Q. Please provide copies of the rate of return and related articles which Mr. Cicchetti published (referred to at p. 2 of his report).

A. See Attachment CA-PUB-19.

Gas Distribution: Now a Higher-Risk Business

The rise in equity risk premiums for local gas utilities may come as a surprise.

By Mark Cicchetti

EQUITY RISK PREMIUMS FOR NATURAL GAS distributors have hit a ten-year high. Moody's Gas Distribution Index showed a jump to a 5.4 percent equity risk premium in December 2001 and has averaged an approximate five percent equity risk premium in 2002, while historically equity risk premiums have averaged 3.4 percent above the yield of 30-year Treasury bonds over the last 10 years. The variation in equity risk premiums over time and in relation to the level of interest rates, as shown in Figure 1, calls into question some commonly used analytical methods—particularly what is called the ex

Moody's Natural Gas Distribution Index—2002

AGL Resources

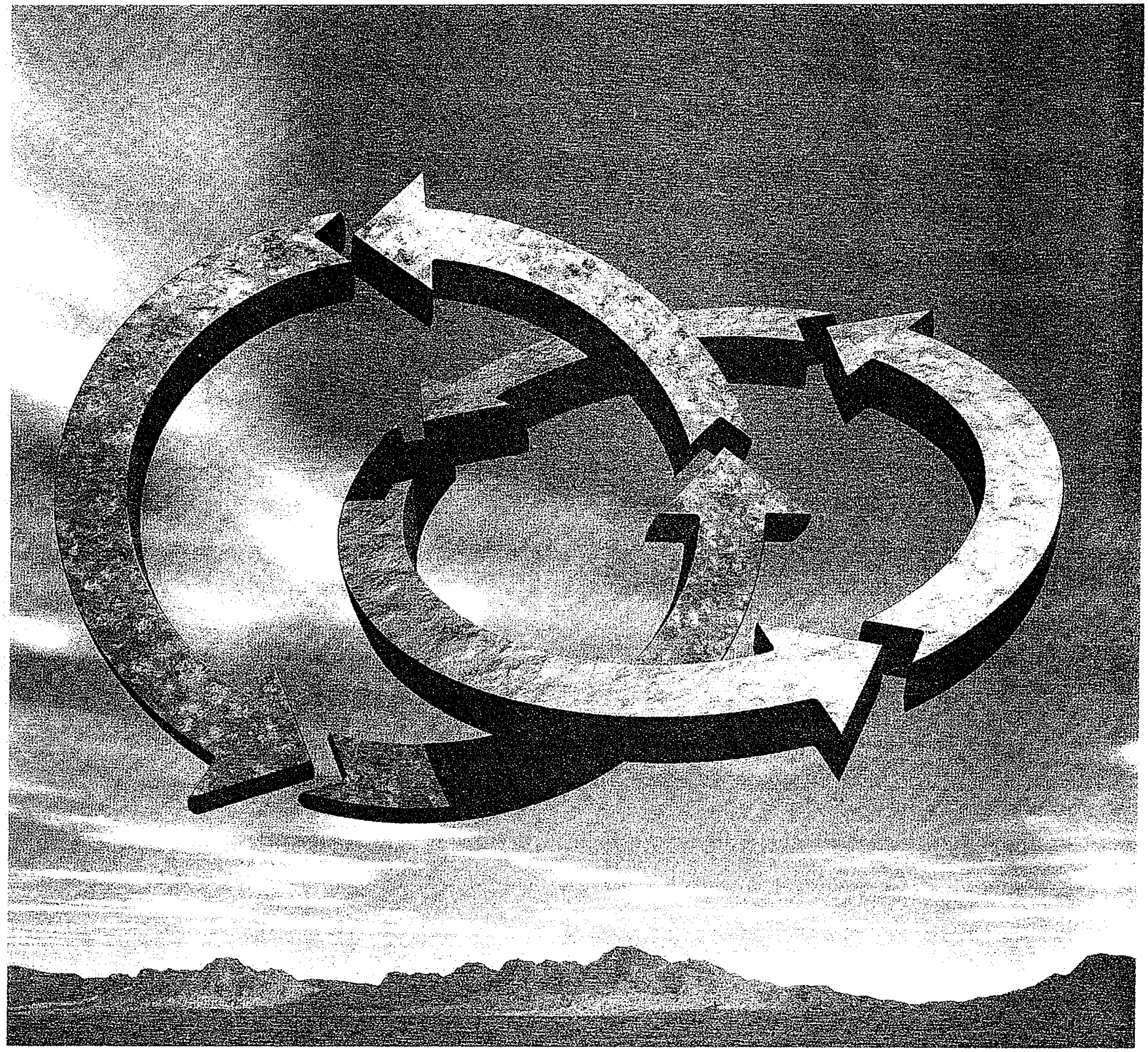
Keyspan Corporation

Laclede Gas

N. W. Natural Gas

Peoples Energy

WGL Holdings



post risk premium analyses, or historical yield spread method, which typically uses extremely long 60- to 70-year periods.

Notwithstanding its widespread use, there is a serious conceptual problem with using the ex post or historical yield spread method to determine risk premiums.

Typically, under the ex post method, the risk premium is calculated as the difference between the historical holding period returns on an index of stocks for a particular past period and the returns from an index of bonds for the same past period. The historical risk premium is then added to a company's current bond yield or to the current yield of a Treasury security to determine the cost of equity.

