252	$176	$123	$130	[d] = [b] x [c].
Market to Book Value of Common Equity	1.96	1.80	2.12	2.00	2.23	2.01	2.40	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$1	$1	$1	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$1	$1	$1	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$49	$49	$48	$45	$35	$30	$31	[h]
Current Liabilities	$42	$42	$41	$36	$31	$32	$26	[i]
Current Portion of Long-Term Debt	$9	$9	$9	$3	$3	$2	$5	[j]
Net Working Capital	$17	$17	$17	$13	$7	$0	$10	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$0	$0	$0	$0	$0	$0	$0	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$122	$122	$118	$116	$73	$81	$65	[n]
Book Value of Long-Term Debt	$132	$132	$127	$119	$76	$83	$70	[o] = [n] + [j].
Market Value of Long-Term Debt	$132	$132	$127	$119	$76	$83	$70	[p] = [o].
Market Value of Debt	$132	$132	$127	$119	$76	$83	$70	[q] = [p] + [m].
MARKET VALUE OF FIRM	$430	$406	$435	$371	$252	$207	$201	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69.21%	67.35%	70.65%	67.79%	69.78%	59.61%	64.96%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.11%	0.11%	0.11%	0.12%	0.20%	0.25%	0.26%	[t] = [g] / [r].
Debt - Market Value Ratio	30.68%	32.54%	29.24%	32.09%	30.02%	40.14%	34.79%	[u] = [q] / [r].

Sources and Notes:
Compustat as of September 11, 2006.
Capital Structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.
2005 balance sheet information and a 15-trading day
average closing price ending on I/B/E/S Tearsheet dates as
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-3

Market Value of the 2006 Water Sample

Panel H: York Water Co

($MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$52	$52	$50	$48	$39	$37	$36	[a]
Shares Outstanding (in millions) - Common	7	7	7	7	6	6	6	[b]
Price per Share ($) - Common	$17.30	$16.76	$16.63	$13.06	$12.14	$10.26	$9.92	[c]
Market Value of Common Equity	$120	$117	$115	$90	$78	$65	$63	[d] = [b] x [c].
Market to Book Value of Common Equity	2.32	2.25	2.29	1.87	2.00	1.75	1.74	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$6	$6	$5	$5	$4	$4	$4	[h]
Current Liabilities	$29	$29	$25	$21	$14	$5	$5	[i]
Current Portion of Long-Term Debt	$12	$12	$12	$16	$3	$0	$0	[j]
Net Working Capital	($11)	($11)	($7)	$0	($7)	($2)	($1)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$7	$7	$7	$0	$7	$3	$2	[l]
Adjusted Short-Term Debt	$7	$7	$7	$0	$7	$2	$1	[m] = See Sources and Notes.
Long-Term Debt	$40	$40	$40	$36	$30	$33	$33	[n]
Book Value of Long-Term Debt	$52	$52	$52	$52	$33	$33	$33	[o] = [n] + [j].
Market Value of Long-Term Debt	$52	$52	$52	$52	$33	$33	$33	[p] = [o].
Market Value of Debt	$59	$59	$59	$52	$40	$34	$34	[q] = [p] + [m].
MARKET VALUE OF FIRM	$179	$176	$174	$142	$118	$100	$96	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	67.04%	66.34%	66.09%	63.41%	66.19%	65.46%	65.03%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[t] = [g] / [r].
Debt - Market Value Ratio	32.96%	33.66%	33.91%	36.59%	33.81%	34.54%	34.97%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

York Water Co 2nd Quarter 2006 Capital Structure Data was taken from the company's 10-Q.

Capital Structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using Year End,

2005 balance sheet information and a 15-trading day

Prices are reported in Workpaper #1 to Table No. MJV-6.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-4
2006 Water Sample
Capital Structure Summary

Company	DCF Capital Structure			5-Year Average Capital Structure		
	Common Equity - Value Ratio [1]	Preferred Equity - Value Ratio [2]	Debt - Value Ratio [3]	Common Equity - Value Ratio [4]	Preferred Equity - Value Ratio [5]	Debt - Value Ratio [6]
American States Water Co	0.70	-	0.30	0.60	0.00	0.40
California Water Service Gp	0.71	0.00	0.29	0.65	0.00	0.34
Connecticut Water Svc Inc	0.70	0.00	0.29	0.74	0.00	0.26
Middlesex Water Co	0.63	0.01	0.36	0.62	0.01	0.36
Aqua America Inc	0.74	-	0.26	0.72	0.00	0.28
SJW Corp	0.78	-	0.22	0.70	-	0.30
Southwest Water Co	0.69	0.00	0.31	0.67	0.00	0.33
York Water Co	0.67	-	0.33	0.65	-	0.35

Sources and Notes:
[1], [4]:Workpaper #1 to Table No. MJV-4.
[2], [5]:Workpaper #2 to Table No. MJV-4.
[3], [6]:Workpaper #3 to Table No. MJV-4.
Values in this table may not add up to one due to rounding.

Workpaper #1 to Table No. MJV-4

2006 Water Sample

Calculation of the Average Common Equity - Market Value Ratio from 2nd Quarter, 2001 to 2nd Quarter, 2006

Company	DCF Capital Structure [1]	2nd Quarter, 2006 [2]	2005 [3]	2004 [4]	2003 [5]	2002 [6]	2001 [7]	5-Year Average [8]
American States Water Co	0.70	0.68	0.65	0.61	0.59	0.52	0.54	0.60
California Water Service Gp	0.71	0.70	0.72	0.71	0.62	0.56	0.63	0.65
Connecticut Water Svc Inc	0.70	0.69	0.72	0.76	0.76	0.74	0.77	0.74
Middlesex Water Co	0.63	0.60	0.60	0.63	0.65	0.62	0.65	0.62
Aqua America Inc	0.74	0.74	0.77	0.72	0.71	0.66	0.71	0.72
SJW Corp	0.78	0.75	0.75	0.70	0.66	0.68	0.70	0.70
Southwest Water Co	0.69	0.67	0.71	0.68	0.70	0.60	0.65	0.67
York Water Co	0.67	0.66	0.66	0.63	0.66	0.65	0.65	0.65

Sources and Notes:
[1] - [7]: Table No. MJV-3; Panels A - H, [s].
[8]: ([2] x 0.50 + [3] + [4] + [5] + [6] + [7] x 0.50) / 5

Workpaper #2 to Table No. MJV-4

2006 Water Sample

Calculation of the Average Preferred Equity - Market Value Ratio from 2nd Quarter, 2001 to 2nd Quarter, 2006

Company	DCF Capital Structure [1]	2nd Quarter, 2006 [2]	2005 [3]	2004 [4]	2003 [5]	2002 [6]	2001 [7]	5-Year Average [8]
American States Water Co	-	-	-	-	-	-	0.00	0.00
California Water Service Gp	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
Connecticut Water Svc Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Middlesex Water Co	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01
Aqua America Inc	-	-	-	-	-	0.00	0.00	0.00
SJW Corp	-	-	-	-	-	-	-	-
Southwest Water Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
York Water Co	-	-	-	-	-	-	-	-

Sources and Notes:

[1] - [7]: Table No. MJV-3; Panels A - H, [t].

[8]: ([2] x 0.50 + [3] + [4] + [5] + [6] + [7] x 0.50) / 5

Values reported as 0.00 have an insignificant amount of preferred equity.

Workpaper #3 to Table No. MJV-4

2006 Water Sample

Calculation of the Average Debt - Market Value Ratio from 2nd Quarter 2001to 2nd Quarter, 2006

Company	DCF Capital Structure [1]	2nd Quarter, 2006 [2]	2005 [3]	2004 [4]	2003 [5]	2002 [6]	2001 [7]	5-Year Average [8]
American States Water Co	0.30	0.32	0.35	0.39	0.41	0.48	0.46	0.40
California Water Service Gp	0.29	0.30	0.28	0.29	0.37	0.44	0.37	0.34
Connecticut Water Svc Inc	0.29	0.31	0.28	0.24	0.24	0.25	0.23	0.26
Middlesex Water Co	0.36	0.39	0.39	0.36	0.33	0.36	0.33	0.36
Aqua America Inc	0.26	0.26	0.23	0.28	0.29	0.34	0.29	0.28
SJW Corp	0.22	0.25	0.25	0.30	0.34	0.32	0.30	0.30
Southwest Water Co	0.31	0.33	0.29	0.32	0.30	0.40	0.35	0.33
York Water Co	0.33	0.34	0.34	0.37	0.34	0.35	0.35	0.35

Sources and Notes:
[1] - [7]: Table No. MJV-3; Panels A - H, [u].
[8]: ([2] x 0.50 + [3] + [4] + [5] + [6] + [7] x 0.50) / 5

Table No. MJV-5

2006 Water Sample

Combined I/B/E/S and Value Line Estimated Growth Rates

Company	I/B/E/S		Value Line			Combined I/B/E/S and Value Line Growth Rate
	I/B/E/S Long-Term Growth Rate	Number of Estimates	Fiscal Year '07 EPS Estimate	Fiscal Year '09 to '11 EPS Estimate	Annualized Growth Rate	
	[1]	[2]	[3]	[4]	[5]	[6]
American States Water Co	6.0%	1	$1.65	$1.90	4.8%	5.4%
California Water Service Gp	7.0%	3	$1.75	$1.80	0.9%	5.5%
Middlesex Water Co	3.5%	1	$0.77	n/a	n/a	3.5%
Aqua America Inc	10.5%	6	$0.85	$1.20	12.2%	10.7%
Southwest Water Co	8.5%	2	$0.45	$0.70	15.9%	11.0%
York Water Co	7.8%	2	$0.97	n/a	n/a	7.8%

Sources and Notes:

[1], [2]: I/B/E/S Tearsheet dates as of September 8, 2006. York Water's I/B/E/S Tearsheet is as of April 14, 2006 and Aqua America's I/B/E/S Tearsheet is as of August 17, 2006.

[3], [4]: Value Line Investment Survey: Plus Edition as of August 24, 2006.

[5]: ([4] / [3]) ^ (1/3) - 1.

[6]: ([1] x [2] + [5]) / ([2] + 1).

Connecticut Water Svc Inc is excluded because no I/B/E/S long-term growth estimates or Value Line EPS estimates are available.

SJW Corp is excluded because there is no Value Line data and the last I/B/E/S data is from 2003.

Middlesex Water Co and York Water Co EPS Fiscal Year 2007 Estimate are based on an estimate for 2009/2011.

Table No. MJV-6

DCF Cost of Equity of the 2006 Water Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price [1]	Quarterly Dividend Q2, 2006 [2]	Combined I/B/E/S and Value Line Long-Term Growth Rate [3]	Quarterly Growth Rate [4]	DCF Cost of Equity [5]
American States Water Co	$37.45	$0.22	5.4%	1.3%	8.0%
California Water Service Gp	$36.80	$0.29	5.5%	1.3%	8.8%
Middlesex Water Co	$19.82	$0.17	3.5%	0.9%	7.1%
Aqua America Inc	$22.42	$0.11	10.7%	2.6%	12.9%
Southwest Water Co	$12.99	$0.05	11.0%	2.6%	12.8%
York Water Co	$17.30	$0.11	7.8%	1.9%	10.6%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-6.
[2]: Workpaper #2 to Table No. MJV-6.
[3]: Table No. MJV-5, [6].
[4]: {(1 + [3]) ^ (1/4)} - 1.
[5]: {(([2] / [1]) x (1 + [4]) + [4] + 1) ^ 4} - 1.
Connecticut Water Svc Inc is excluded because no I/B/E/S long-term growth estimates or Value Line EPS estimates are available.
SJW Corp is excluded because there is no Value Line data and the last I/B/E/S data is from 2003.

Table No. MJV-6

DCF Cost of Equity of the 2006 Water Sample

Panel B: Multi-Stage DCF (Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	Stock Price [1]	Quarterly Dividend Q2, 2006 [2]	Combined I/B/E/S and *Value Line* Long-Term Growth Rate [3]	Growth Rate: FY 2012 [4]	Growth Rate: FY 2013 [5]	Growth Rate: FY 2014 [6]	Growth Rate: FY 2015 [7]	Growth Rate: FY 2016 [8]	GDP Long-Term Growth Rate [9]	DCF Cost of Equity [10]
American States Water Co	$37.45	$0.22	5.4%	5.4%	5.3%	5.3%	5.3%	5.2%	5.2%	7.8%
California Water Service Gp	$36.80	$0.29	5.5%	5.4%	5.4%	5.3%	5.3%	5.2%	5.2%	8.6%
Middlesex Water Co	$19.82	$0.17	3.5%	3.8%	4.1%	4.4%	4.6%	4.9%	5.2%	8.4%
Aqua America Inc	$22.42	$0.11	10.7%	9.8%	8.9%	8.0%	7.0%	6.1%	5.2%	8.1%
Southwest Water Co	$12.99	$0.05	11.0%	10.0%	9.0%	8.1%	7.1%	6.2%	5.2%	7.7%
York Water Co	$17.30	$0.11	7.8%	7.4%	6.9%	6.5%	6.1%	5.6%	5.2%	8.5%

Sources and Notes:

[1]: Workpaper #1 to Table No. MJV-6.

[2]: Workpaper #2 to Table No. MJV-6.

[3]: Table No. MJV-5, [6].

[4]: [3] - {([3] - [9])/ 6}.

[5]: [4] - {([3] - [9])/ 6}.

[6]: [5] - {([3] - [9])/ 6}.

[7]: [6] - {([3] - [9])/ 6}.

[8]: [7] - {([3] - [9])/ 6}.

[9]: Blue Chip Economic Indicators, March 2006, page 15 (Nominal GDP for 2013-2017). This number is assumed to be the perpetual growth rate.

[10]: Workpaper #3 to Table No. MJV-6.

Connecticut Water Svc Inc is excluded because no I/B/E/S long-term growth estimates or Value Line EPS estimates are available.

SJW Corp is excluded because there is no Value Line data and the last I/B/E/S data is from 2003.

Workpaper #1 to Table No. MJV-6

2006 Water Sample

15 Day Common Stock Prices as of I/B/E/S Dates.

I/B/E/S Date 1	13-Apr-06	12-Apr-06	11-Apr-06	10-Apr-06	07-Apr-06	06-Apr-06	05-Apr-06	04-Apr-06	03-Apr-06	31-Mar-06	30-Mar-06	29-Mar-06	28-Mar-06	27-Mar-06	24-Mar-06	Average
I/B/E/S Date 2	08-Sep-06	07-Sep-06	06-Sep-06	05-Sep-06	04-Sep-06	01-Sep-06	31-Aug-06	30-Aug-06	29-Aug-06	28-Aug-06	25-Aug-06	24-Aug-06	23-Aug-06	22-Aug-06	21-Aug-06	
I/B/E/S Date 3	17-Aug-06	16-Aug-06	15-Aug-06	14-Aug-06	11-Aug-06	10-Aug-06	09-Aug-06	08-Aug-06	07-Aug-06	04-Aug-06	03-Aug-06	02-Aug-06	01-Aug-06	31-Jul-06	28-Jul-06	
American States Water Co	$36.82	$37.22	$37.56	$38.74	-	$38.64	$38.43	$38.01	$38.09	$36.97	$36.56	$36.39	$36.71	$37.18	$37.04	$37.45
California Water Service Gp	$36.10	$36.37	$37.04	$38.16	-	$38.08	$38.08	$37.50	$37.26	$36.58	$35.81	$35.48	$35.41	$36.58	$36.60	$36.80
Middlesex Water Co	$18.94	$19.09	$19.64	$20.12	-	$20.20	$20.32	$20.05	$20.06	$19.87	$19.96	$19.75	$19.54	$19.97	$19.87	$19.82
Aqua America Inc	$22.67	$22.59	$22.61	$22.29	$22.36	$22.75	$22.06	$22.18	$23.01	$23.31	$22.61	$22.51	$21.53	$21.80	$21.96	$22.42
Southwest Water Co	$12.63	$12.79	$12.79	$12.94	-	$13.01	$12.97	$13.09	$12.98	$13.09	$13.10	$13.28	$12.93	$13.11	$13.01	$12.99
York Water Co	$17.37	$16.94	$17.17	$17.03	$17.33	$17.26	$16.77	$16.87	$17.28	$17.55	$17.40	$17.31	$17.43	$17.99	$17.73	$17.30

Sources and Notes:

Compustat as of October 6, 2006.