This is expressed as follows:

Ke = Kd + historical equity/debt spread

where: Ke = cost of equity

Kd = cost of debt

But the cost of equity is a forward-looking concept. That is, the cost of equity is based on investor expectations, and not ex post performance. There is no reason to

Figure 1	Risk Premium Analysis Moody's Natural Gas Distribution Index—Annual Averages, 1992-2002		
Year	Gas Index Cost of Equity	Risk Free Rate	Risk Premium
1992	10.19	7.69	2.50
1993	9.00	6.70	2.30
1994	9.32	7.24	2.08
1995	9.60	7.04	2.56
1996	9.58	6.66	2.92
1997	9.83	6.65	3.18
1998	9.71	5.66	4.05
1999	10.10	5.76	4.34
2000	10.49	6.01	4.48
2001	9.99	5.49	4.50
2002*	10.52	5.65	4.87
Avg.	9.84	6.41	3.43

* Through July

believe that investors expect future relative returns to be the same as those earned in the past. Actual performance may deviate substantially from what was expected, but it is expectations relative to requirements that will determine if an investment should be made. Simply because a company's stock returned either one percent or 500 percent over the cost of debt does not mean the company's cost of equity was either one percent or 500 percent over the cost of debt. Furthermore, ex post risk premium analyses typically incorporate negative risk premiums because there are many months and years when stock market returns are negative. It is illogical and contrary to financial theory regarding risk aversion and required returns to presume the cost of equity is negative or less than the cost of debt. Cost of equity analyses should be consistent with that type of financial theory.

Because it avoids some of the serious flaws of other approaches, an ex ante approach is the appropriate way to determine equity risk premiums. Under an ex ante approach, the required return on equity used to calculate equity risk premiums is determined using investor expectations, as opposed to relying on past returns.

For example, many analysts have established a 7.8 percent equity risk premium when analyzing the earned return on the S&P 500, as compared to those earnings of an index of

Figure 2 **Comparison of Interest Rates and Risk Premiums**

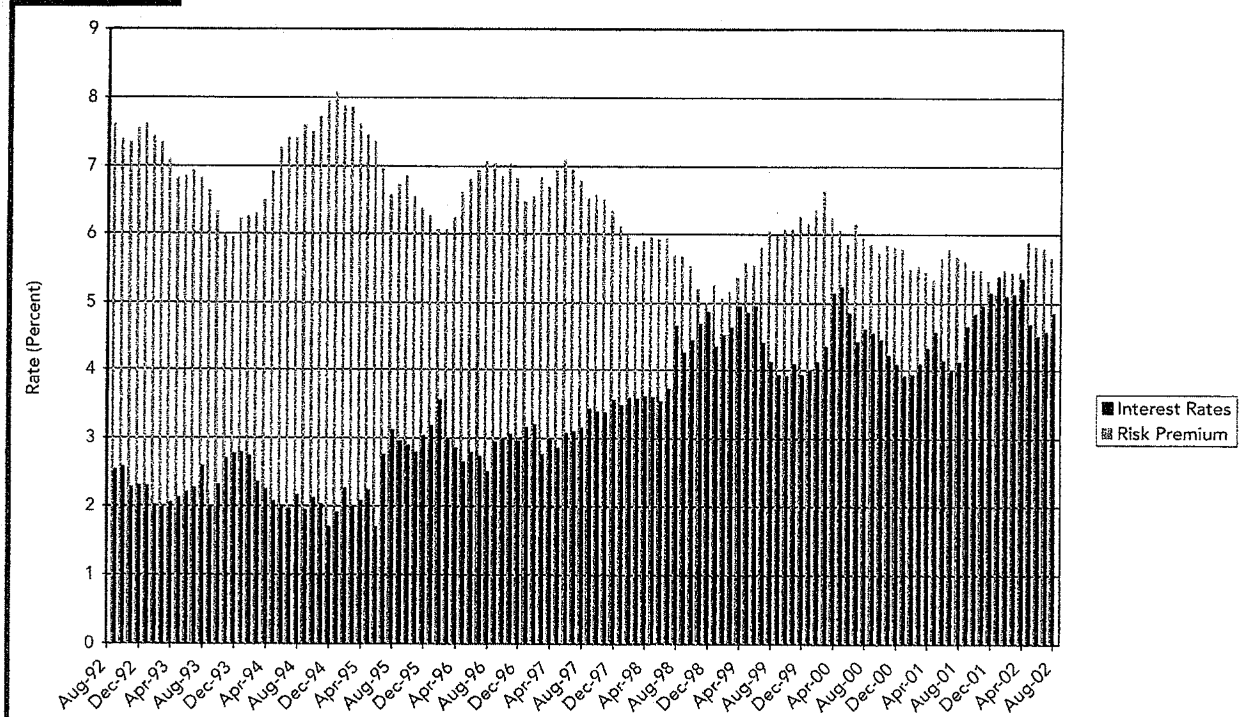


Exhibit 1

long-term government bonds dating back to 1926, as reported by Ibbotson Associates.[1]

The validity of using ex post premiums determined in markets from long-ago periods is called into question, with improvements and advances in market efficiencies, portfolio theory, the creation of options and futures markets, financial regulations and reporting, and the increased availability and quality of investor information. The earned returns from long ago are simply not representative of today's markets.

The risk premium method of estimating the cost of equity is an intuitively appealing and widely used approach for determining the required return on common equity capital. Naturally, one might point out that a benefit of a risk premium analysis, particularly from a utility ratemaking standpoint, is that it uses a longer time-period perspective and is less vulnerable to a particular capital market environment. However, the methodology used to calculate equity risk premiums should be consistent with financial theory regarding risk aversion and required returns. Consequently, equity risk premiums should be calculated using an ex ante methodology over a period long enough to ensure the robustness of the analysis, but not so long as to be obsolete.