The prices chosen are the daily closing prices from Compustat starting from I/B/E/S forecast date and ending fifteen trading days before.

I/B/E/S Tearsheet dates as of September 8, 2006. York Water's I/B/E/S Tearsheet is as of April 14, 2006 and Aqua America's I/B/E/S Tearsheet is as of August 17, 2006.

Since April 14, 2006 is not a trading day, prices ending in April 13, 2006 were used instead.

Workpaper #2 to Table No. MJV-6

2006 Water Sample

2nd Quarter, 2006 Dividend Payments

Company	Q2, 2006
American States Water Co	$0.22
California Water Service Gp	$0.29
Middlesex Water Co	$0.17
Aqua America Inc	$0.11
Southwest Water Co	$0.05
York Water Co	$0.11

Sources and Notes:
Compustat as of September 11, 2006.

Workpaper #3 to Table No. MJV-6

DCF Cost of Equity of the 2006 Water Sample

Multi - Stage DCF (using the Blue Chip Indicators Long-Term GDP Growth Rate Forecast as the Perpetual Growth Rate)

		1	2	4	5	7	8
		AWR	CWT	MSEX	WTR	SWWC	YORW
Year	Company	American States Water Co	California Water Service Gp	Middlesex Water Co	Aqua America Inc	Southwest Water Co	York Water Co
	Current Stock Price	($37.45)	($36.80)	($19.82)	($22.42)	($12.99)	($17.30)
YEAR 2006	Dividend Q3 Estimate	$0.23	$0.29	$0.17	$0.11	$0.05	$0.11
YEAR 2006	Dividend Q4 Estimate	$0.23	$0.30	$0.17	$0.11	$0.06	$0.12
YEAR 2007	Dividend Q1 Estimate	$0.23	$0.30	$0.17	$0.12	$0.06	$0.12
YEAR 2007	Dividend Q2 Estimate	$0.24	$0.30	$0.18	$0.12	$0.06	$0.12
YEAR 2007	Dividend Q3 Estimate	$0.24	$0.31	$0.18	$0.12	$0.06	$0.12
YEAR 2007	Dividend Q4 Estimate	$0.24	$0.31	$0.18	$0.12	$0.06	$0.13
YEAR 2008	Dividend Q1 Estimate	$0.25	$0.32	$0.18	$0.13	$0.06	$0.13
YEAR 2008	Dividend Q2 Estimate	$0.25	$0.32	$0.18	$0.13	$0.06	$0.13
YEAR 2008	Dividend Q3 Estimate	$0.25	$0.32	$0.18	$0.13	$0.07	$0.13
YEAR 2008	Dividend Q4 Estimate	$0.26	$0.33	$0.19	$0.14	$0.07	$0.14
YEAR 2009	Dividend Q1 Estimate	$0.26	$0.33	$0.19	$0.14	$0.07	$0.14
YEAR 2009	Dividend Q2 Estimate	$0.26	$0.34	$0.19	$0.15	$0.07	$0.14
YEAR 2009	Dividend Q3 Estimate	$0.27	$0.34	$0.19	$0.15	$0.07	$0.14
YEAR 2009	Dividend Q4 Estimate	$0.27	$0.35	$0.19	$0.15	$0.08	$0.15
YEAR 2010	Dividend Q1 Estimate	$0.27	$0.35	$0.19	$0.16	$0.08	$0.15
YEAR 2010	Dividend Q2 Estimate	$0.28	$0.36	$0.20	$0.16	$0.08	$0.15
YEAR 2010	Dividend Q3 Estimate	$0.28	$0.36	$0.20	$0.16	$0.08	$0.15
YEAR 2010	Dividend Q4 Estimate	$0.29	$0.37	$0.20	$0.17	$0.08	$0.16
YEAR 2011	Dividend Q1 Estimate	$0.29	$0.37	$0.20	$0.17	$0.09	$0.16
YEAR 2011	Dividend Q2 Estimate	$0.29	$0.38	$0.20	$0.18	$0.09	$0.16
YEAR 2011	Dividend Q3 Estimate	$0.30	$0.38	$0.20	$0.18	$0.09	$0.17
YEAR 2011	Dividend Q4 Estimate	$0.30	$0.39	$0.21	$0.19	$0.09	$0.17
YEAR 2012	Dividend Q1 Estimate	$0.30	$0.39	$0.21	$0.19	$0.10	$0.17
YEAR 2012	Dividend Q2 Estimate	$0.31	$0.40	$0.21	$0.20	$0.10	$0.18
YEAR 2012	Dividend Q3 Estimate	$0.31	$0.40	$0.21	$0.20	$0.10	$0.18
YEAR 2012	Dividend Q4 Estimate	$0.32	$0.41	$0.21	$0.21	$0.10	$0.18
YEAR 2013	Dividend Q1 Estimate	$0.32	$0.41	$0.22	$0.21	$0.10	$0.18
YEAR 2013	Dividend Q2 Estimate	$0.33	$0.42	$0.22	$0.21	$0.11	$0.19
YEAR 2013	Dividend Q3 Estimate	$0.33	$0.42	$0.22	$0.22	$0.11	$0.19
YEAR 2013	Dividend Q4 Estimate	$0.33	$0.43	$0.22	$0.22	$0.11	$0.19
YEAR 2014	Dividend Q1 Estimate	$0.34	$0.43	$0.22	$0.23	$0.11	$0.20
YEAR 2014	Dividend Q2 Estimate	$0.34	$0.44	$0.23	$0.23	$0.12	$0.20
YEAR 2014	Dividend Q3 Estimate	$0.35	$0.45	$0.23	$0.24	$0.12	$0.20
YEAR 2014	Dividend Q4 Estimate	$0.35	$0.45	$0.23	$0.24	$0.12	$0.21
YEAR 2015	Dividend Q1 Estimate	$0.36	$0.46	$0.23	$0.25	$0.12	$0.21
YEAR 2015	Dividend Q2 Estimate	$0.36	$0.46	$0.24	$0.25	$0.12	$0.21
YEAR 2015	Dividend Q3 Estimate	$0.37	$0.47	$0.24	$0.25	$0.13	$0.22
YEAR 2015	Dividend Q4 Estimate	$0.37	$0.48	$0.24	$0.26	$0.13	$0.22
YEAR 2016	Dividend Q1 Estimate	$0.37	$0.48	$0.25	$0.26	$0.13	$0.22
YEAR 2016	Dividend Q2 Estimate	$0.38	$0.49	$0.25	$0.27	$0.13	$0.23
YEAR 2016 Q3	Year 10 Stock Price	$63.35	$62.39	$33.02	$39.33	$22.70	$29.86
	Trial COE - Quarterly Rate	1.9%	2.1%	2.0%	2.0%	1.9%	2.1%
	Trial COE - Annual Rate	7.8%	8.6%	8.4%	8.1%	7.7%	8.5%
	Cost of Equity	7.8%	8.6%	8.4%	8.1%	7.7%	8.5%
	(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:

All Growth Rate Estimates: Table No. MJV-6; Panel B.

Stock Prices and Dividends are from Compustat as of August 24, 2006.

1. See Workpaper #1 to Table No. MJV-6 for the average closing stock price obtained from Compustat.
2. See Workpaper #2 to Table No. MJV-6 for the for the quarterly dividend obtained from Compustat.
3. The Blue Chip Long-Term GDP Growth Rate is used to calculate the Year 10 Stock Price.
   {(the Dividend Year 2016 Q3 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/2))} /
   {(Trial COE - Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Table No. MJV-7

Overall After-Tax DCF Cost of Captial of the 2006 Water Sample

Panel A: Simple DCF Method (Quarterly)

Company		2nd Quarter, 2006 Bond Rating [1]	2nd Quarter, 2006 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	DCF Preferred Equity to Market Value Ratio [5]	Cost of Debt [6]	DCF Debt to Market Value Ratio [7]	Corporate Tax Rate [8]	Cost of Preferred Equity [9]	Overall After- Tax Cost of Capital [10]
American States Water Co	*	A	-	8.0%	0.70	-	6.4%	0.30	39.2%	-	6.7%
California Water Service Gp	*	A	A	8.8%	0.71	0.00	6.4%	0.29	39.2%	6.3%	7.4%
Middlesex Water Co		A	A	7.1%	0.63	0.01	6.4%	0.36	39.2%	6.3%	5.9%
Aqua America Inc	*	A	-	12.9%	0.74	-	6.4%	0.26	39.2%	-	10.5%
Southwest Water Co		A	A	12.8%	0.69	0.00	6.4%	0.31	39.2%	6.3%	10.0%
York Water Co		A	-	10.6%	0.67	-	6.4%	0.33	39.2%	-	8.4%
Average [a]				10.0%	0.69	0.00	6.4%	0.31	39.2%	6.3%	8.2%
Average [b]				9.9%	0.71	0.00	6.4%	0.28	39.2%	6.3%	8.2%

Sources and Notes:

[1]: Workpaper #1 to Table No. MJV-10; Panel A, [1].

[2]: Preferred ratings were assumed equal to debt ratings.

[3]: Table No. MJV-6; Panel A, [5].

[4]: Table No. MJV-4, [1].

[5]: Table No. MJV-4, [2].

[6]: Mergent Bond Record, August 2006.

[7]: Table No. MJV-4, [3].

[8]: Provided by Tennessee American Water.

[9]: Mergent Bond Record, August 2006.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

[a]: Average for all companies.

[b]: Average for companies with an asterix.

* Represents companies that have revenues from regulated activities greater than 75%.
Connecticut Water Svc Inc is excluded because no I/B/E/S long-term growth estimates are available.
Middlesex Water Co., SJW Corp and York Water are excluded because
they do not have both I/B/E/S and Value Line long-term growth rates.

Table No. MJV-7

Overall After-Tax DCF Cost of Captial of the 2006 Water Sample

Panel B: Multi-Stage DCF (Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company		2nd Quarter, 2006 Bond Rating [1]	2nd Quarter, 2006 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	DCF Preferred Equity to Market Value Ratio [5]	Cost of Debt [6]	DCF Debt to Market Value Ratio [7]	Corporate Tax Rate [8]	Cost of Preferred Equity [9]	Overall After- Tax Cost of Capital [10]
American States Water Co	*	A	-	7.8%	0.70	-	6.4%	0.30	39.2%	-	6.6%
California Water Service Gp	*	A	A	8.6%	0.71	0.00	6.4%	0.29	39.2%	6.3%	7.2%
Middlesex Water Co		A	A	8.4%	0.63	0.01	6.4%	0.36	39.2%	6.3%	6.8%
Aqua America Inc	*	A	-	8.1%	0.74	-	6.4%	0.26	39.2%	-	7.0%
Southwest Water Co		A	A	7.7%	0.69	0.00	6.4%	0.31	39.2%	6.3%	6.5%
York Water Co		A	-	8.5%	0.67	-	6.4%	0.33	39.2%	-	6.9%
Average [a]				8.2%	0.69	0.00	6.4%	0.31	39.2%	6.3%	6.8%
Average [b]				8.2%	0.71	0.00	6.4%	0.28	39.2%	6.3%	6.9%

Sources and Notes:

[1]: Workpaper #1 to Table No. MJV-10; Panel A, [1].
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Table No. MJV-6; Panel B, [10].
[4]: Table No. MJV-4, [1].
[5]: Mergent Bond Record, August 2006.
[5]: Table No. MJV-4, [2].
[7]: Mergent Bond Record, August 2006.
[7]: Table No. MJV-4, [3].
[8]: Provided by Tennessee American Water.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.
[a]: Average for all companies.
[b]: Average for companies with an asterix.
* Represents companies that have revenues from regulated activities greater than 75%.
Connecticut Water Svc Inc is excluded because no I/B/E/S long-term growth estimates are available.
Middlesex Water Co., SJW Corp and York Water are excluded because
they do not have both I/B/E/S and Value Line long-term growth rates.

Table No. MJV-8

DCF Cost of Equity at Tennessee American Water's Capital Structure

2006 Water Sample Return on Equity

	Overall Cost of Capital [1]	Tennessee American Water's Regulatory % Debt [2]	Tennessee American Water's Cost of Debt [3]	Corporate Tax Rate [4]	Tennessee American Water's Regulatory % Preferred Equity [5]	Tennessee American Water's Cost of Preferred Equity [6]	Tennessee American Water's Regulatory % Equity [7]	Estimated Return on Equity [8]
Using All Companies								
Simple DCF Quarterly	8.2%	0.55	6.4%	39.2%	0.01	6.3%	0.43	13.7%
Multi-Stage DCF - Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate	6.8%	0.55	6.4%	39.2%	0.01	6.3%	0.43	10.6%
Using Companies that have 2005 Revenues from Regulated Activities Greater Than 75%.								
Simple DCF Quarterly	8.2%	0.55	6.4%	39.2%	0.01	6.3%	0.43	13.8%
Multi-Stage DCF - Using the Blue-Chip Long-Term GDP Growth Forecast as the Perpetual Rate	6.9%	0.55	6.4%	39.2%	0.01	6.3%	0.43	10.8%

Sources and Notes:
[1]: Table No. MJV-7, Panels A-B, [10].
[2]: Provided by Tennessee American Water.
[3]: Mergent Bond Record, August 2006. Based on an A rating.
[4]: Tax Rate provided by Tennessee American Water.
[5]: Provided by Tennessee American Water.
[6]: Mergent Bond Record, August 2006. Based on an A rating.
[7]: Provided by Tennessee American Water.
[8]: {[1] - ([2] x [3] x (1 - [4]) + [6] x [7])} / [5].

Table No. MJV-9

Risk Positioning Cost of Equity of the 2006 Water Sample

Panel A: Using Unadjusted Value Line Betas and the Long-Term Risk-Free Rate

Company		Long-Term Risk-Free Rate [1]	Unadjusted Beta [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (0.5%) Cost of Equity [5]	ECAPM (1.5%) Cost of Equity [6]
American States Water Co	*	5.00%	0.60	6.5%	8.9%	9.1%	9.5%
California Water Service Gp	*	5.00%	0.67	6.5%	9.4%	9.5%	9.9%
Connecticut Water Svc Inc	*	5.00%	0.67	6.5%	9.4%	9.5%	9.9%
Middlesex Water Co	*	5.00%	0.67	6.5%	9.4%	9.5%	9.9%
Aqua America Inc	*	5.00%	0.67	6.5%	9.4%	9.5%	9.9%
SJW Corp	*	5.00%	0.52	6.5%	8.4%	8.6%	9.1%
Southwest Water Co		5.00%	0.52	6.5%	8.4%	8.6%	9.1%
York Water Co	*	5.00%	0.15	6.5%	6.0%	6.4%	7.2%

Sources and Notes:
[1]: Workpaper # 2 to Table No. MJV-9, Panel B [10].
[2]: Workpaper # 1 to Table No. MJV-9.
[3]: MJV Testimony, Appendix B.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 0.5%) + [2] x ([3] - 0.5%).
[6]: ([1] + 1.5%) + [2] x ([3] - 1.5%).
* Represents companies that have revenues from regulated activities greater than 75%.