ROE: How Much Return for the New Risks?

The required return on equity for the 1992 to 2001 period for Moody's Gas Distribution Index can be determined using a non-constant growth, quarterly-compounded discounted cash flow (DCF) model:[2]

$$Po(1-fc) = \sum_{t=1}^{n} Dt/(1+k)^t = (Dn(1+gn))/(k-gn) * (1/(1+k))^t$$

A two-stage model was used to take advantage of the explicit dividend forecasts that are available from *Value Line* (annual dividends for years one and four were given, while years two and three were interpolated). The long-term constant rate of growth was calculated using the earnings retention (b times r) method and Value Line's three- to five-year expected return on equity (r) and expected retention rate (b). The stock prices used were the average of the high and low prices for the relevant month. A three percent adjustment for flotation costs was included.

As shown in Figure 1, the equity risk premiums ranged from approximately two percent to 5.4 percent over the 10-year period. It is interesting to note that the premiums vary in relation to the level of interest rates, with the premiums being larger when interest rates are lower. Furthermore, in the current, low-interest rate environment, the risk premium for the index is approximately 500 basis points. The variation in premiums relative to interest rates for the natural gas distributors are consistent with those found by Brigham, Shome, and Vinson[3] for electric utilities and industrial companies.

In conclusion, the appeal of the risk premium method derives from its theoretic simplicity. Equity is riskier than debt because the return to equity investors is a residual return (i.e., equity investors are not paid until debt holders have been paid) and is less certain than the yield on bonds. Therefore, investors require a higher return on equity capital than on debt capital. By determining the premium required by investors for the additional risk associated with equity capital, the cost of equity can be estimated, given the required return on debt. Ⓕ

Ex post analyses [are] illogical . . . an ex ante approach is the appropriate way.

Mark Cicchetti is a project manager and manager of the Tallahassee, Fla. office for C.H. Guernsey & Co. Mr. Cicchetti can be reached at 850.906.9229 (phone), 850.906.9233 (fax) or mark.cicchetti@chguernsey.com

1 Ibbotson Associates' *Valuation Edition 2001 Yearbook*, page 65.

2 For ratemaking purposes, the return determined by a quarterly DCF calculation (the effective rate) may need to be adjusted to a nominal rate. See C.M. Linke, and J.K. Zumwalt, "Estimation Biases in Discounted Cash Flow Analyses of Equity Capital Cost in Rate Regulation." Financial Management, Autumn 1984, p. 15-21, and M. Cicchetti, "The Quarterly DCF Model, Effective and Nominal Rates of Return and the Determination of Revenue Requirements for Regulated Public Utilities," National Regulatory Research Institute Quarterly Bulletin, Fall 1989, p. 249-259.

3 See E.F. Brigham, D.K.Shome, and S.R. Vinson, "The Risk Premium Approach to Measuring a Utility's Cost of Equity," Financial Management, Spring 1985, p. 33-45.

Irregular Incentives

By Mark A. Cicchetti

Does current regulation allow utilities to have their cake and eat it too?

Public utility regulation lacks a formal proxy for the economic profits that can be earned in an effectively competitive market if a firm is efficient or innovative. After all, public utility regulation operates on a cost-plus basis. If a utility is efficient or innovative and lowers its costs, its typical reward is to have its rates reduced. This is a perverse incentive to motivate a utility to produce at the most efficient level. In addition, since regulation operates on this cost-plus basis, a utility can increase its net income, all other things being equal, by overinvesting in (or "gold-plating") its system, another perverse incentive.

Recognizing these flaws of regulation, academicians, utility executives, regulators, and legislators have tried over the last several years to implement incentive regulation plans that correct such perverse incentives. However, under many of the earnings-sharing or price-regulation incentive plans, the rewards for efficient production are not tied directly to measures under a company's control. In fact, such plans could prove highly detrimental to ratepayers and competitors of the regulated company and its affiliates.

Under a typical earnings-sharing plan, a utility has the opportunity, after sharing, to earn above its cost of equity. In some cases, the amount can be significantly higher. Although certain factors, such as refinancing from higher- to lower-cost long-term debt, can be removed from a sharing formula, events such as a reduction in a company's cost of equity, declining production costs, or a booming economy obviously could produce returns to a company that are significantly above its cost of equity. Under such a scenario, any returns above the cost of equity would be earned without an associated company-controlled improvement in efficiency. This scenario engenders monopoly profits as the solution to the monopoly profits problem—the reason why the company was regulated in the first place!

Under price-regulation plans, the same result could occur through manipulations such as price squeezes or price increases on services with inelastic demand. Generally, price-regulation plans allow a regulated company to charge prices within a predetermined band. This is done with the understanding that such prices may result in a return on common equity above the company's cost of equity. In fact, the opportunity to earn a return above the cost of equity is usually considered the incentive to minimize costs. Although many price-regulation plans include a productivity offset, they also generally include an inflation factor that could offset the productivity factor if a company operates in a declining cost environment. Furthermore, the productivity factor could prove either much too high or much too low. Finally, under an incentive plan having "sharing points," or a maximum allowed return on common equity, the company faces the same type of perverse gold-plating incentive as under traditional regulation.