Table No. MJV-9

Risk Positioning Cost of Equity of the 2006 Water Sample

Panel B: Using Unadjusted Value Line Betas and the Short-Term Risk-Free Rate

Company		Short-Term Risk-Free Rate [1]	Unadjusted Beta [2]	Short-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1%) Cost of Equity [5]	ECAPM (2%) Cost of Equity [6]	ECAPM (3%) Cost of Equity [7]
American States Water Co	*	4.10%	0.60	8.0%	8.9%	9.3%	9.7%	10.1%
California Water Service Gp	*	4.10%	0.67	8.0%	9.5%	9.8%	10.1%	10.5%
Connecticut Water Svc Inc	*	4.10%	0.67	8.0%	9.5%	9.8%	10.1%	10.5%
Middlesex Water Co	*	4.10%	0.67	8.0%	9.5%	9.8%	10.1%	10.5%
Aqua America Inc	*	4.10%	0.67	8.0%	9.5%	9.8%	10.1%	10.5%
SJW Corp	*	4.10%	0.52	8.0%	8.3%	8.8%	9.2%	9.7%
Southwest Water Co		4.10%	0.52	8.0%	8.3%	8.8%	9.2%	9.7%
York Water Co	*	4.10%	0.15	8.0%	5.3%	6.1%	7.0%	7.8%

Sources and Notes:

[1]: Workpaper # 2 to Table No. MJV-9, Panel B [10].

[2]: Workpaper # 1 to Table No. MJV-9.

[3]: MJV Testimony, Appendix B.

[4]: [1] + ([2] x [3]).

[5]: ([1] + 1%) + [2] x ([3] - 1%).

[6]: ([1] + 2%) + [2] x ([3] - 2%).

[7]: ([1] + 3%) + [2] x ([3] - 3%).

* Represents companies that have revenues from regulated activities greater than 75%.

Workpaper # 1 to Table No. MJV-9

2006 Water Sample

Value Line Betas

Company	Beta on Market [1]	Unadjusted Beta [2]
American States Water Co	0.75	0.60
California Water Service Gp	0.80	0.67
Connecticut Water Svc Inc	0.80	0.67
Middlesex Water Co	0.80	0.67
Aqua America Inc	0.80	0.67
SJW Corp	0.70	0.52
Southwest Water Co	0.70	0.52
York Water Co	0.45	0.15
Average	0.73	0.56

Sources and Notes:

[1] Value Line Investment Survey: Plus Edition as of August 24, 2006.

[2]: The reported beta in [1] by Value Line is unadjusted using the formula: ([1] - .35) / .67.

Workpaper # 2 to Table No. MJV-9
2006 Water Sample
Panel A: US Interest Rate Series (All Constant Maturity Series)

Trading Date		30 Day	90 Day	180 Day	1 Year	2 Year	3 Year	5 Year	7 Year	10 Year	Long Term
2006-08-17		5.15%	5.09%	5.18%	5.08%	4.89%	4.84%	4.82%	4.82%	4.87%	5.08%
2006-08-18		5.13%	5.10%	5.19%	5.08%	4.87%	4.82%	4.78%	4.78%	4.84%	5.05%
2006-08-21		5.15%	5.11%	5.18%	5.07%	4.85%	4.79%	4.77%	4.77%	4.82%	5.04%
2006-08-22		5.17%	5.10%	5.17%	5.07%	4.87%	4.79%	4.77%	4.77%	4.82%	5.03%
2006-08-23		5.17%	5.09%	5.17%	5.07%	4.87%	4.81%	4.77%	4.78%	4.82%	5.03%
2006-08-24		5.16%	5.09%	5.17%	5.07%	4.88%	4.80%	4.78%	4.78%	4.81%	5.02%
2006-08-25		5.17%	5.11%	5.16%	5.06%	4.86%	4.79%	4.76%	4.76%	4.79%	5.01%
2006-08-28		5.17%	5.10%	5.18%	5.08%	4.88%	4.80%	4.77%	4.77%	4.80%	5.01%
2006-08-29		5.19%	5.07%	5.16%	5.06%	4.87%	4.79%	4.77%	4.77%	4.79%	5.00%
2006-08-30		5.16%	5.05%	5.14%	5.03%	4.83%	4.76%	4.72%	4.72%	4.76%	4.98%
2006-08-31		5.12%	5.05%	5.11%	5.01%	4.79%	4.71%	4.70%	4.70%	4.74%	4.95%
2006-09-01		5.07%	5.02%	5.10%	4.99%	4.77%	4.70%	4.68%	4.69%	4.73%	4.95%
2006-09-05		4.96%	5.00%	5.13%	5.02%	4.80%	4.73%	4.73%	4.74%	4.78%	5.01%
2006-09-06		4.89%	4.97%	5.12%	5.02%	4.82%	4.76%	4.75%	4.76%	4.80%	5.02%
2006-09-07		4.89%	4.97%	5.13%	5.02%	4.82%	4.76%	4.74%	4.75%	4.80%	5.01%
Average:	[A]	5.10%	5.06%	5.15%	5.05%	4.84%	4.78%	4.75%	4.76%	4.80%	5.01%
Maturity Premium:	[B]	0.00%	0.10%	0.23%	0.40%	0.65%	0.83%	1.00%	1.10%	1.20%	1.50%
Implied Short-Term Yield:	[C]	5.10%	4.96%	4.92%	4.65%	4.19%	3.95%	3.75%	3.66%	3.60%	3.51%

Sources and Notes:

[A]: Average over the last 15 trading days.

[B]: Workpaper #3 to Table No. MJV-9, Panel C, [2].

[C]: [A] - [B].

St. Louis Federal Reserve Bank. {http://research.stlouisfed.org/fred2/}. The most recent 15 trading days are used.

Workpaper # 2 to Table No. MJV-9
2006 Water Sample
Panel B: Forecasted Short-Term Interest Rates

		30 Day [1]	90 Day [2]	180 Day [3]	1 Year [4]	2 Year [5]	3 Year [6]	5 Year [7]	7 Year [8]	Total Days [9]	Implicit Short-Term Rate [10]
Implied Short-Term Yield:	[A]	5.10%	4.96%	4.92%	4.65%	4.19%	3.95%	3.75%	3.66%		
Days Remaining in 2006	[B]	30	60	25						115	4.99%
Days Remaining in 2007	[C]			65	185	115				365	4.55%
Days Remaining in 2008	[D]					250	115			365	4.12%
Days Remaining in 2009	[E]						250	115		365	3.89%
Days Remaining in 2010	[F]							365		365	3.75%
Days Remaining in 2011	[G]							250	115	365	3.72%
Total Days	[H]	30	60	90	185	365	365	730	115	1940	
Implicit Short-Term Rate for 2007-2010	[I]									1460	4.08%
Implicit Short-Term Rate for 2007-2011	[J]									1825	4.01%

Sources and Notes:

[A]: Workpaper # 2 to Table No. MJV-9 Panel A, [C].

[B] - [G]: Total number of days remaining for each period, beginning with August 23, 2006.

[H]: Sum of [B] through [G] for the respective period.

[10]: [(1+ Implied Short-Term Yield$_1$)^(days remaining in period$_1$)x...x(1+Implied Short-Term Yield$_n$)^(days remaining in period$_n$)]^(1/[9])-1.

This formula is applied to all periods from 1 to n in each year.

[I]: ((1+[10][C])^[9][C]x...x(1+10[F])^[9][F]))^(1/[9][I])-1.

[J]: ((1+[10][C])^[9][C]x...x(1+10[G])^[9][G]))^(1/[9][J])-1.

Workpaper #3 to Table No. MJV-9

2006 Water Sample

Panel A: Historical Bond Yield Averages

	Treasury Bill Yield [1]	Intermediate-Term Government Bond Yield [2]	Long-Term Government Bond Yield [3]	Long-Term Corporate Bonds (Total Return) [4]
1926	3.27%	3.61%	3.54%	7.37%
1927	3.12%	3.40%	3.17%	7.44%
1928	3.56%	4.01%	3.40%	2.84%
1929	4.75%	3.62%	3.40%	3.27%
1930	2.41%	2.91%	3.30%	7.98%
1931	1.07%	4.12%	4.07%	-1.85%
1932	0.96%	3.04%	3.15%	10.82%
1933	0.30%	3.25%	3.36%	10.38%
1934	0.16%	2.49%	2.93%	13.84%
1935	0.17%	1.63%	2.76%	9.61%
1936	0.18%	1.29%	2.55%	6.74%
1937	0.31%	1.14%	2.73%	2.75%
1938	-0.02%	1.52%	2.52%	6.13%
1939	0.02%	0.98%	2.26%	3.97%
1940	0.00%	0.57%	1.94%	3.39%
1941	0.06%	0.82%	2.04%	2.73%
1942	0.27%	0.72%	2.46%	2.60%
1943	0.35%	1.45%	2.48%	2.83%
1944	0.33%	1.40%	2.46%	4.73%
1945	0.33%	1.03%	1.99%	4.08%
1946	0.35%	1.12%	2.12%	1.72%
1947	0.50%	1.34%	2.43%	-2.34%
1948	0.81%	1.51%	2.37%	4.14%
1949	1.10%	1.23%	2.09%	3.31%
1950	1.20%	1.62%	2.24%	2.12%
1951	1.49%	2.17%	2.69%	-2.69%
1952	1.66%	2.35%	2.79%	3.52%
1953	1.82%	2.18%	2.74%	3.41%
1954	0.86%	1.72%	2.72%	5.39%
1955	1.57%	2.80%	2.95%	0.48%
1956	2.46%	3.63%	3.45%	-6.81%
1957	3.14%	2.84%	3.23%	8.71%
1958	1.54%	3.81%	3.82%	-2.22%
1959	2.95%	4.98%	4.47%	-0.97%
1960	2.66%	3.31%	3.80%	9.07%
1961	2.13%	3.84%	4.15%	4.82%
1962	2.73%	3.50%	3.95%	7.95%
1963	3.12%	4.04%	4.17%	2.19%
1964	3.54%	4.03%	4.23%	4.77%
1965	3.93%	4.90%	4.50%	-0.46%
1966	4.76%	4.79%	4.55%	0.20%
1967	4.21%	5.77%	5.56%	-4.95%
1968	5.21%	5.96%	5.98%	2.57%
1969	6.58%	8.29%	6.87%	-8.09%
1970	6.52%	5.90%	6.48%	18.37%
1971	4.39%	5.25%	5.97%	11.01%
1972	3.84%	5.85%	5.99%	7.26%
1973	6.93%	6.79%	7.26%	1.14%
1974	8.00%	7.12%	7.60%	-3.06%
1975	5.80%	7.19%	8.05%	14.64%
1976	5.08%	6.00%	7.21%	18.65%
1977	5.12%	7.51%	8.03%	1.71%
1978	7.18%	8.83%	8.98%	-0.07%
1979	10.38%	10.33%	10.12%	-4.18%
1980	11.24%	12.45%	11.99%	-2.62%
1981	14.71%	13.96%	13.34%	-0.96%
1982	10.54%	9.90%	10.95%	43.79%
1983	8.80%	11.41%	11.97%	4.70%
1984	9.85%	11.04%	11.70%	16.39%
1985	7.72%	8.55%	9.56%	30.90%
1986	6.16%	6.85%	7.89%	19.85%
1987	5.47%	8.32%	9.20%	-0.27%
1988	6.35%	9.17%	9.19%	10.70%
1989	8.37%	7.94%	8.16%	16.23%
1990	7.81%	7.70%	8.44%	6.78%
1991	5.60%	5.97%	7.30%	19.89%
1992	3.51%	6.11%	7.26%	9.39%
1993	2.90%	5.22%	6.54%	13.19%
1994	3.90%	7.80%	7.99%	-5.76%
1995	5.60%	5.38%	6.03%	27.20%
1996	5.21%	6.16%	6.73%	1.40%
1997	5.26%	5.73%	6.02%	12.95%
1998	4.86%	4.68%	5.42%	10.76%
1999	4.68%	6.45%	6.82%	-7.45%
2000	5.89%	5.07%	5.58%	12.87%
2001	3.83%	4.42%	5.75%	10.65%
2002	1.65%	2.61%	4.84%	16.33%
2003	1.02%	2.97%	5.11%	5.27%
2004	1.20%	3.47%	4.84%	8.72%
2005	2.98%	4.34%	4.61%	5.87%

Sources and Notes:

[1] - [4]: Ibbotson Associates Stocks Bonds Bills (SBBI) and Inflation monthly paper reports.

Workpaper #3 to Table No. MJV-9

2006 Water Sample

Panel B: Calculation of Maturity Premia for Different Bond Series

	Annual Historical Average			Maturity Premium Calculation		
	T-Bill Total Return [1]	Intermediate Term Bond Yields [2]	Long-Term Government Bond Yield [3]	T-Bill Total Return [4]	Intermediate Term Bond Yields [5]	Long-Term Government Bond Yield [6]
1926 - 2005	3.75%	4.74%	5.29%	0.00%	0.99%	1.54%
1947 - 2005	4.72%	5.68%	6.18%	0.00%	0.96%	1.46%
1947 - 1966	2.20%	3.03%	3.37%	0.00%	0.83%	1.17%
1967 - 1986	7.41%	8.25%	8.57%	0.00%	0.83%	1.16%
1987 - 2005	4.53%	5.76%	6.62%	0.00%	1.23%	2.09%
Current	5.16%	4.84%	5.10%	0.00%	-0.31%	-0.05%

Sources and Notes:

[1] - [3] : Workpaper #3 to Table No. MJV-9, Panel A.

Maturity Premium is defined as the Average Bond Yield (for each series) less Risk Free Total Return.

[4]: [1] - [1].

[5]: [2] - [1].

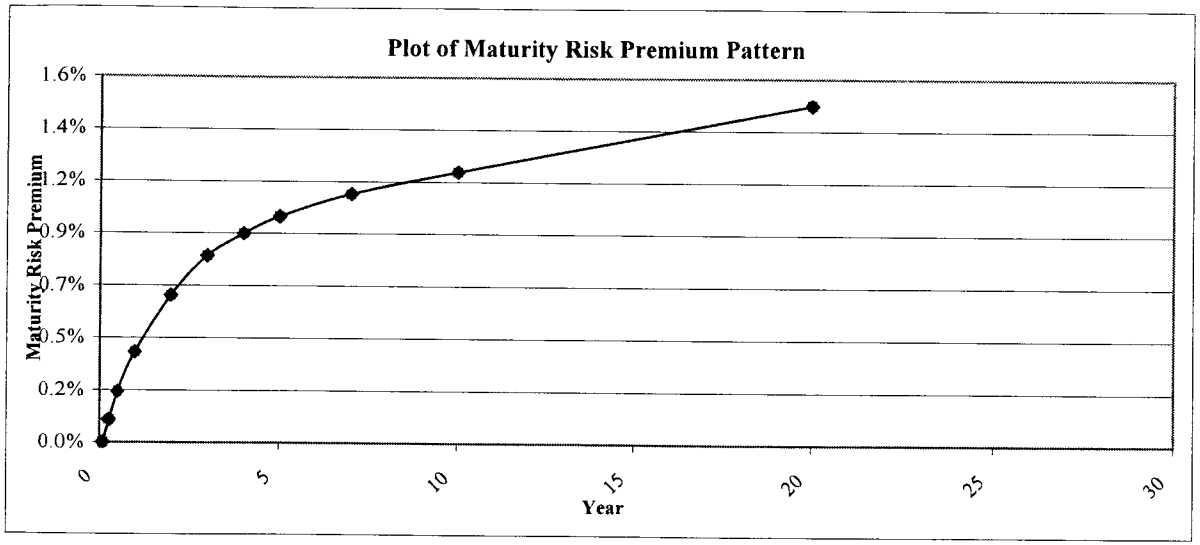
[6]: [3] - [1].

Current data from Workpaper #2 to Table No. MJV-9.

Workpaper #3 to Table No. MJV-9

2006 Water Sample

Panel C: Maturity Premium Graph and Calculations (Using Annual Series Data)



Maturity of Bond (Years) [1]	Maturity Risk Premium [2]	Annualized Difference [3]
0.083	0.00%	
0.25	0.10%	0.60%
0.5	0.23%	0.50%
1	0.40%	0.35%
2	0.65%	0.25%
3	0.83%	0.18%
4	0.93%	0.10%
5	1.00%	0.08%
7	1.10%	0.05%
10	1.20%	0.03%
20	1.50%	0.03%

Sources and Notes:

[1]: The maturity of a bond in years.

[2]: Workpaper #3 to Table No. MJV-9, Panel B; [4] - [6] and MJV Testimony.

[3]: MJV Testimony.

Table No. MJV-10

Overall After-Tax Risk Positioning Cost of Capital of the 2006 Water Sample

Panel A: CAPM Cost of Equity Based on Unadjusted Value Line Betas and a Long-Term Risk-Free Rate

Company		CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Corporate Tax Rate [7]	Weighted-Average Cost of Preferred Equity [3]	Overall After- Tax Cost of Capital [8]
American States Water Co	*	8.9%	0.60	0.00	6.4%	0.40	39.2%	6.3%	6.9%
California Water Service Gp	*	9.4%	0.65	0.00	6.3%	0.34	39.2%	6.2%	7.5%
Connecticut Water Svc Inc	*	9.4%	0.74	0.00	6.4%	0.26	39.2%	6.3%	8.0%
Middlesex Water Co	*	9.4%	0.62	0.01	6.4%	0.36	39.2%	6.3%	7.3%
Aqua America Inc	*	9.4%	0.72	0.00	6.4%	0.28	39.2%	6.3%	7.8%
SJW Corp	*	8.4%	0.70	-	6.4%	0.30	39.2%	-	7.0%
Southwest Water Co		8.4%	0.67	0.00	6.4%	0.33	39.2%	6.3%	6.9%
York Water Co	*	6.0%	0.65	-	6.4%	0.35	39.2%	-	5.2%
Average [a]		9.0%	67.2%	0.4%	6.4%	32.5%	39.2%	6.2%	7.3%
Average [b]		9.1%	67.2%	0.4%	6.4%	32.4%	39.2%	6.2%	7.4%

Sources and Notes:

[1]: Table No. MJV-9; Panel A, [4].
[2]: Table No. MJV-4, [4].
[3]: Table No. MJV-4, [5].
[4]: Workpaper #2 to Table No. MJV-10 ; Panel A, [6].
[5]: Table No. MJV-4, [6].
[6]: Tax Rate provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-10 ; Panel B, [6].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average for all companies whose cost of equity exceeds their cost of debt by at least 25 basis points.
[b]: Average for companies with an asterisk.
* Represents companies that have revenues from regulated activities greater than 75%.

Table No. MJV-10

Overall After-Tax Risk Positioning Cost of Capital of the 2006 Water Sample

Panel B: ECAPM (0.5%) Cost of Equity Based on Unadjusted Value Line Betas and a Long-Term Risk-Free Rate

Company		ECAPM (0.5%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Corporate Tax Rate [7]	Weighted-Average Cost of Preferred Equity [3]	Overall After- Tax Cost of Capital [8]
American States Water Co	*	9.1%	0.60	0.00	6.4%	0.40	39.2%	6.3%	7.0%
California Water Service Gp	*	9.5%	0.65	0.00	6.3%	0.34	39.2%	6.2%	7.6%
Connecticut Water Svc Inc	*	9.5%	0.74	0.00	6.4%	0.26	39.2%	6.3%	8.1%
Middlesex Water Co	*	9.5%	0.62	0.01	6.4%	0.36	39.2%	6.3%	7.4%
Aqua America Inc	*	9.5%	0.72	0.00	6.4%	0.28	39.2%	6.3%	7.9%
SJW Corp	*	8.6%	0.70	-	6.4%	0.30	39.2%	-	7.2%
Southwest Water Co		8.6%	0.67	0.00	6.4%	0.33	39.2%	6.3%	7.1%
York Water Co	*	6.4%	0.65	-	6.4%	0.35	39.2%	-	5.5%
Average [a]		8.9%	0.67	0.00	6.4%	0.33	39.2%	6.2%	7.5%
Average [b]		8.9%	0.67	0.00	6.4%	0.33	39.2%	6.2%	7.5%

Sources and Notes:
[1]: Table No. MJV-9; Panel A, [5].
[2]: Table No. MJV-4, [4].
[3]: Table No. MJV-4, [5].
[4]: Workpaper #2 to Table No. MJV-10 ; Panel A, [6].
[5]: Table No. MJV-4, [6].
[6]: Tax Rate provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-10 ; Panel B, [6].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average for all companies whose cost of equity exceeds their cost of debt by at least 25 basis points.
[b]: Average for companies with an asterisk.
* Represents companies that have revenues from regulated activities greater than 75%.

Table No. MJV-10

Overall After-Tax Risk Positioning Cost of Capital of the 2006 Water Sample

Panel C: ECAPM (1.5%) Cost of Equity Based on Unadjusted Value Line Betas and a Long-Term Risk-Free Rate

Company		ECAPM (1.5%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Corporate Tax Rate [7]	Weighted-Average Cost of Preferred Equity [3]	Overall After- Tax Cost of Capital [8]
American States Water Co	*	9.5%	0.60	0.00	6.4%	0.40	39.2%	6.3%	7.2%
California Water Service Gp	*	9.9%	0.65	0.00	6.3%	0.34	39.2%	6.2%	7.8%
Connecticut Water Svc Inc	*	9.9%	0.74	0.00	6.4%	0.26	39.2%	6.3%	8.3%
Middlesex Water Co	*	9.9%	0.62	0.01	6.4%	0.36	39.2%	6.3%	7.6%
Aqua America Inc	*	9.9%	0.72	0.00	6.4%	0.28	39.2%	6.3%	8.2%
SJW Corp	*	9.1%	0.70	-	6.4%	0.30	39.2%	-	7.5%
Southwest Water Co		9.1%	0.67	0.00	6.4%	0.33	39.2%	6.3%	7.4%
York Water Co	*	7.2%	0.65	-	6.4%	0.35	39.2%	-	6.1%
Average [a]		9.3%	0.67	0.00	6.4%	0.33	39.2%	6.2%	7.7%
Average [b]		9.3%	0.67	0.00	6.4%	0.33	39.2%	6.2%	7.8%

Sources and Notes:

[1]: Table No. MJV-9; Panel A, [6].
[2]: Table No. MJV-4, [4].
[3]: Table No. MJV-4, [5].
[4]: Workpaper #2 to Table No. MJV-10 ; Panel A, [6].
[5]: Table No. MJV-4, [6].
[6]: Tax Rate provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-10 ; Panel B, [6].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average for all companies whose cost of equity exceeds their cost of debt by at least 25 basis points.
[b]: Average for companies with an asterisk.
* Represents companies that have revenues from regulated activities greater than 75%.

Table No. MJV-10

Overall After-Tax Risk Positioning Cost of Capital of the 2006 Water Sample

Panel D: CAPM Cost of Equity Based on Unadjusted Value Line Betas and a Short-Term Risk-Free Rate

Company		CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Corporate Tax Rate [7]	Weighted-Average Cost of Preferred Equity [3]	Overall After- Tax Cost of Capital [8]
American States Water Co	*	8.9%	0.60	0.00	6.4%	0.40	39.2%	6.3%	6.9%
California Water Service Gp	*	9.5%	0.65	0.00	6.3%	0.34	39.2%	6.2%	7.5%
Connecticut Water Svc Inc	*	9.5%	0.74	0.00	6.4%	0.26	39.2%	6.3%	8.0%
Middlesex Water Co	*	9.5%	0.62	0.01	6.4%	0.36	39.2%	6.3%	7.4%
Aqua America Inc	*	9.5%	0.72	0.00	6.4%	0.28	39.2%	6.3%	7.9%
SJW Corp	*	8.3%	0.70	-	6.4%	0.30	39.2%	-	7.0%
Southwest Water Co		8.3%	0.67	0.00	6.4%	0.33	39.2%	6.3%	6.8%
York Water Co	*	5.3%	0.65	-	6.4%	0.35	39.2%	-	4.8%
Average [a]		9.0%	67.2%	0.4%	6.4%	32.5%	39.2%	6.2%	7.4%
Average [b]		9.2%	67.2%	0.4%	6.4%	32.4%	39.2%	6.2%	7.4%

Sources and Notes:

[1]: Table No. MJV-9; Panel B, [4].
[2]: Table No. MJV-4, [4].
[3]: Table No. MJV-4, [5].
[4]: Workpaper #2 to Table No. MJV-10 ; Panel A, [6].
[5]: Table No. MJV-4, [6].
[6]: Tax Rate provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-10 ; Panel B, [6].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average for all companies whose cost of equity exceeds their cost of debt by at least 25 basis points.
[b]: Average for companies with an asterisk.
* Represents companies that have revenues from regulated activities greater than 75%.

Table No. MJV-10

Overall After-Tax Risk Positioning Cost of Capital of the 2006 Water Sample

Panel E: ECAPM (1%) Cost of Equity Based on Unadjusted Value Line Betas and a Short-Term Risk-Free Rate

Company		ECAPM (1%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Corporate Tax Rate [7]	Weighted-Average Cost of Preferred Equity [3]	Overall After- Tax Cost of Capital [8]
American States Water Co	*	9.3%	0.60	0.00	6.4%	0.40	39.2%	6.3%	7.1%
California Water Service Gp	*	9.8%	0.65	0.00	6.3%	0.34	39.2%	6.2%	7.8%
Connecticut Water Svc Inc	*	9.8%	0.74	0.00	6.4%	0.26	39.2%	6.3%	8.3%
Middlesex Water Co	*	9.8%	0.62	0.01	6.4%	0.36	39.2%	6.3%	7.6%
Aqua America Inc	*	9.8%	0.72	0.00	6.4%	0.28	39.2%	6.3%	8.1%
SJW Corp	*	8.8%	0.70	-	6.4%	0.30	39.2%	-	7.3%
Southwest Water Co		8.8%	0.67	0.00	6.4%	0.33	39.2%	6.3%	7.1%
York Water Co	*	6.1%	0.65	-	6.4%	0.35	39.2%	-	5.4%
Average [a]		9.0%	0.67	0.00	6.4%	0.33	39.2%	6.2%	7.6%
Average [b]		9.1%	0.67	0.00	6.4%	0.33	39.2%	6.2%	7.7%

Sources and Notes:
[1]: Table No. MJV-9; Panel B, [5].
[2]: Table No. MJV-4, [4].
[3]: Table No. MJV-4, [5].
[4]: Workpaper #2 to Table No. MJV-10 ; Panel A, [6].
[5]: Table No. MJV-4, [6].
[6]: Tax Rate provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-10 ; Panel B, [6].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average for all companies whose cost of equity exceeds their cost of debt by at least 25 basis points.
[b]: Average for companies with an asterisk.
* Represents companies that have revenues from regulated activities greater than 75%.

Table No. MJV-10

Overall After-Tax Risk Positioning Cost of Capital of the 2006 Water Sample

Panel F: ECAPM (2%) Cost of Equity Based on Unadjusted Value Line Betas and a Short-Term Risk-Free Rate

Company		ECAPM (2%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Corporate Tax Rate [7]	Weighted-Average Cost of Preferred Equity [3]	Overall After- Tax Cost of Capital [8]
American States Water Co	*	9.7%	0.60	0.00	6.4%	0.40	39.2%	6.3%	7.3%
California Water Service Gp	*	10.1%	0.65	0.00	6.3%	0.34	39.2%	6.2%	8.0%
Connecticut Water Svc Inc	*	10.1%	0.74	0.00	6.4%	0.26	39.2%	6.3%	8.5%
Middlesex Water Co	*	10.1%	0.62	0.01	6.4%	0.36	39.2%	6.3%	7.8%
Aqua America Inc	*	10.1%	0.72	0.00	6.4%	0.28	39.2%	6.3%	8.4%
SJW Corp	*	9.2%	0.70	-	6.4%	0.30	39.2%	-	7.6%
Southwest Water Co		9.2%	0.67	0.00	6.4%	0.33	39.2%	6.3%	7.5%
York Water Co	*	7.0%	0.65	-	6.4%	0.35	39.2%	-	5.9%
Average [a]		9.5%	0.67	0.00	6.4%	0.33	39.2%	6.2%	7.9%
Average [b]		9.5%	0.67	0.00	6.4%	0.33	39.2%	6.2%	7.9%

Sources and Notes:

[1]: Table No. MJV-9; Panel B, [6].
[2]: Table No. MJV-4, [4].
[3]: Table No. MJV-4, [5].
[4]: Workpaper #2 to Table No. MJV-10 ; Panel A, [6].
[5]: Table No. MJV-4, [6].
[6]: Tax Rate provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-10 ; Panel B, [6].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average for all companies whose cost of equity exceeds their cost of debt by at least 25 basis points.
[b]: Average for companies with an asterisk.
* Represents companies that have revenues from regulated activities greater than 75%.

Table No. MJV-10

Overall After-Tax Risk Positioning Cost of Capital of the 2006 Water Sample

Panel G: ECAPM (3%) Cost of Equity Based on Unadjusted Value Line Betas and a Short-Term Risk-Free Rate

Company		ECAPM (3%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted - Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	Corporate Tax Rate [7]	Weighted-Average Cost of Preferred Equity [3]	Overall After- Tax Cost of Capital [8]
American States Water Co	*	10.1%	0.60	0.00	6.4%	0.40	39.2%	6.3%	7.6%
California Water Service Gp	*	10.5%	0.65	0.00	6.3%	0.34	39.2%	6.2%	8.2%
Connecticut Water Svc Inc	*	10.5%	0.74	0.00	6.4%	0.26	39.2%	6.3%	8.8%
Middlesex Water Co	*	10.5%	0.62	0.01	6.4%	0.36	39.2%	6.3%	8.0%
Aqua America Inc	*	10.5%	0.72	0.00	6.4%	0.28	39.2%	6.3%	8.6%
SJW Corp	*	9.7%	0.70	-	6.4%	0.30	39.2%	-	8.0%
Southwest Water Co		9.7%	0.67	0.00	6.4%	0.33	39.2%	6.3%	7.8%
York Water Co	*	7.8%	0.65	-	6.4%	0.35	39.2%	-	6.5%
Average [a]		9.9%	0.67	0.00	6.4%	0.33	39.2%	6.2%	8.1%
Average [b]		9.9%	0.67	0.00	6.4%	0.33	39.2%	6.2%	8.2%

Sources and Notes:
[1]: Table No. MJV-9; Panel B, [7].
[2]: Table No. MJV-4, [4].
[3]: Table No. MJV-4, [5].
[4]: Workpaper #2 to Table No. MJV-10 ; Panel A, [6].
[5]: Table No. MJV-4, [6].
[6]: Tax Rate provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-10 ; Panel B, [6].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

[a]: Average for all companies whose cost of equity exceeds their cost of debt by at least 25 basis points.
[b]: Average for companies with an asterisk.
* Represents companies that have revenues from regulated activities greater than 75%.

Workpaper #1 to Table No. MJV-10

2006 Water Sample

Panel A: Bond Rating Summary, 2nd Quarter, 2001 to 2nd Quarter, 2006

Company	2nd Quarter, 2006 [1]	2005 [2]	2004 [3]	2003 [4]	2002 [5]	2001 [6]
American States Water Co	A	A	A	A	A	A
California Water Service Gp	A	A	A	A	A	AA
Connecticut Water Svc Inc	A	A	A	A	*A*	*A*
Middlesex Water Co	A	A	A	A	A	A
Aqua America Inc	*A*	*A*	*A*	*A*	*A*	*A*
SJW Corp	*A*	*A*	*A*	*A*	*A*	*A*
Southwest Water Co	*A*	*A*	*A*	*A*	*A*	*A*
York Water Co	A	A	A	*A*	*A*	*A*

Sources and Notes:

[1] - [6]: Compustat as of September 11, 2006.