An incentive regulation plan that ties an appropriate reward for efficient production to specific efficiency gains is a better proxy of an effectively competitive environment. What's more, it is superior to an incentive plan that rewards circumstances beyond the company's control or self-serving manipulation. This is particularly true if no earnings cap is associated with the reward for efficiency. Rewards for efficient production should be tied to specific actions. A suitable incentive plan does not preclude appropriately derived flexible prices for certain products or services where warranted.

Common inequity

To understand how earnings-sharing and price-regulation incentive plans can harm utility ratepayers and competitors, one must understand the effect of market structure on a firm's return on common equity.

"Market structure" is the range of conditions (such as the number of firms, the economies of scale or scope, the type of product sold, and the demand for a product) that may affect a firm's behavior and performance. Market structure is best thought of as a line stretching between purely competitive markets and natural monopoly. Purely competitive markets are characterized by minimal economies of scale or scope; no single supplier has a natural cost advantage over other suppliers. In the short run, a firm can earn economic profits (that is, a return above its cost of capital) only if it is efficient or innovative. In the long run, a firm cannot earn above its cost of capital due to the ease of entry into and exit from the market. If a firm in an effectively competitive environment is earning above its cost of equity, new firms will try to share those profits.

Another way to look at it is to recall that in economics "long term" is defined as the period of time necessary to change production processes. In the long term, economists like to say, a firm's competitors will match its efficiency by changing their production processes.

Incentive regulation that ties rewards for efficient production to gains in efficiency is a better proxy of effective competition.

Natural monopoly markets, by contrast, are marked by substantial economies of scale or scope and decreasing average costs. This means that one supplier can always serve the market at lower unit cost than two or more suppliers. Entry barriers are severe, because the single most efficient provider will always be able to price below any potential entrant. Left unregulated, a natural monopoly will not produce competitive results. Assuming an industry is a natural monopoly, regulation benefits society by increasing output while reducing price and economic profits. Regulators do this by backing away from the objectives of allocative efficiency and marginal-cost pricing, and by establishing a "fair-return" price. Although this does not produce a socially optimum price and output, it is an improvement over an unregulated natural monopoly.

Because utilities must meet the peak demand for their products or services, they generally have significant excess capacity during periods of normal demand. This requires a high level of facilities investment, which means that the unit costs of production will probably decrease over a wide range of output. The result is a socially optimum price that is below average cost. Pricing here would likely result in bankruptcy. Therefore, regulators set a "fair-return" price that allows a utility to recover the reasonable and prudent costs associated with providing utility service, including an appropriate return on common equity.

The telephone experience

Most earnings-sharing and price-regulation incentive plans are in place for telecommunications companies. The cost and demand functions associated with providing local exchange service continue to exhibit the characteristics of natural monopoly. Large fixed investments are necessary to provide homogenous local exchange service to large numbers of customers, and the obligation to serve does not allow free exit. In addition, no practical alternatives to the local exchange companies currently exist for basic telephone service.

By contrast, other telecommunications markets have seen technological advances that have lowered costs, enabling at least several firms of efficient size to compete to supply high-volume customers. Consequently, adequate protection for ratepayers and competitors must ensure that the regulated company's profits associated with basic monopoly services are sufficiently constrained either by effective competition or adequate regulation. An incentive regulation plan that potentially allows a regulated monopoly supplier to generate hundreds of millions of dollars a year above its cost of equity for reasons not related to specific efficiency gains is not in the public interest, yields excessive compensation, and provides a source of funding to subsidize competitive services that would not be available if the company operated in an effectively competitive environment.

A generally accepted rule is that regulation should act as a proxy for competition. A more appropriate incentive regulation plan would provide a proxy for the economic profits a firm could earn in a competitive environment and would be tied directly to company efforts to increase production efficiency.

Rewards for a job well done

A regulatory incentive plan that provides a proxy for economic profits earned in an effectively competitive environment and ties rewards to measures under a company's control can be created. An efficiency-based incentive regulation plan for a regulated telecommunications firm can be created by determining the company's per-access-line cost of providing basic local exchange service, based on the amount invested, and then calculating the operating and maintenance expenses and the capital costs associated with investment. These categories relate to the company's rate base, net operating income, and cost of capital used in rate base regulation. The amounts used should be company-reported costs and not commission-allowed costs, since a regulatory commission can select exactly which costs it wants to target to provide an efficiency incentive.

Next, the regulatory commission would create a regional (state or national) rural/urban index of similar costs for the local exchange providers serving the designated area. Finally, the commission would determine what percentage of cost savings the company would receive (in addition to its cost of providing service) if the company produced at a cost below the average cost of the index. Such an index could be created for any regulated industry. The concept applies to all companies under a regulatory commission's jurisdiction, since all regulated firms face the same perverse regulatory incentives.

The regulatory commission would be able to adjust the index or the company's results for outside factors where warranted—for example, if a company experienced unique costs attributable to uncommon circumstances. No earnings cap would be associated with earnings from cost savings and, therefore, no motivation would exist to gold-plate rather than economize. There would be less likelihood of unwanted results related to earnings-sharing and price-regulation plans, because the company's reward would be tied directly to efficiency gains and not to revenue production, as under some current and proposed incentive regulation plans. Additionally, industrywide costs and productivity improvements, including those associated with technological advances, would be reflected in the regional index, eliminating the need for inflation and productivity offsets.

Unregulated industries experience technological gains and productivity improvements. For a firm facing effective competition in an unregulated industry to earn economic profits, it must be especially efficient or innovative compared to its competitors. Therefore, an efficiency-based incentive plan is a better proxy of the competitive environment than the typical earnings-sharing and price-regulation plans in place or proposed. Of course, under any incentive regulation plan, regulators should continue to monitor acceptable service quality.

The carrot and stick of competition

Relatively recent regulatory decisions allowing entry into markets where technological advances were assumed to have reduced or eliminated natural monopoly aspects have made regulated utilities keenly aware of economic and uneconomic bypass.

Economic bypass occurs when a regulated utility's product or service can be provided more efficiently by a competitor. The gains associated with bypass through trade between a customer and the utility's competitor are preserved by society because the customer's demands are met by the lowest-cost provider. Assuming a regulated utility is operating in a natural monopoly market and its prices are set appropriately (that is, not above the reasonable and prudent costs associated with providing service and not below long-run incremental cost), economic bypass could not occur.

Uneconomic bypass occurs when the customer's needs could be met more efficiently by the regulated utility supplier, but the firm's price is higher than its competitor's. This may happen if the utility's price reflects inefficiencies or is set at a point above its true cost. The customer will then seek to bypass the regulated firm's excessive price.

Existing and potential competitors ready to attack inefficient prices make an efficiency-based incentive plan more feasible now that entry into contestable markets is acceptable.

Mark Cicchetti, former chief of finance for the Florida Public Service Commission, is president of Tallahassee, FL-based Cicchetti & Co. and the National Society of Rate of Return Analysts. He is former chief of finance at the Florida Public Service Commission.

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Attachment 1.

THE QUARTERLY DCF MODEL, EFFECTIVE AND NOMINAL RATES OF RETURN AND THE DETERMINATION OF REVENUE REQUIREMENTS FOR REGULATED PUBLIC UTILITIES

by Mark Cicchetti
Chief, Bureau of Finance, Florida PSC

Authors in previous articles[1] have brought forth the concepts of effective and nominal rates of return and their relation to the determination of revenue requirements for regulated public utilities. It appears that much confusion exists concerning these concepts.[2] This paper will examine the appropriateness of the quarterly discounted cash flow (DCF) model and will expound upon the consistency of the various assumptions relating to: (1) the model, (2) adjusting the effective rate to the nominal rate, and (3) the proper determination of revenue requirements for regulated public utilities.

The DCF model is the most generally accepted method of measuring the cost of equity capital. According to DCF theory, the cost of equity is the discount rate (required rate) which equates the present value of the expected cash flows associated with a share of stock to the stock's price. The expected cash flows consist of expected dividends plus the price investors expect to receive when they sell the stock. The sales price in any period (t) will equal the present value of the dividends and sales price expected after period (t). Therefore, applying this concept to all future sales prices, the current stock price can be shown to equal the present value of all dividends expected to be paid in the future, including any liquidating dividend. This relationship can be expressed as:

$$P_0 = \frac{D_1}{(1+K)} + \frac{D_2}{(1+K)^2} + \frac{D_3}{(1+K)^3} + \dots + \frac{D_\infty}{(1+K)^\infty} \qquad (1)$$

where: D_t = Dividend expected at the end of period t

K = Investor's required rate of return (the market cost of equity

P_0 = Price of stock at time zero

[1] For example see, C. M. Linke and J. K. Zumwalt, "Estimation Biases in Discounted Cash Flow Analyses of Equity Capital Cost in Rate Regulation," *Financial Management* (Autumn 1984): 15-20; J. J. Seigel, "The Application of the DCF Methodology for Determining the Cost of Equity Capital," *Financial Management* (Spring 1985): 46-51; and, C. M. Linke and J. K. Zumwalt, "The Irrelevance of Compounding Frequency in Determining a Utility's Cost of Equity," *Financial Management* (Autumn 1987): 65-69.

[2] See C. J. Cicchetti and J. D. Makholm, "The FERC's Discounted Cash Flow: A Compromise in the Wrong Direction," *Public Utilities Fortnightly*, July 9, 1987, 11-15; "Out of the Mailbag," *Public Utilities Fortnightly*, October 15, 1987 and May 16, 1988; and, "What Others Think," *Public Utilities Fortnightly*, February 4, 1988.

Assuming a constant growth in dividends (g) and g < k, equation (1) can be reduced to:

$$P_0 = \frac{D_1}{K - g} \qquad (2)$$

which, after rearranging terms, results in the familiar infinite-horizon, constant-growth, annual DCF model:

$$K = \frac{D_1}{P_0} + g. \qquad (3)$$

Equation (3) is predicated upon certain limiting assumptions including (1) annual dividend payment, (2) a constant rate of dividend growth, (3) P_0 determined on a dividend-payment date, and (4) an annual increase in dividends starting exactly one year in the future.

However, DCF models can be derived to evaluate cash flows of any periodicity (monthly, quarterly, annually, etc.) and/or growth. Any DCF model actually used should be derived to portray accurately the timing and amount of expected cash flows. Therefore, when dividends associated with common equity are paid on a quarterly basis, the investor's required return on common equity should be determined using a DCF model which reflects that quarterly payment.

A quarterly DCF model of the following form can be derived from equation (1):[3]

$$K = \frac{D_1(1+K)^{1-F_1} + D_2(1+K)^{1-F_2} + D_3(1+K)^{1-F_3} + D_4(1+K)^{1-F_4}}{P_0} + g \qquad (4)$$

where: D_1 through D_4 = The quarterly dividends expected over the coming year.

F_1, F_2, F_3, F_4 = The fraction of the year before the quarterly dividends are received.