Entries in italics are interpolated from surrounding entries or assumed.

CompuStat does not report bond ratings for Connecticut Water Services Inc. for 2002. It is assumed to be A.

The bond rating for Aqua America was obtained from www.standardandpoors.com as of May 2006. It is the credit rating for the subsidiary Aqua Pennsylvania from January 2002 onward.

CompuStat does not report bond ratings for SJW Corp. and Southwest Water Co. It is assumed to be A.

CompuStat does not report bond ratings for York Water Co. from 2002 to 2003. It is assumed to be A.

Workpaper #1 to Table No. MJV-10

2006 Water Sample

Panel B: Preferred Equity Rating Summary, 2nd Quarter, 2001 to 2nd Quarter, 2006

Company	2nd Quarter, 2006 [1]	2005 [2]	2004 [3]	2003 [4]	2002 [5]	2001 [6]
American States Water Co	-	-	-	-	-	A
California Water Service Gp	A	A	A	A	A	AA
Connecticut Water Svc Inc	A	A	A	A	A	A
Middlesex Water Co	A	A	A	A	A	A
Aqua America Inc	-	-	-	-	A	A
SJW Corp	-	-	-	-	-	-
Southwest Water Co	A	A	A	A	A	A
York Water Co	-	-	-	-	-	-

Sources and Notes:

[1] - [6]: Preferred equity ratings are assumed equal to the company's bond rating reported in Workpaper #1 to Table No. MJV-10, Panel A.

Workpaper #2 to Table No. MJV-10

2006 Water Sample

Panel A: Bond Yield Summary, 2nd Quarter, 2001 to 2nd Quarter, 2006

Company	2nd Quarter, 2006 [1]	2005 [2]	2004 [3]	2003 [4]	2002 [5]	2001 [6]	5-Year Average [7]
American States Water Co	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%
California Water Service Gp	6.37%	6.37%	6.37%	6.37%	6.37%	6.13%	6.35%
Connecticut Water Svc Inc	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%
Middlesex Water Co	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%
Aqua America Inc	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%
SJW Corp	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%
Southwest Water Co	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%
York Water Co	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%	6.37%

Sources and Notes:

[1] - [6]: Ratings are based on Workpaper #1 to Table No. MJV-10, Panel A, and bond yields are from Mergent Bond Record, August 2006.

[7]: ([1] x 0.50 + [2] + [3] + [4] + [5] + [6] x 0.50) / 5

Workpaper #2 to Table No. MJV-10

2006 Water Sample

Panel B: Preferred EquityYield Summary, 2001 to 2nd Quarter, 2006

Company	2nd Quarter, 2006 [1]	2005 [2]	2004 [3]	2003 [4]	2002 [5]	2001 [6]	5-Year Average [7]
American States Water Co	-	-	-	-	-	6.25%	6.25%
California Water Service Gp	6.25%	6.25%	6.25%	6.25%	6.25%	6.17%	6.24%
Connecticut Water Svc Inc	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%
Middlesex Water Co	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%
Aqua America Inc	-	-	-	-	6.25%	6.25%	6.25%
SJW Corp	-	-	-	-	-	-	-
Southwest Water Co	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%
York Water Co	-	-	-	-	-	-	-

Sources and Notes:

[1] - [6]: Ratings based on Workpaper #1 to Table No. MJV-10, Panel B and yields from Mergent Bond Record, August 2006.

The report does not publish yield data for AA-rated preferred equity. Therefore, we assumed:

Yield on AA-rated preferred equity = Yield on A-rated bond - {(1/2) x (Yield on BBB-rated bond - Yield on A-rated bond)}.

[7]: ([1] x 0.50 + [2] + [3] + [4] + [5] + [6] x 0.50) / 5

Table No. MJV-11

Risk Positioning Cost of Equity at Tennessee American Water's Capital Structure

Panel A: 2006 Water Sample
Using All Companies

	Overall Cost of Capital [1]	Tennessee American Water's Regulatory % Debt [2]	Tennessee American Water's Cost of Debt [3]	Corporate Tax Rate [4]	Tennessee American Water's Regulatory % Preferred Equity [5]	Tennessee American Water's Cost of Preferred Equity [6]	Tennessee American Water's Regulatory % Equity [7]	Estimated Return on Equity [8]
Using Long-Term Risk-Free Rates:								
CAPM using Unadjusted Value Line Betas	7.3%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.8%
ECAPM (0.5 %) using Unadjusted Value Line Betas	7.5%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.1%
ECAPM (1.5%) using Unadjusted Value Line Betas	7.7%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.6%
Using Short-Term Risk-Free Rates:								
CAPM using Unadjusted Value Line Betas	7.4%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.8%
ECAPM (1%) using Unadjusted Value Line Betas	7.6%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.4%
ECAPM (2%) using Unadjusted Value Line Betas	7.9%	0.55	6.4%	39.2%	0.01	6.3%	0.43	13.0%
ECAPM (3%) using Unadjusted Value Line Betas	8.1%	0.55	6.4%	39.2%	0.01	6.3%	0.43	13.6%

Sources and Notes:
[1]: Table No. MJV-10; Panels A - G, [8].
[2]: Provided by Tennessee American Water.
[3]: Mergent Bond Record, August 2006. Based on an A rating.
[4]: Tax Rate provided by Tennessee American Water.
[5]: Provided by Tennessee American Water.
[6]: Mergent Bond Record, August 2006. Based on an A rating.
[7]: Provided by Tennessee American Water.
[8]: {[1] - ([2] x [3] x (1 - [4]) + [6] x [7])} / [5].

Table No. MJV-11

Risk Positioning Cost of Equity at Tennessee American Water's Capital Structure

Panel B: 2006 Water Sample

Using Companies with 2005 Revenues from Regulated Activities Greater Than 75%.

	Overall Cost of Capital [1]	Tennessee American Water's Regulatory % Debt [2]	Tennessee American Water's Cost of Debt [3]	Corporate Tax Rate [4]	Tennessee American Water's Regulatory % Preferred Equity [5]	Tennessee American Water's Cost of Preferred Equity [6]	Tennessee American Water's Regulatory % Equity [7]	Estimated Return on Equity [8]
Using Long-Term Risk-Free Rates:								
CAPM using Unadjusted Value Line Betas	7.4%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.9%
ECAPM (0.5 %) using Unadjusted Value Line Betas	7.5%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.2%
ECAPM (1.5%) using Unadjusted Value Line Betas	7.8%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.8%
Using Short-Term Risk-Free Rates:								
CAPM using Unadjusted Value Line Betas	7.4%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.0%
ECAPM (1%) using Unadjusted Value Line Betas	7.7%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.6%
ECAPM (2%) using Unadjusted Value Line Betas	7.9%	0.55	6.4%	39.2%	0.01	6.3%	0.43	13.1%
ECAPM (3%) using Unadjusted Value Line Betas	8.2%	0.55	6.4%	39.2%	0.01	6.3%	0.43	13.7%

Sources and Notes:

[1]: Table No. MJV-10; Panels A - G, [8].

[2]: Provided by Tennessee American Water.

[3]: Mergent Bond Record, August 2006. Based on an A rating.

[4]: Tax Rate provided by Tennessee American Water.

[5]: Provided by Tennessee American Water.

[6]: Mergent Bond Record, August 2006. Based on an A rating.

[7]: Provided by Tennessee American Water.

[8]: {[1] - ([2] x [3] x (1 - [4]) + [6] x [7])} / [5].

Table No. MJV-12

2006 US LDC Sample

Percentage of Revenue from Regulated Activities in 2005 (MM)

Company	Regulated Segment Description [1]	Revenues from Regulated Actvities [2]	Revenues from Unregulated Actvities [3]	Total Revenues [4]	Percentage from Regulated Activities [5]
Laclede Group Inc	Gas Distribution	$ 978.19	$ 618.84	$ 1,597.03	61.25%
Northwest Natural Gas Co †	Gas Distribution	$ 887.00	$ 23.49	$ 910.49	97.42%
South Jersey Industries Inc †	Gas Distribution	$ 576.40	$ 344.58	$ 920.98	62.59%
Southwest Gas Corp	Gas Distribution	$ 1,455.30	$ 258.98	$ 1,714.28	84.89%
WGL Holdings Inc	Gas Distribution	$ 1,379.40	$ 806.90	$ 2,186.30	63.09%
Average				$ 1,465.82	73.85%

Sources and Notes:

[1], [2] and [4]: Company Form 10-K's, Annual Reports for 2005 and CompuStat.

[3]: [4] - [2].

[5]: [2] / [4].

† In addition to the Revenues from Regulated Activities listed above, Northwest Natural Gas has revenues from Interstate Gas Storage which may be regulated. South Jersey Industries has some revnues from gas transportation services which may be regulated.

Table No. MJV-13

Market Value of the 2006 US LDC Sample

Panel A: Laclede Group Inc

(MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$407	$407	$393	$369	$309	$295	$289	[a]
Shares Outstanding (in millions) - Common	21	21	21	21	19	19	19	[b]
Price per Share - Common	$32.21	$33.60	$29.49	$31.19	$29.32	$24.20	$23.78	[c]
Market Value of Common Equity	$682	$711	$627	$656	$561	$459	$449	[d] = [b] x [c].
Market to Book Value of Common Equity	1.68	1.75	1.60	1.78	1.81	1.55	1.55	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$1	$1	$1	$1	$1	$1	$1	[f]
Market Value of Preferred Equity	$1	$1	$1	$1	$1	$1	$1	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$351	$351	$635	$465	$378	$300	$242	[h]
Current Liabilities	$305	$305	$631	$401	$455	$360	$262	[i]
Current Portion of Long-Term Debt	$40	$40	$40	$25	$0	$25	$0	[j]
Net Working Capital	$87	$87	$44	$89	($77)	($35)	($19)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$71	$71	$71	$71	$218	$162	$117	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$77	$35	$19	[m] = See Sources and Notes.
Long-Term Debt	$395	$395	$340	$380	$280	$305	$284	[n]
Book Value of Long-Term Debt	$435	$435	$381	$406	$280	$330	$284	[o] = [n] + [j].
Market Value of Long-Term Debt	$435	$435	$381	$406	$280	$330	$284	[p] = [o].
Market Value of Debt	$435	$435	$381	$406	$357	$365	$304	[q] = [p] + [m].
MARKET VALUE OF FIRM								
	$1,118	$1,148	$1,008	$1,062	$919	$825	$754	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	60.99%	61.99%	62.16%	61.73%	61.01%	55.64%	59.53%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	0.07%	0.07%	0.09%	0.10%	0.14%	0.15%	0.17%	[t] = [g] / [r].
Debt - Market Value Ratio	38.94%	37.94%	37.75%	38.17%	38.86%	44.21%	40.30%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Capital structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using 2nd Quarter, 2006 balance sheet information and a 15-trading day average closing price ending on 9/8/2006.

Prices are reported in Workpaper #1 to Table No. MJV-16.

For 2nd Quarter of 2006, Current Portion of Long-Term Debt and Notes Payable data was not available for 2nd Quarter, 2006. This data was assumed equal to the previous year end.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-13

Market Value of the 2006 US LDC Sample

Panel B: Northwest Natural Gas Co

(MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$611	$611	$587	$569	$506	$483	$468	[a]
Shares Outstanding (in millions) - Common	28	28	28	28	26	26	25	[b]
Price per Share - Common	$38.02	$36.05	$34.54	$33.68	$31.01	$27.18	$25.79	[c]
Market Value of Common Equity	$1,047	$993	$952	$928	$804	$695	$651	[d] = [b] x [c].
Market to Book Value of Common Equity	1.71	1.63	1.62	1.63	1.59	1.44	1.39	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$8	$34	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$8	$34	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$198	$198	$324	$237	$200	$194	$210	[h]
Current Liabilities	$215	$215	$327	$267	$214	$205	$274	[i]
Current Portion of Long-Term Debt	$8	$8	$8	$15	$0	$20	$40	[j]
Net Working Capital	($9)	($9)	$5	($15)	($15)	$9	($23)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$127	$127	$127	$103	$85	$70	$108	[l]
Adjusted Short-Term Debt	$9	$9	$0	$15	$15	$0	$23	[m] = See Sources and Notes.
Long-Term Debt	$492	$492	$522	$484	$500	$446	$378	[n]
Book Value of Long-Term Debt	$500	$500	$530	$499	$500	$466	$418	[o] = [n] + [j].
Market Value of Long-Term Debt	$500	$500	$530	$499	$500	$466	$418	[p] = [o].
Market Value of Debt	$509	$509	$530	$514	$515	$466	$442	[q] = [p] + [m].
MARKET VALUE OF FIRM	$1,556	$1,502	$1,482	$1,442	$1,319	$1,170	$1,126	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	67.30%	66.11%	64.27%	64.34%	60.95%	59.46%	57.77%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	0.71%	3.02%	[t] = [g] / [r].
Debt - Market Value Ratio	32.70%	33.89%	35.73%	35.66%	39.05%	39.84%	39.21%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Capital structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using 2nd Quarter, 2006 balance sheet information and a 15-trading day average closing price ending on 9/8/2006.

Prices are reported in Workpaper #1 to Table No. MJV-16.

For 2nd Quarter of 2006, Current Portion of Long-Term Debt and Notes Payable data was not available for 2nd Quarter, 2006. This data was assumed equal to the previous year end.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-13

Market Value of the 2006 US LDC Sample

Panel C: South Jersey Industries Inc

(MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$424	$424	$391	$344	$298	$238	$220	[a]
Shares Outstanding (in millions) - Common	29	29	29	28	26	24	24	[b]
Price per Share - Common	$28.77	$27.14	$29.46	$26.23	$20.21	$16.53	$16.54	[c]
Market Value of Common Equity	$839	$792	$854	$728	$535	$404	$392	[d] = [b] x [c].
Market to Book Value of Common Equity	1.98	1.87	2.18	2.11	1.79	1.70	1.78	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$2	$2	$2	$2	[f]
Market Value of Preferred Equity	$0	$0	$0	$2	$2	$2	$2	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$296	$296	$357	$284	$266	$213	$222	[h]
Current Liabilities	$327	$327	$403	$285	$268	$317	$310	[i]
Current Portion of Long-Term Debt	$2	$2	$2	$5	$5	$11	$10	[j]
Net Working Capital	($29)	($29)	($43)	$4	$3	($93)	($78)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$147	$147	$147	$92	$113	$167	$152	[l]
Adjusted Short-Term Debt	$29	$29	$43	$0	$0	$93	$78	[m] = See Sources and Notes.
Long-Term Debt	$358	$358	$319	$329	$309	$273	$294	[n]
Book Value of Long-Term Debt	$360	$360	$321	$334	$314	$284	$304	[o] = [n] + [j].
Market Value of Long-Term Debt	$360	$360	$321	$334	$314	$284	$304	[p] = [o].
Market Value of Debt	$389	$389	$365	$334	$314	$377	$382	[q] = [p] + [m].
MARKET VALUE OF FIRM								
	$1,229	$1,181	$1,219	$1,064	$850	$782	$776	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	68.31%	67.04%	70.07%	68.43%	62.87%	51.59%	50.54%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	0.16%	0.20%	0.22%	0.22%	[t] = [g] / [r].
Debt - Market Value Ratio	31.69%	32.96%	29.93%	31.41%	36.93%	48.19%	49.24%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Capital structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using 2nd Quarter, 2006 balance sheet information and a 15-trading day average closing price ending on 9/8/2006.

Prices are reported in Workpaper #1 to Table No. MJV-16.

For 2nd Quarter of 2006, Current Portion of Long-Term Debt and Notes Payable data was not available for 2nd Quarter, 2006. This data was assumed equal to the previous year end.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-13

Market Value of the 2006 US LDC Sample

Panel D: Southwest Gas Corp

(MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$820	$820	$751	$706	$630	$596	$561	[a]
Shares Outstanding (in millions) - Common	41	41	39	37	34	33	32	[b]
Price per Share - Common	$33.37	$30.58	$26.50	$25.49	$22.89	$23.14	$22.69	[c]
Market Value of Common Equity	$1,358	$1,245	$1,042	$938	$784	$770	$737	[d] = [b] x [c].
Market to Book Value of Common Equity	1.66	1.52	1.39	1.33	1.24	1.29	1.31	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$319	$319	$543	$432	$281	$262	$400	[h]
Current Liabilities	$426	$426	$621	$483	$310	$313	$653	[i]
Current Portion of Long-Term Debt	$83	$83	$83	$30	$6	$9	$308	[j]
Net Working Capital	($24)	($24)	$5	($21)	($23)	($43)	$55	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$24	$24	$24	$100	$52	$53	$93	[l]
Adjusted Short-Term Debt	$24	$24	$0	$21	$23	$43	$0	[m] = See Sources and Notes.
Long-Term Debt	$1,267	$1,267	$1,325	$1,263	$1,221	$1,152	$856	[n]
Book Value of Long-Term Debt	$1,350	$1,350	$1,408	$1,293	$1,228	$1,161	$1,164	[o] = [n] + [j].
Market Value of Long-Term Debt	$1,350	$1,350	$1,408	$1,293	$1,228	$1,161	$1,164	[p] = [o].
Market Value of Debt	$1,374	$1,374	$1,408	$1,314	$1,250	$1,204	$1,164	[q] = [p] + [m].
MARKET VALUE OF FIRM								
	$2,732	$2,619	$2,450	$2,252	$2,034	$1,974	$1,901	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	49.71%	47.53%	42.54%	41.65%	38.53%	39.03%	38.78%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	-	-	-	-	-	-	-	[t] = [g] / [r].
Debt - Market Value Ratio	50.29%	52.47%	57.46%	58.35%	61.47%	60.97%	61.22%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Capital structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using 2nd Quarter, 2006 balance sheet information and a 15-trading day average closing price ending on 9/8/2006.

Prices are reported in Workpaper #1 to Table No. MJV-16.

For 2nd Quarter of 2006, Current Portion of Long-Term Debt and Notes Payable data was not available for 2nd Quarter, 2006. This data was assumed equal to the previous year end.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-13

Market Value of the 2006 US LDC Sample

Panel E: WGL Holdings Inc

(MM)

	DCF Capital Structure	2nd Quarter, 2006	Year End, 2005	Year End, 2004	Year End, 2003	Year End, 2002	Year End, 2001	Notes
MARKET VALUE OF COMMON EQUITY								
Book Value, Common Shareholder's Equity	$947	$947	$922	$881	$843	$802	$803	[a]
Shares Outstanding (in millions) - Common	49	49	49	49	49	49	49	[b]
Price per Share - Common	$30.57	$28.55	$30.18	$31.01	$28.11	$24.01	$29.22	[c]
Market Value of Common Equity	$1,491	$1,392	$1,471	$1,509	$1,367	$1,167	$1,419	[d] = [b] x [c].
Market to Book Value of Common Equity	1.57	1.47	1.60	1.71	1.62	1.45	1.77	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY								
Book Value of Preferred Equity	$28	$28	$28	$28	$28	$28	$28	[f]
Market Value of Preferred Equity	$28	$28	$28	$28	$28	$28	$28	[g] = [f].
MARKET VALUE OF DEBT								
Current Assets	$542	$542	$962	$631	$591	$513	$476	[h]
Current Liabilities	$465	$465	$992	$627	$552	$529	$422	[i]
Current Portion of Long-Term Debt	$50	$50	$50	$61	$12	$42	$48	[j]
Net Working Capital	$127	$127	$20	$65	$51	$26	$102	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$41	$41	$41	$96	$167	$91	$134	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$582	$582	$560	$574	$638	$623	$613	[n]
Book Value of Long-Term Debt	$632	$632	$611	$634	$650	$666	$661	[o] = [n] + [j].
Market Value of Long-Term Debt	$632	$632	$611	$634	$650	$666	$661	[p] = [o].
Market Value of Debt	$632	$632	$611	$634	$650	$666	$661	[q] = [p] + [m].
MARKET VALUE OF FIRM	$2,151	$2,052	$2,110	$2,172	$2,045	$1,860	$2,108	[r] = [d] + [g] + [q].
DEBT AND EQUITY TO MARKET VALUE RATIOS								
Common Equity - Market Value Ratio	69.31%	67.83%	69.73%	69.49%	66.85%	62.71%	67.30%	[s] = [d] / [r].
Preferred Equity - Market Value Ratio	1.31%	1.37%	1.34%	1.30%	1.38%	1.51%	1.34%	[t] = [g] / [r].
Debt - Market Value Ratio	29.38%	30.79%	28.94%	29.21%	31.78%	35.78%	31.36%	[u] = [q] / [r].

Sources and Notes:

Compustat as of September 11, 2006.

Capital structure from Year End, 2001 to 2nd Quarter, 2006 calculated using respective balance sheet information and 5-day average prices ending at period end.

The DCF Capital structure is calculated using 2nd Quarter, 2006 balance sheet information and a 15-trading day average closing price ending on 9/8/2006.

Prices are reported in Workpaper #1 to Table No. MJV-16.

For 2nd Quarter of 2006, Current Portion of Long-Term Debt and Notes Payable data was not available for 2nd Quarter, 2006. This data was assumed equal to the previous year end.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

Table No. MJV-14

2006 US LDC Sample

Capital Structure Summary

Company	DCF Capital Structure			5-Year Average Capital Structure		
	Common Equity - Value Ratio [1]	Preferred Equity - Value Ratio [2]	Debt - Value Ratio [3]	Common Equity - Value Ratio [4]	Preferred Equity - Value Ratio [5]	Debt - Value Ratio [6]
Laclede Group Inc	0.61	0.00	0.39	0.60	0.00	0.40
Northwest Natural Gas Co	0.67	-	0.33	0.62	0.00	0.37
South Jersey Industries Inc	0.68	-	0.32	0.62	0.00	0.38
Southwest Gas Corp	0.50	-	0.50	0.41	-	0.59
WGL Holdings Inc	0.69	0.01	0.29	0.67	0.01	0.31

Sources and Notes:
[1], [4]:Workpaper #1 to Table No. MJV-14.
[2], [5]:Workpaper #2 to Table No. MJV-14.
[3], [6]:Workpaper #3 to Table No. MJV-14.

Workpaper #1 to Table No. MJV-14

2006 US LDC Sample

Calculation of the Average Common Equity - Market Value Ratio from 2001 to 2nd Quarter, 2006

Company	DCF Capital Structure [1]	2nd Quarter, 2006 [2]	2005 [3]	2004 [4]	2003 [5]	2002 [6]	2001 [7]	5-Year Average [8]
Laclede Group Inc	0.61	0.62	0.62	0.62	0.61	0.56	0.60	0.60
Northwest Natural Gas Co	0.67	0.66	0.64	0.64	0.61	0.59	0.58	0.62
South Jersey Industries Inc	0.68	0.67	0.70	0.68	0.63	0.52	0.51	0.62
Southwest Gas Corp	0.50	0.48	0.43	0.42	0.39	0.39	0.39	0.41
WGL Holdings Inc	0.69	0.68	0.70	0.69	0.67	0.63	0.67	0.67

Sources and Notes:
[1] - [7]: Table No. MJV-13; Panels A - E, [s].
[8]: {[2] x 0.50 + [3] + [4] + [5] + [6] + [7] x 0.50}/ 5.

Workpaper #2 to Table No. MJV-14

2006 US LDC Sample

Calculation of the Average Preferred Equity - Market Value Ratio from 2001 to 2nd Quarter, 2006

Company	DCF Capital Structure [1]	2nd Quarter, 2006 [2]	2005 [3]	2004 [4]	2003 [5]	2002 [6]	2001 [7]	5-Year Average [8]
Laclede Group Inc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Northwest Natural Gas Co	-	-	-	-	-	0.01	0.03	0.00
South Jersey Industries Inc	-	-	-	0.00	0.00	0.00	0.00	0.00
Southwest Gas Corp	-	-	-	-	-	-	-	-
WGL Holdings Inc	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01

Sources and Notes:
[1] - [7]: Table No. MJV-13; Panels A - E, [t].
[8]: {[2] x 0.50 + [3] + [4] + [5] + [6] + [7] x 0.50}/ 5.
Values reported as 0.00 have an insignificant amount of preferred equity.

Workpaper #3 to Table No. MJV-14

2006 US LDC Sample

Calculation of the Average Debt - Market Value Ratio from 2001 to 2nd Quarter, 2006

Company	DCF Capital Structure [1]	2nd Quarter, 2006 [2]	2005 [3]	2004 [4]	2003 [5]	2002 [6]	2001 [7]	5-Year Average [8]
Laclede Group Inc	0.39	0.38	0.38	0.38	0.39	0.44	0.40	0.40
Northwest Natural Gas Co	0.33	0.34	0.36	0.36	0.39	0.40	0.39	0.37
South Jersey Industries Inc	0.32	0.33	0.30	0.31	0.37	0.48	0.49	0.38
Southwest Gas Corp	0.50	0.52	0.57	0.58	0.61	0.61	0.61	0.59
WGL Holdings Inc	0.29	0.31	0.29	0.29	0.32	0.36	0.31	0.31

Sources and Notes:
[1] - [7]: Table No. MJV-13; Panels A - E, [u].
[8]: {[2] x 0.50 + [3] + [4] + [5] + [6] + [7] x 0.50}/ 5.

Table No. MJV-15

2006 US LDC Sample

Combined I/B/E/S and Value Line Estimated Growth Rates

Company	I/B/E/S		Value Line			Combined I/B/E/S and Value Line Growth Rate
	I/B/E/S Long-Term Growth Rate	Number of Estimates	EPS Year 2007 Estimate	EPS 2009 - 2011 Estimate	Annualized Growth Rate	
	[1]	[2]	[3]	[4]	[5]	[6]
Laclede Group Inc	4.0%	1	$2.15	$2.50	5.2%	4.6%
Northwest Natural Gas Co	5.4%	5	$2.40	$2.85	5.9%	5.4%
South Jersey Industries Inc	6.0%	3	$1.95	$2.35	6.4%	6.1%
Southwest Gas Corp	3.0%	1	$1.95	$2.25	4.9%	3.9%
WGL Holdings Inc	3.3%	3	$1.95	$2.35	6.4%	4.1%

Sources and Notes:
[1] - [2]: I/B/E/S Tearsheets as of September 08, 2006.
[3] - [4]: Value Line Investment Survey, Standard Edition as of September 15, 2006.
[5]: ([4] / [3]) ^ (1/3) - 1.
[6]: ([1] x [2] + [5]) / ([2] + 1).

Table No. MJV-16

DCF Cost of Equity of the 2006 US LDC Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price [1]	Quarterly Dividend Q2, 2006 [2]	Combined I/B/E/S and Value Line Long-Term Growth Rate [3]	Quarterly Growth Rate [4]	DCF Cost of Equity [5]
Laclede Group Inc	$32.21	$0.35	4.6%	1.1%	9.3%
Northwest Natural Gas Co	$38.02	$0.34	5.4%	1.3%	9.3%
South Jersey Industries Inc	$28.77	$0.22	6.1%	1.5%	9.5%
Southwest Gas Corp	$33.37	$0.20	3.9%	1.0%	6.5%
WGL Holdings Inc	$30.57	$0.34	4.1%	1.0%	8.8%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-16.
[2]: Workpaper #2 to Table No. MJV-16.
[3]:Table No. MJV-15, [6].
[4]: {(1 + [3]) ^ (1/4)} - 1.
[5]: {(([2] / [1]) x (1 + [4]) + [4] + 1) ^ 4} - 1.

Table No. MJV-16

DCF Cost of Equity of the 2006 US LDC Sample

Panel B: Multi-Stage DCF (Using Blue Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	Stock Price [1]	Quarterly Dividend Q2, 2006 [2]	Combined I/B/E/S and *Value Line* Long-Term Growth Rate [3]	Growth Rate: FY 2012 [4]	Growth Rate: FY 2013 [5]	Growth Rate: FY 2014 [6]	Growth Rate: FY 2015 [7]	Growth Rate: FY 2016 [8]	GDP Long-Term Growth Rate [9]	DCF Cost of Equity [10]
Laclede Group Inc	$32.21	$0.35	4.6%	4.7%	4.8%	4.9%	5.0%	5.1%	5.2%	9.7%
Northwest Natural Gas Co	$38.02	$0.34	5.4%	5.4%	5.4%	5.3%	5.3%	5.2%	5.2%	9.1%
South Jersey Industries Inc	$28.77	$0.22	6.1%	6.0%	5.8%	5.7%	5.5%	5.4%	5.2%	8.7%
Southwest Gas Corp	$33.37	$0.20	3.9%	4.2%	4.4%	4.6%	4.8%	5.0%	5.2%	7.6%
WGL Holdings Inc	$30.57	$0.34	4.1%	4.3%	4.5%	4.7%	4.8%	5.0%	5.2%	9.6%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-16.
[2]: Workpaper #2 to Table No. MJV-16.
[3]: Table No. MJV-15, [6].
[4]: [3] - {([3] - [9])/ 6}.
[5]: [4] - {([3] - [9])/ 6}.
[6]: [5] - {([3] - [9])/ 6}.
[7]: [6] - {([3] - [9])/ 6}.
[8]: [7] - {([3] - [9])/ 6}.
[9]: Blue Chip Economic Indicators, March, 2006, page 15 (Nominal GDP for 2013-2017). This number is assumed to be the perpetual growth rate.
[10]: Workpaper #3 to Table No. MJV-16.

Workpaper #1 to Table No. MJV-16

2006 US LDC Sample

Common Stock Prices from August 18, 2006 to September 8, 2006

Company	08-Sep-06	07-Sep-06	06-Sep-06	05-Sep-06	01-Sep-06	31-Aug-06	30-Aug-06	29-Aug-06	28-Aug-06	25-Aug-06	24-Aug-06	23-Aug-06	22-Aug-06	21-Aug-06	18-Aug-06	Average
Laclede Group Inc	$31.87	$31.35	$32.13	$32.72	$32.50	$32.59	$32.55	$32.47	$32.20	$31.88	$31.95	$31.71	$32.70	$31.95	$32.64	$32.21
Northwest Natural Gas Co	$37.90	$37.83	$38.19	$38.62	$38.45	$38.25	$38.08	$38.50	$37.91	$37.46	$37.47	$37.22	$38.27	$38.05	$38.06	$38.02
South Jersey Industries Inc	$28.58	$28.50	$28.80	$29.06	$28.83	$28.99	$29.00	$29.29	$28.89	$28.40	$28.41	$28.19	$28.96	$28.71	$28.97	$28.77
Southwest Gas Corp	$32.94	$32.96	$33.28	$34.11	$33.64	$33.70	$33.88	$33.78	$33.58	$32.83	$32.75	$32.85	$33.38	$33.33	$33.61	$33.37
WGL Holdings Inc	$30.26	$30.42	$30.77	$30.94	$30.85	$31.07	$30.76	$30.85	$30.59	$30.15	$30.20	$30.07	$30.62	$30.39	$30.65	$30.57

Sources and Notes:

Compustat as of October 6, 2006.

I/B/E/S Tearsheets as of September 08, 2006.