The quarterly DCF model recognizes that investors receive dividends quarterly and can reinvest them at their required rate of return. Therefore, when dividends are paid every three months, the quarterly model produces a higher required rate of return than the annual model, which assumes investors receive their dividends at the end of the year. For example, if the current price of a company's stock is $30.85, the

[3] Equation (5) assumes dividends will increase at a constant rate. If dividends are not expected to increase at a constant rate, a non-constant growth quarterly DCF model should be used. For an excellent analysis of constant growth and non-constant growth quarterly DCF models, including equation (5), see E. F. Brigham and T. C. Tapley, *Modifications to the DCF Stock Valuation Model*, (Public Utilities Research Center, Working Paper Series November 1984).

expected dividend during the coming year is \$2.80 (\$0.70 quarterly with the first payment one quarter away), the company's last dividend was paid at the old rate and dividends are expected to increase annually at a constant rate of 4.5 percent, the annual model produces a cost of equity of 13.58 percent:

$$K = \frac{D_1}{P_0} + G = \frac{\$\,2.80}{\$30.85} + 4.5\% = 13.58\%,$$

while the quarterly model produces a cost of equity of 14.04 percent:

$$K = \frac{.70(1+K)^{.75} + .70(1+K)^{.50} + .70(1+K)^{.25} + .70(1+K)^{0}}{\$30.85} + 4.5\% = 14.04\%$$

The 46-basis-point difference (14.04% - 13.58% = .46%) between the two models is due to the time value of money associated with investors receiving quarterly dividends, as recognized by the quarterly model, rather than annually, as assumed by the annual model. Depending on the circumstances, the annual model can significantly underestimate investors' required return.

Although theory indicates the quarterly model is the proper model to use in determining an investor's required rate of return for common equity when dividends are paid quarterly, it is the annual model that has been used most often in regulatory proceedings. However, use of the quarterly model is becoming more common. Consequently, regulators should recognize that the investor's required rate of return determined by the quarterly model (the effective rate) needs to be adjusted to a nominal rate for use in determining revenue requirements. The adjustment is needed because of the reinvestment assumptions associated with dividends paid and earnings retained.

The inapplicability of the use of an effective annual DCF required rate of return as the basis for computing utility revenue requirements can be shown best through an example using a certificate of deposit that is compounded several times a year. The nominal rate, although lower than the effective rate, is used to calculate the interest. The effective rate is used for comparison purposes and for calculating annual return requirements but cannot be applied--unadjusted--to the relevant principal balance.

<u>The Nominal Rate of Return and the Determination of Revenue Requirements</u>: The goal of regulation is to set rates so shareholders can expect to earn their required rate of return. As commonly practiced, a utility's required after-tax equity earnings are determined as the product of the

DCF cost of equity, the percentage of equity in the capital structure and the amount of rate base. However, as previously stated, the market-determined quarterly DCF cost of equity--the effective rate--needs adjustment to recognize the reinvestment assumptions associated with dividends paid and earnings retained. By making this adjustment, the determination of the test-period equity ratio used in calculating the revenue requirement will be consistent with the assumption inherent in the quarterly DCF cost-of-equity calculation regarding the utility's accumulation of equity and payment of dividends.

The adjustment is made by determining the n-period compounded equivalent (the nominal rate) of the quarterly DCF required rate of return. The number of compounding periods used in determining the nominal rate should equal the number of compounding periods used in compounding the utility's reinvestment of accumulated equity. The n-period compounded equivalent of the quarterly DCF required rate of return can be calculated using the following equation:

$$K_{rate} = [(1 + K_{qDCF})^{1/n} - 1] \times 12 \tag{5}$$

where: K_{rate} = The rate making rate of return

K_{qDCF} = The quarterly DCF required rate of return

n = The number of compounding periods

By applying the nominal rate to each future, beginning-of-the-period equity balance, the utility will be provided with enough revenue to meet investor return requirements. However, if the effective required rate of return is applied to each future, beginning-of-the-period equity balance, the utility will be provided with more revenue than necessary to meet investor return requirements. This can be illustrated easily. Using the previous example, the quarterly model produced an effective required return on equity of 14.04 percent based on a stock price of $30.85, coming-year expected dividends of $2.80 and an expected growth rate of 4.5 percent. The assumptions inherent in this example are:

1. Stock price appreciation of $1.38825 ($30.85 x .045)
2. Earnings per share of $4.18825 ($1.38825 + $2.80)
3. Payout ratio of 66.85 percent ($2.80/$4.18825)
4. Growth in book value of 4.5 percent.

As shown in figure 1, applying the unadjusted quarterly DCF required rate of return to the beginning-of-the-period equity balance associated with each month of the test period produces a revenue requirement greater than necessary to meet the investor requirements inherent in the DCF cost of equity calculation.

As can be seen, the assumptions concerning earnings per share, the payout ratio, the growth in book value and the growth in per-share stock price are not consistent with those inherent in the DCF cost-of-equity calculation. This is due to the compounding associated with the utility's reinvestment of accumulated equity. Therefore, the DCF required rate of return--again, the effective rate--should be adjusted to a nominal rate of return to recognize the compounding associated with dividends paid and retained earnings. The sum of dividends, earnings on reinvested dividends and earnings on the utility's equity will result in the investor earning the required effective rate of return.

As shown in figure 2, applying the ratemaking rate of return of 13.21 percent,

$$13.21\% = [(1 + .1404)^{1/12} - 1] \times 12$$

to the beginning of the period equity balance associated with each month of the test period provides the utility with only the revenue necessary to meet the investor requirements inherent in the DCF cost of equity calculation.