The prices chosen are the daily closing prices from Compustat starting from I/B/E/S Tearsheet date and ending fifteen trading days before.

Workpaper #2 to Table No. MJV-16

2006 US LDC Sample

2nd Quarter, 2006 Dividend Payments

Company	Q2, 2006
Laclede Group Inc	$0.35
Northwest Natural Gas Co	$0.34
South Jersey Industries Inc	$0.22
Southwest Gas Corp	$0.20
WGL Holdings Inc	$0.34

Sources and Notes:
Compustat as of September 11, 2006.

Workpaper #3 to Table No. MJV-16

DCF Cost of Equity of the 2006 US LDC Sample

Multi - Stage DCF (using Blue Chip Long-Term GDP Forecast and Consensus Forecast Inflation Rate as the Perpetual Growth Rate)

Year	Company	Laclede Group Inc	Northwest Natural Gas Co	South Jersey Industries Inc	Southwest Gas Corp	WGL Holdings Inc
	Current Stock Price	($32.21)	($38.02)	($28.77)	($33.37)	($30.57)
YEAR 2006	Dividend Q3 Estimate	$0.36	$0.35	$0.23	$0.21	$0.34
YEAR 2006	Dividend Q4 Estimate	$0.36	$0.35	$0.23	$0.21	$0.34
YEAR 2007	Dividend Q1 Estimate	$0.37	$0.36	$0.24	$0.21	$0.35
YEAR 2007	Dividend Q2 Estimate	$0.37	$0.36	$0.24	$0.21	$0.35
YEAR 2007	Dividend Q3 Estimate	$0.38	$0.37	$0.24	$0.22	$0.35
YEAR 2007	Dividend Q4 Estimate	$0.38	$0.37	$0.25	$0.22	$0.36
YEAR 2008	Dividend Q1 Estimate	$0.38	$0.38	$0.25	$0.22	$0.36
YEAR 2008	Dividend Q2 Estimate	$0.39	$0.38	$0.25	$0.22	$0.37
YEAR 2008	Dividend Q3 Estimate	$0.39	$0.39	$0.26	$0.22	$0.37
YEAR 2008	Dividend Q4 Estimate	$0.40	$0.39	$0.26	$0.23	$0.37
YEAR 2009	Dividend Q1 Estimate	$0.40	$0.40	$0.26	$0.23	$0.38
YEAR 2009	Dividend Q2 Estimate	$0.41	$0.40	$0.27	$0.23	$0.38
YEAR 2009	Dividend Q3 Estimate	$0.41	$0.41	$0.27	$0.23	$0.38
YEAR 2009	Dividend Q4 Estimate	$0.42	$0.42	$0.28	$0.23	$0.39
YEAR 2010	Dividend Q1 Estimate	$0.42	$0.42	$0.28	$0.24	$0.39
YEAR 2010	Dividend Q2 Estimate	$0.42	$0.43	$0.29	$0.24	$0.40
YEAR 2010	Dividend Q3 Estimate	$0.43	$0.43	$0.29	$0.24	$0.40
YEAR 2010	Dividend Q4 Estimate	$0.43	$0.44	$0.29	$0.24	$0.40
YEAR 2011	Dividend Q1 Estimate	$0.44	$0.44	$0.30	$0.25	$0.41
YEAR 2011	Dividend Q2 Estimate	$0.44	$0.45	$0.30	$0.25	$0.41
YEAR 2011	Dividend Q3 Estimate	$0.45	$0.46	$0.31	$0.25	$0.42
YEAR 2011	Dividend Q4 Estimate	$0.45	$0.46	$0.31	$0.25	$0.42
YEAR 2012	Dividend Q1 Estimate	$0.46	$0.47	$0.32	$0.26	$0.43
YEAR 2012	Dividend Q2 Estimate	$0.46	$0.47	$0.32	$0.26	$0.43
YEAR 2012	Dividend Q3 Estimate	$0.47	$0.48	$0.33	$0.26	$0.43
YEAR 2012	Dividend Q4 Estimate	$0.48	$0.49	$0.33	$0.26	$0.44
YEAR 2013	Dividend Q1 Estimate	$0.48	$0.49	$0.33	$0.27	$0.44
YEAR 2013	Dividend Q2 Estimate	$0.49	$0.50	$0.34	$0.27	$0.45
YEAR 2013	Dividend Q3 Estimate	$0.49	$0.51	$0.34	$0.27	$0.45
YEAR 2013	Dividend Q4 Estimate	$0.50	$0.51	$0.35	$0.28	$0.46
YEAR 2014	Dividend Q1 Estimate	$0.50	$0.52	$0.35	$0.28	$0.46
YEAR 2014	Dividend Q2 Estimate	$0.51	$0.53	$0.36	$0.28	$0.47
YEAR 2014	Dividend Q3 Estimate	$0.52	$0.53	$0.36	$0.29	$0.47
YEAR 2014	Dividend Q4 Estimate	$0.52	$0.54	$0.37	$0.29	$0.48
YEAR 2015	Dividend Q1 Estimate	$0.53	$0.55	$0.37	$0.29	$0.49
YEAR 2015	Dividend Q2 Estimate	$0.54	$0.55	$0.38	$0.30	$0.49
YEAR 2015	Dividend Q3 Estimate	$0.54	$0.56	$0.38	$0.30	$0.50
YEAR 2015	Dividend Q4 Estimate	$0.55	$0.57	$0.39	$0.30	$0.50
YEAR 2016	Dividend Q1 Estimate	$0.56	$0.58	$0.39	$0.31	$0.51
YEAR 2016	Dividend Q2 Estimate	$0.56	$0.58	$0.40	$0.31	$0.52
YEAR 2016 Q3	Year 10 Stock Price	$54.15	$64.48	$49.06	$55.90	$51.12
	Trial COE - Quarterly Rate	2.3%	2.2%	2.1%	1.8%	2.3%
	Trial COE - Annual Rate	9.7%	9.1%	8.7%	7.6%	9.6%
	Cost of Equity	9.7%	9.1%	8.7%	7.6%	9.6%
	(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00

Sources and Notes:

All Growth Rate Estimates: Table No. MJV-16; Panel B.

Stock Prices and Dividends are from Compustat as of September 11, 2006.

1. See Workpaper #1 to Table No. MJV-16 for the average closing stock price obtained from Compustat.
2. See Workpaper #2 to Table No. MJV-16 for the for the quarterly dividend obtained from Compustat.
3. Blue Chip Economic Indicators, March, 2006, page 15 (Nominal GDP for 2013-2017). Both are used to calculate the Year 10 Stock Price.
   {(the Dividend Year 2016 Q3 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/2))} /
   {(Trial COE - Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Table No. MJV-17

Overall After-Tax DCF Cost of Capital of the 2006 US LDC Sample

Panel A: Simple DCF Method (Quarterly)

Company	2nd Quarter, 2006 Bond Rating [1]	2nd Quarter, 2006 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	DCF Preferred Equity to Market Value Ratio [5]	Cost of Debt [6]	DCF Debt to Market Value Ratio [7]	Tennessee American Water's Corporate Tax Rate [8]	Cost of Preferred Equity [9]	Overall After- Tax Cost of Capital [10]
Laclede Group Inc	A	A	9.3%	0.61	0.00	6.4%	0.39	39.2%	6.3%	7.2%
Northwest Natural Gas Co	AA	-	9.3%	0.67	-	6.1%	0.33	39.2%	-	7.5%
South Jersey Industries Inc	BBB	-	9.5%	0.68	-	6.6%	0.32	39.2%	-	7.7%
Southwest Gas Corp	BBB	-	6.5%	0.50	-	6.6%	0.50	39.2%	-	5.3%
WGL Holdings Inc	AA	AA	8.8%	0.69	0.01	6.1%	0.29	39.2%	6.2%	7.3%
Average:			8.7%	0.63	0.00	6.4%	0.37	39.2%	6.2%	7.0%

Sources and Notes:

[1]: Compustat as of September 11, 2006.
For South Jersey Industries a Moody's rating of Baa2 is used. Last accessed on August 29, 2006.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Table No. MJV-16, Panel A, [5].
[4]: Table No. MJV-14, [1].
[5]: Table No. MJV-14, [2].
[6]: Mergent Bond Ratings, August 2006.
[7]: Table No. MJV-14, [3].
[8]: Provided by Tennessee American Water.
[9]: Mergent Bond Ratings, August 2006.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

Table No. MJV-17

Overall After-Tax DCF Cost of Capital of the 2006 US LDC Sample

Panel B: Multi-Stage DCF (Using Blue Chip Long-Term GDP Growth Forecast as the Perpetual Rate)

Company	2nd Quarter, 2006 Bond Rating [1]	2nd Quarter, 2006 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	DCF Preferred Equity to Market Value Ratio [5]	Cost of Debt [6]	DCF Debt to Market Value Ratio [7]	Tennessee American Water's Corporate Tax Rate [8]	Cost of Preferred Equity [9]	Overall After- Tax Cost of Capital [10]
Laclede Group Inc	A	A	9.7%	0.61	0.00	6.4%	0.39	39.2%	6.3%	7.4%
Northwest Natural Gas Co	AA	-	9.1%	0.67	-	6.1%	0.33	39.2%	-	7.3%
South Jersey Industries Inc	BBB	-	8.7%	0.68	-	6.6%	0.32	39.2%	-	7.2%
Southwest Gas Corp	BBB	-	7.6%	0.50	-	6.6%	0.50	39.2%	-	5.8%
WGL Holdings Inc	AA	AA	9.6%	0.69	0.01	6.1%	0.29	39.2%	6.2%	7.8%
Average:			8.9%	0.63	0.00	6.4%	0.37	39.2%	6.2%	7.1%

Sources and Notes:

[1]: Compustat as of September 11, 2006.
For South Jersey Industries a Moody's rating of Baa2 is used. Last accessed on August 29, 2006.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Table No. MJV-16; Panel B, [10].
[4]: Table No. MJV-14, [1].
[5]: Table No. MJV-14, [2].
[6]: Mergent Bond Ratings, August 2006.
[7]: Table No. MJV-14, [3].
[8]: Provided by Tennessee American Water.
[9]: Mergent Bond Ratings, August 2006.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

Table No. MJV-18

DCF Cost of Equity at Tennessee American Water's Capital Structure

2006 US LDC Sample Return on Equity

	Overall Cost of Capital [1]	Tennessee American Water's Regulatory % Debt [2]	Tennessee American Water's Cost of Debt [3]	Tennessee American Water's Corporate Tax Rate [4]	Tennessee American Water's Regulatory % Preferred Equity [5]	Tennessee American Water's Cost of Preferred Equity [6]	Tennessee American Water's Regulatory % Equity [7]	Estimated Return on Equity [8]
Using All Companies								
Simple DCF Quarterly	7.0%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.0%
Multi-Stage DCF - Using EIA Long-Term GDP Growth Forecast as the Perpetual Rate	7.1%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.3%

Sources and Notes:
[1]: Table No. MJV-17; Panels A-B, [10].
[2]: Provided by Tennessee American Water.
[3]: Mergent Bond Ratings, August 2006. Based on A rating.
[4]: Provided by Tennessee American Water.
[5]: Provided by Tennessee American Water.
[6]: Mergent Bond Ratings, August 2006. Based on A rating.
[7]: Provided by Tennessee American Water.
[8]: ([1] - [2] x [3] x (1 - [4]) - [5] x [6])} / [7].

Table No. MJV-19

Risk Positioning Cost of Equity of the 2006 US LDC Sample

Panel A: Using Value Line Betas and the Long-Term Risk-Free Rate

Company	Long-Term Risk-Free Rate [1]	Unadjusted Value Line Beta on Market [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (0.5%) Cost of Equity [5]	ECAPM (1.5%) Cost of Equity [6]
Laclede Group Inc	5.00%	0.75	6.5%	9.9%	10.0%	10.2%
Northwest Natural Gas Co	5.00%	0.60	6.5%	8.9%	9.1%	9.5%
South Jersey Industries Inc	5.00%	0.52	6.5%	8.4%	8.6%	9.1%
Southwest Gas Corp	5.00%	0.75	6.5%	9.9%	10.0%	10.2%
WGL Holdings Inc	5.00%	0.67	6.5%	9.4%	9.5%	9.9%

Sources and Notes:
[1]: Table No. MJV-9.
[2]: Workpaper # 1 to Table No. MJV-19.
[3]: MJV Testimony, Appendix B.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 0.5%) + [2] x ([3] - 0.5%).
[6]: ([1] + 1.5%) + [2] x ([3] - 1.5%).

Table No. MJV-19

Risk Positioning Cost of Equity of the 2006 US LDC Sample

Panel B: Using Value Line Betas and the Short-Term Risk-Free Rate

Company	Short-Term Risk-Free Rate [1]	Unadjusted Value Line Beta on Market [2]	Short-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.%) Cost of Equity [5]	ECAPM (2%) Cost of Equity [6]	ECAPM (3%) Cost of Equity [7]
Laclede Group Inc	4.10%	0.75	8.0%	10.1%	10.3%	10.6%	10.8%
Northwest Natural Gas Co	4.10%	0.60	8.0%	8.9%	9.3%	9.7%	10.1%
South Jersey Industries Inc	4.10%	0.52	8.0%	8.3%	8.8%	9.2%	9.7%
Southwest Gas Corp	4.10%	0.75	8.0%	10.1%	10.3%	10.6%	10.8%
WGL Holdings Inc	4.10%	0.67	8.0%	9.5%	9.8%	10.1%	10.5%

Sources and Notes:
[1]: Table No. MJV-9.
[2]: Workpaper # 1 to Table No. MJV-19.
[3]: MJV Testimony, Appendix B.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.0%) + [2] x ([3] - 1.0%).
[6]: ([1] + 2.0%) + [2] x ([3] - 2.0%).
[7]: ([1] + 3.0%) + [2] x ([3] - 3.0%).

Workpaper # 1 to Table No. MJV-19

2006 US LDC Sample

Panel A: Value Line Betas

Company	Beta on Market [1]	Unadjusted Beta [2]
Laclede Group Inc	0.85	0.75
Northwest Natural Gas Co	0.75	0.60
South Jersey Industries Inc	0.70	0.52
Southwest Gas Corp	0.85	0.75
WGL Holdings Inc	0.80	0.67
Average:	0.79	0.66

Sources and Notes:

Standard Edition as of September

[2]: The reported beta in [1] by Value Line is unadjusted using the formula: ([1] - .35)/.67.