The required rate of return used in determining revenue requirements may also need adjustment to accommodate the equity-ratio construct mandated by the regulatory agency (that is, 13-month-average, 12-month-average, etc.).

The ratemaking rate of return can be determined for any equity-ratio construct used by a regulatory agency simply by relating the required after-tax equity earnings as determined in figure 2, to the equity-ratio construct used by the regulatory agency. This relationship can be expressed as follows:

$$K_{rate} = \frac{\text{Required after-tax equity earnings}}{\text{Equity-ratio construct}} \qquad (6)$$

Continuing with the previous example and assuming a 13-month average rate base/equity ratio-construct, the ratemaking rate of return is 13.19 percent:

$$K_{rate} = \frac{\$\ 13,576}{\$102,898} = 13.19\%$$

Figure 3 shows that the use of the 13-month average rate base and the 13.9 percent ratemaking rate of return produce results consistent with the assumptions inherent in the DCF cost of equity calculation and those achieved in figure 2.

Inherent in equation (6) is the assumption that earnings will occur evenly over the year. This is a simplifying assumption that may not always be valid. For example, most natural gas distributors' earnings may occur during the winter months. Therefore, to account for an uneven earnings pattern, a weighted monthly equity factor should reflect the expected pattern of earnings. Figure 4 shows how the monthly equity factor can be determined using the expected monthly earnings to develop monthly weights. The weights are then used, as in equation (8), to solve through an iterative process for the nominal rate.

Figure 5 shows that application of the weighted monthly equity factor to the expected beginning-of-the-period equity balances will provide the investor with the effective required return on his initial investment. The effects of compounding and the size of the continuing equity balance will be affected by the degree to which earnings are slanted toward either the beginning or end of the test period. As shown in figure 5, when the earnings are concentrated in the beginning of the year, the adjustment to accommodate the 13-month average equity-ratio construct decreases the nominal rate by approximately 22 basis points.

Conclusions: The DCF model used to determine an investor's required rate of return should be derived to portray accurately the timing and amount of expected cash flows. When the dividends associated with common equity are paid on a quarterly basis, the investor's required return on common equity should be determined using a quarterly DCF model. However, the required rate of return determined by the DCF model--the effective rate--should be adjusted to a nominal rate of return for use in determining revenue requirements. The need for the adjustment is due to the reinvestment assumptions associated with dividends paid and earnings retained and certain regulatory practices regarding the equity ratio construct.

By applying the nominal rate to each future, beginning-of-the-period equity balance, the utility will be provided with only enough revenue to meet the investor return requirements inherent in the DCF cost of equity calculation. All other things being equal, ratepayers will not be overcharged or undercharged. Furthermore, given the amount of investment made by public utilities, proper determination of their allowed rate of return and the associated revenue requirements can have a significant effect.

MONTH (1)	COMMON EQUITY (2)	MONTHLY COST OF EQUITY FACTOR (3)	REV. REQ. (4)	EPS (5)	DPS (6)	P/O RATIO (7)	STOCK PRICE (8)
DEC 31,19X1	100000						30.85
JAN 31,19X2	101170	0.01170075	1170	0.3610			31.21
FEB 29	102354	0.01170075	1184	0.3652			31.58
MAR 31	101282	0.01170075	1198	0.3695	0.70	0.6389	31.25
APR 30	102467	0.01170075	1185	0.3656			31.61
MAY 31	103666	0.01170075	1199	0.3699			31.98
JUNE 30	102610	0.01170075	1213	0.3742	0.70	0.6308	31.66
JULY 31	103811	0.01170075	1201	0.3704			32.03
AUG 31	105026	0.01170075	1215	0.3747			32.40
SEPT 30	103985	0.01170075	1229	0.3791	0.70	0.6227	32.08
OCT 31	105202	0.01170075	1217	0.3754			32.45
NOV 30	106433	0.01170075	1231	0.3797			32.83
DEC 31	105409	0.01170075	1245	0.3842	0.70	0.6144	32.52
TOTAL			14486	4.4688	2.80	0.6266	

	DCF Analysis	Exhibit 1
DPS	$2.80	$2.80
EPS	$4.18825	$4.4688
P/O Ratio	66.85%	62.66%
Stock Price Appreciation	$1.38825	$1.6688
End of Period Book Value	$104,500	$105,409

Notes:
1) Monthly factor = Market required rate of return of 14.04% : 12 = .01170075
2) Previous month's ending balance is current month's beginning balance
3) Assumes 100% equity financing. For firms not 100% equity financed the amount of equity would be used to determine the equity ratio.
4) Monthly compounding of accumulated earnings.

Fig. 1. Company is allowed the quarterly DCF required rate of return on the beginning of the period equity balance associated with each month of the test period. For expository convenience the examples presented ignore flotation costs. For an excellent analysis regarding the need for a flotation cost adjustment see E. F. Brigham, D. A. Aberwald and L. C. Gapenski, "Common Equity Flotation Costs and Ratemaking," *Public Utilities Fortnightly*, May 2, 1985, 28-36.