Table No. MJV-20

Overall After-Tax Risk Positioning Cost of Capital of the 2006 US LDC Sample

Panel A: CAPM Cost of Equity Based on Value Line Unadjusted Betas and a Long-Term Risk-Free Rate

Company	CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [3]	Weighted - Average Cost of Debt [4]	5-Year Average Debt to Market Value Ratio [5]	Tennessee American Water's Corporate Tax Rate [6]	Weighted - Average Cost of Preferred Equity [7]	Overall After- Tax Cost of Capital [8]
Laclede Group Inc	9.9%	0.60	0.00	6.3%	0.40	39.2%	6.2%	7.5%
Northwest Natural Gas Co	8.9%	0.62	0.00	6.3%	0.37	39.2%	6.3%	7.0%
South Jersey Industries Inc	8.4%	0.62	0.00	6.6%	0.38	39.2%	6.4%	6.8%
Southwest Gas Corp	9.9%	0.41	-	6.6%	0.59	39.2%	-	6.4%
WGL Holdings Inc	9.4%	0.67	0.01	6.1%	0.31	39.2%	6.2%	7.6%
Average:	9.3%	0.59	0.00	6.4%	0.41	39.2%	6.3%	7.0%

Sources and Notes:
[1]: Table No. MJV-19; Panel A, [4].
[2]: Table No. MJV-14, [4].
[3]: Table No. MJV-14, [5].
[4]: Workpaper #2 to Table No. MJV-20 ; Panel A, [7].
[5]: Table No. MJV-14, [6].
[6]: Provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-20 ; Panel B, [7].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Table No. MJV-20

Overall After-Tax Risk Positioning Cost of Capital of the 2006 US LDC Sample

Panel B: ECAPM (0.5%) Cost of Equity Based on Value Line Unadjusted Betas and a Long-Term Risk-Free Rate

Company	ECAPM (0.5%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [3]	Weighted - Average Cost of Debt [4]	5-Year Average Debt to Market Value Ratio [5]	Tennessee American Water's Corporate Tax Rate [6]	Weighted - Average Cost of Preferred Equity [7]	Overall After- Tax Cost of Capital [8]
Laclede Group Inc	10.0%	0.60	0.00	6.3%	0.40	39.2%	6.2%	7.5%
Northwest Natural Gas Co	9.1%	0.62	0.00	6.3%	0.37	39.2%	6.3%	7.1%
South Jersey Industries Inc	8.6%	0.62	0.00	6.6%	0.38	39.2%	6.4%	6.9%
Southwest Gas Corp	10.0%	0.41	-	6.6%	0.59	39.2%	-	6.5%
WGL Holdings Inc	9.5%	0.67	0.01	6.1%	0.31	39.2%	6.2%	7.7%
Average:	9.4%	0.59	0.00	6.4%	0.41	39.2%	6.3%	7.1%

Sources and Notes:
[1]: Table No. MJV-19; Panel A, [5].
[2]: Table No. MJV-14, [4].
[3]: Table No. MJV-14, [5].
[4]: Workpaper #2 to Table No. MJV-20 ; Panel A, [7].
[5]: Table No. MJV-14, [6].
[6]: Provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-20 ; Panel B, [7].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Table No. MJV-20

Overall After-Tax Risk Positioning Cost of Capital of the 2006 US LDC Sample

Panel C: ECAPM (1.5%) Cost of Equity Based on Value Line Unadjusted Betas and a Long-Term Risk-Free Rate

Company	ECAPM (1.5%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [3]	Weighted - Average Cost of Debt [4]	5-Year Average Debt to Market Value Ratio [5]	Tennessee American Water's Corporate Tax Rate [6]	Weighted - Average Cost of Preferred Equity [7]	Overall After- Tax Cost of Capital [8]
Laclede Group Inc	10.2%	0.60	0.00	6.3%	0.40	39.2%	6.2%	7.7%
Northwest Natural Gas Co	9.5%	0.62	0.00	6.3%	0.37	39.2%	6.3%	7.4%
South Jersey Industries Inc	9.1%	0.62	0.00	6.6%	0.38	39.2%	6.4%	7.2%
Southwest Gas Corp	10.2%	0.41	-	6.6%	0.59	39.2%	-	6.6%
WGL Holdings Inc	9.9%	0.67	0.01	6.1%	0.31	39.2%	6.2%	7.9%
Average:	9.8%	0.59	0.00	6.4%	0.41	39.2%	6.3%	7.3%

Sources and Notes:
[1]: Table No. MJV-19; Panel A, [6].
[2]: Table No. MJV-14, [4].
[3]: Table No. MJV-14, [5].
[4]: Workpaper #2 to Table No. MJV-20 ; Panel A, [7].
[5]: Table No. MJV-14, [6].
[6]: Provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-20 ; Panel B, [7].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Table No. MJV-20

Overall After-Tax Risk Positioning Cost of Capital of the 2006 US LDC Sample

Panel D: CAPM Cost of Equity Based on Value Line Unadjusted Betas and a Short-Term Risk-Free Rate

Company	CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [3]	Weighted - Average Cost of Debt [4]	5-Year Average Debt to Market Value Ratio [5]	Tennessee American Water's Corporate Tax Rate [6]	Weighted - Average Cost of Preferred Equity [7]	Overall After- Tax Cost of Capital [8]
Laclede Group Inc	10.1%	0.60	0.00	6.3%	0.40	39.2%	6.2%	7.6%
Northwest Natural Gas Co	8.9%	0.62	0.00	6.3%	0.37	39.2%	6.3%	7.0%
South Jersey Industries Inc	8.3%	0.62	0.00	6.6%	0.38	39.2%	6.4%	6.7%
Southwest Gas Corp	10.1%	0.41	-	6.6%	0.59	39.2%	-	6.5%
WGL Holdings Inc	9.5%	0.67	0.01	6.1%	0.31	39.2%	6.2%	7.6%
Average:	9.4%	0.59	0.00	6.4%	0.41	39.2%	6.3%	7.1%

Sources and Notes:
[1]: Table No. MJV-19; Panel B, [4].
[2]: Table No. MJV-14, [4].
[3]: Table No. MJV-14, [5].
[4]: Workpaper #2 to Table No. MJV-20 ; Panel A, [7].
[5]: Table No. MJV-14, [6].
[6]: Provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-20 ; Panel B, [7].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Table No. MJV-20

Overall After-Tax Risk Positioning Cost of Capital of the 2006 US LDC Sample

Panel E: ECAPM (1%) Cost of Equity Based on Value Line Unadjusted Betas and a Short-Term Risk-Free Rate

Company	ECAPM (1.%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [3]	Weighted - Average Cost of Debt [4]	5-Year Average Debt to Market Value Ratio [5]	Tennessee American Water's Corporate Tax Rate [6]	Weighted - Average Cost of Preferred Equity [7]	Overall After- Tax Cost of Capital [8]
Laclede Group Inc	10.3%	0.60	0.00	6.3%	0.40	39.2%	6.2%	7.8%
Northwest Natural Gas Co	9.3%	0.62	0.00	6.3%	0.37	39.2%	6.3%	7.2%
South Jersey Industries Inc	8.8%	0.62	0.00	6.6%	0.38	39.2%	6.4%	7.0%
Southwest Gas Corp	10.3%	0.41	-	6.6%	0.59	39.2%	-	6.6%
WGL Holdings Inc	9.8%	0.67	0.01	6.1%	0.31	39.2%	6.2%	7.8%
Average:	9.7%	0.59	0.00	6.4%	0.41	39.2%	6.3%	7.3%

Sources and Notes:
[1]: Table No. MJV-19; Panel B, [5].
[2]: Table No. MJV-14, [4].
[3]: Table No. MJV-14, [5].
[4]: Workpaper #2 to Table No. MJV-20 ; Panel A, [7].
[5]: Table No. MJV-14, [6].
[6]: Provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-20 ; Panel B, [7].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Table No. MJV-20

Overall After-Tax Risk Positioning Cost of Capital of the 2006 US LDC Sample

Panel F: ECAPM (2%) Cost of Equity Based on Value Line Unadjusted Betas and a Short-Term Risk-Free Rate

Company	ECAPM (2%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [3]	Weighted - Average Cost of Debt [4]	5-Year Average Debt to Market Value Ratio [5]	Tennessee American Water's Corporate Tax Rate [6]	Weighted - Average Cost of Preferred Equity [7]	Overall After- Tax Cost of Capital [8]
Laclede Group Inc	10.6%	0.60	0.00	6.3%	0.40	39.2%	6.2%	7.9%
Northwest Natural Gas Co	9.7%	0.62	0.00	6.3%	0.37	39.2%	6.3%	7.5%
South Jersey Industries Inc	9.2%	0.62	0.00	6.6%	0.38	39.2%	6.4%	7.3%
Southwest Gas Corp	10.6%	0.41	-	6.6%	0.59	39.2%	-	6.7%
WGL Holdings Inc	10.1%	0.67	0.01	6.1%	0.31	39.2%	6.2%	8.1%
Average:	10.0%	0.59	0.00	6.4%	0.41	39.2%	6.3%	7.5%

Sources and Notes:
[1]: Table No. MJV-19; Panel B, [6].
[2]: Table No. MJV-14, [4].
[3]: Table No. MJV-14, [5].
[4]: Workpaper #2 to Table No. MJV-20 ; Panel A, [7].
[5]: Table No. MJV-14, [6].
[6]: Provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-20 ; Panel B, [7].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Table No. MJV-20

Overall After-Tax Risk Positioning Cost of Capital of the 2006 US LDC Sample

Panel G: ECAPM (3%) Cost of Equity Based on Value Line Unadjusted Betas and a Short-Term Risk-Free Rate

Company	ECAPM (3%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	5-Year Average Preferred Equity to Market Value Ratio [3]	Weighted - Average Cost of Debt [4]	5-Year Average Debt to Market Value Ratio [5]	Tennessee American Water's Corporate Tax Rate [6]	Weighted - Average Cost of Preferred Equity [7]	Overall After- Tax Cost of Capital [8]
Laclede Group Inc	10.8%	0.60	0.00	6.3%	0.40	39.2%	6.2%	8.1%
Northwest Natural Gas Co	10.1%	0.62	0.00	6.3%	0.37	39.2%	6.3%	7.7%
South Jersey Industries Inc	9.7%	0.62	0.00	6.6%	0.38	39.2%	6.4%	7.6%
Southwest Gas Corp	10.8%	0.41	-	6.6%	0.59	39.2%	-	6.8%
WGL Holdings Inc	10.5%	0.67	0.01	6.1%	0.31	39.2%	6.2%	8.3%
Average:	10.4%	0.59	0.00	6.4%	0.41	39.2%	6.3%	7.7%

Sources and Notes:
[1]: Table No. MJV-19; Panel B, [7].
[2]: Table No. MJV-14, [4].
[3]: Table No. MJV-14, [5].
[4]: Workpaper #2 to Table No. MJV-20 ; Panel A, [7].
[5]: Table No. MJV-14, [6].
[6]: Provided by Tennessee American Water.
[7]: Workpaper #2 to Table No. MJV-20 ; Panel B, [7].
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Workpaper #1 to Table No. MJV-20

2006 US LDC Sample

Panel A: Bond Rating Summary, Year End, 2001 to 2nd Quarter, 2006

Company	2nd Quarter, 2006 [1]	Year End, 2005 [2]	Year End, 2004 [3]	Year End, 2003 [4]	Year End, 2002 [5]	Year End, 2001 [6]
Laclede Group Inc	A	A	A	A	A	AA
Northwest Natural Gas Co	AA	A	A	A	A	A
South Jersey Industries Inc	BBB	BBB	BBB	BBB	BBB	BBB
Southwest Gas Corp	BBB	BBB	BBB	BBB	BBB	BBB
WGL Holdings Inc	AA	AA	AA	AA	AA	AA

Sources and Notes:
[1] - [6]: Compustat as of September 11, 2006.
For South Jersey Industries a Moody's rating of Baa2 is used. Last accessed on August 30, 2006.

Workpaper #1 to Table No. MJV-20

2006 US LDC Sample

Panel B: Preferred Equity Rating Summary, Year End, 2001 to 2nd Quarter, 2006

Company	2nd Quarter, 2006 [1]	Year End, 2005 [2]	Year End, 2004 [3]	Year End, 2003 [4]	Year End, 2002 [5]	Year End, 2001 [6]
Laclede Group Inc	A	A	A	A	A	AA
Northwest Natural Gas Co	-	-	-	-	A	A
South Jersey Industries Inc	-	-	BBB	BBB	BBB	BBB
Southwest Gas Corp	-	-	-	-	-	-
WGL Holdings Inc	AA	AA	AA	AA	AA	AA

Sources and Notes:
[1] - [6]: Preferred equity
ratings are assumed equal to the

Workpaper #2 to Table No. MJV-20

2006 US LDC Sample

Panel A: Bond Yield Summary, Year End, 2001 to 2nd Quarter, 2006

Company	2nd Quarter, 2006 [1]	Year End, 2005 [2]	Year End, 2004 [3]	Year End, 2003 [4]	Year End, 2002 [5]	Year End, 2001 [6]	5-Year Average [7]
Laclede Group Inc	6.37%	6.37%	6.37%	6.37%	6.37%	6.13%	6.35%
Northwest Natural Gas Co	6.13%	6.37%	6.37%	6.37%	6.37%	6.37%	6.35%
South Jersey Industries Inc	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Southwest Gas Corp	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
WGL Holdings Inc	6.13%	6.13%	6.13%	6.13%	6.13%	6.13%	6.13%

Sources and Notes:

[1] - [6]: Ratings based on Workpaper #1 to Table No. MJV-20, Panel A and bond yields from Mergent Bond Ratings, August 2006.

[7]: {[1] x 0.50 + [2] + [3] + [4] + [5] + [6] x 0.50}/ 5.

The report does not publish yield data for AA-rated bond. Therefore, we assumed:

Yield on AA-rated bond = Yield on A-rated bond - {(1/2) x (Yield on BBB-rated bond - Yield on A-rated bond)}.

Workpaper #2 to Table No. MJV-20

2006 US LDC Sample

Panel B: Preferred Equity Yield Summary, Year End, 2001 to 2nd Quarter, 2006

Company	2nd Quarter, 2006 [1]	Year End, 2005 [2]	Year End, 2004 [3]	Year End, 2003 [4]	Year End, 2002 [5]	Year End, 2001 [6]	5-Year Average [7]
Laclede Group Inc	6.25%	6.25%	6.25%	6.25%	6.25%	6.17%	6.24%
Northwest Natural Gas Co	-	-	-	-	6.25%	6.25%	6.25%
South Jersey Industries Inc	-	-	6.42%	6.42%	6.42%	6.42%	6.42%
Southwest Gas Corp	-	-	-	-	-	-	-
WGL Holdings Inc	6.17%	6.17%	6.17%	6.17%	6.17%	6.17%	6.17%

Sources and Notes:

[1] - [6]: Ratings based on Workpaper #1 to Table No. MJV-20, Panel B and yields from Mergent Bond Ratings, August 2006.

[7]: {[1] x 0.50 + [2] + [3] + [4] + [5] + [6] x 0.50}/ 5.

The report does not publish yield data for AA-rated preferred equity. Therefore, we assumed:

Yield on AA-rated preferred equity = Yield on A-rated bond - {(1/2) x (Yield on BBB-rated bond - Yield on A-rated bond)}.

Table No. MJV-21

Risk Positioning Cost of Equity at Tennessee American Water's Capital Structure

2006 US LDC Sample

Using all Companies

	Overall Cost of Capital [1]	Tennessee American Water's Regulatory % Debt [2]	Tennessee American Water's Cost of Debt [3]	Tennessee American Water's Corporate Tax Rate [4]	Tennessee American Water's Regulatory % Preferred Equity [5]	Tennessee American Water's Cost of Preferred Equity [6]	Tennessee American Water's Regulatory % Equity [7]	Estimated Return on Equity [8]
Using Long-Term Risk-Free Rates:								
CAPM using Value Line Betas	7.0%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.1%
ECAPM (0.5%) using Value Line Betas	7.1%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.3%
ECAPM (1.5%) using Value Line Betas	7.3%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.8%
Using Short-Term Risk-Free Rates:								
CAPM using Value Line Betas	7.1%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.2%
ECAPM (1%) using Value Line Betas	7.3%	0.55	6.4%	39.2%	0.01	6.3%	0.43	11.6%
ECAPM (2%) using Value Line Betas	7.5%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.1%
ECAPM (3%) using Value Line Betas	7.7%	0.55	6.4%	39.2%	0.01	6.3%	0.43	12.6%

Sources and Notes:

[1]: Table No. MJV-20; Panels A - G, [8].

[2]: Provided by Tennessee American Water.

[3]: Mergent Bond Ratings, August 2006. Based on A rating.

[4]: Provided by Tennessee American Water.

[5]: Provided by Tennessee American Water.

[6]: Mergent Bond Ratings, August 2006. Based on A rating.

[7]: Provided by Tennessee American Water.

[8]: ([1] - [2] x [3] x (1 - [4]) - [5] x [6])} / [7].