MONTH (1)	COMMON EQUITY (2)	MONTHLY COST OF EQUITY FACTOR (3)	REV. REQ. (4)	EPS (5)	DPS (6)	P/O RATIO (7)	STOCK PRICE (8)
DEC 31,19X1	100000						30.85
JAN 31,19X2	101101	0.011009073	1101	0.3396			31.19
FEB 29	102214	0.011009073	1113	0.3434			31.53
MAR 31	101070	0.011009073	1125	0.3471	0.70	0.6795	31.18
APR 30	102183	0.011009073	1113	0.3433			31.52
MAY 31	103308	0.011009073	1125	0.3470			31.87
JUNE 30	102176	0.011009073	1137	0.3509	0.70	0.6723	31.52
JULY 31	103301	0.011009073	1125	0.3470			31.87
AUG 31	104438	0.011009073	1137	0.3508			32.22
SEPT 30	103319	0.011009073	1150	0.3547	0.70	0.6650	31.87
OCT 31	104456	0.011009073	1137	0.3509			32.22
NOV 30	105606	0.011009073	1150	0.3548			32.58
DEC 31	104500	0.011009073	1163	0.3587	0.70	0.6577	32.24
TOTAL			13576	4.1882	2.80	0.6685	

	DCF Analysis	Exhibit 2
DPS	$2.80	$2.80
EPS	$4.18825	$4.18825
P/O Ratio	66.85%	66.85%
Stock Price Appreciation	$1.38825	$1.38825
End of Period Book Value	$104,500	$104,500

Notes:
1) Monthly factor = Ratemaking rate of return of 13.21% : 12 = .011009073
2) Previous month's ending balance is current month's beginning balance
3) Assumes 100% equity financing. For firms not 100% equity financed the amount of equity would be used to determine the equity ratio.
4) Monthly compounding of accumulated earnings.

Fig. 2. Company is allowed the ratemaking rate of return on the beginning of the period equity balance associated with each month of the test period

MONTH (1)	COMMON EQUITY (2)	MONTHLY COST OF EQUITY FACTOR (3)	REV. REQ. (4)	EPS (5)	DPS (6)	P/O RATIO (7)	STOCK PRICE (8)
DEC 31,19X1	102898						30.85
JAN 31,19X2	102898	0.01099477	1131	0.3490			31.20
FEB 29	102898	0.01099477	1131	0.3490			31.55
MAR 31	102898	0.01099477	1131	0.3490	0.70	0.6685	31.20
APR 30	102898	0.01099477	1131	0.3490			31.55
MAY 31	102898	0.01099477	1131	0.3490			31.90
JUNE 30	102898	0.01099477	1131	0.3490	0.70	0.6685	31.54
JULY 31	102898	0.01099477	1131	0.3490			31.89
AUG 31	102898	0.01099477	1131	0.3490			32.24
SEPT 30	102898	0.01099477	1131	0.3490	0.70	0.6685	31.89
OCT 31	102898	0.01099477	1131	0.3490			32.24
NOV 30	102898	0.01099477	1131	0.3490			32.59
DEC 31	102898	0.01099477	1131	0.3490	0.70	0.6685	32.24
TOTAL			13576	4.1882	2.80	0.6685	

Notes:
1) Monthly factor = Ratemaking rate of return for 13-month average rate base/equity ratio of 13.19% : 12 = .01099477
2) Previous month's ending balance is current month's beginning balance
3) Assumes 100% equity financing. For firms not 100% equity financed the amount of equity would be used to determine the equity ratio.
4) Monthly compounding of accumulated earnings.
5) Mkt/Bk ratio calculated using actual book value and not allowed average book value.

Fig. 3. Company is allowed the ratemaking rate of return on the 13-month average equity rate base

MONTH	EARNINGS	AS A PERCENT OF TOTAL EARNINGS	CUMULATIVE PERCENT
--------	--------	------	-----
JANUARY	$2,245	15.99%	15.99%
FEBRUARY	$2,000	14.25%	30.24%
MARCH	$1,695	12.07%	42.31%
APRIL	$900	6.41%	48.72%
MAY	$900	6.41%	55.13%
JUNE	$900	6.41%	61.54%
JULY	$900	6.41%	67.95%
AUGUST	$900	6.41%	74.36%
SEPTEMBER	$900	6.41%	80.77%
OCTOBER	$900	6.41%	87.18%
NOVEMBER	$900	6.41%	93.59%
DECEMBER	$900	6.41%	100.00%
--------	--------	------	-----
	$14,040	100.00%	

INVESTOR'S REQUIRED RETURN = 14.04%

INVESTOR'S REQUIRED RETURN = ((1+(MW1xNR))x(1+(MW2xNR))x(1+(MW3xNR))x (8)
(1+(MW4xNR))x(1+(MW5xNR))x(1+(MW6xNR))x
(1+(MW7xNR))x(1+(MW8xNR))x(1+(MW9xNR))x
(1+(MW10xNR))x(1+(MW11xNR))x(1+(MW12xNR))) - 1

WHERE:

MW = MONTHLY WEIGHT(MONTHLY EARNINGS AS A PERCENT OF TOTAL EARNINGS)
NR = NOMINAL RATE OF RETURN(SOLVED ITERATIVELY)

14.04% = ((1+(.1599 x .132222226))x(1+(.1425 x .132222226))x(1+(.1207 x .132222226))x
(1+(.0641 x .132222226))x(1+(.0641 x .132222226))x(1+(.0641 x .132222226))x
(1+(.0641 x .132222226))x(1+(.0641 x .132222226))x(1+(.0641 x .132222226))x
(1+(.0641 x .132222226))x(1+(.0641 x .132222226))x(1+(.0641 x .132222226))) - 1

Fig. 4. Determination of nominal rate of return using expected monthly revenue flows to develop weights

EXHIBIT 5: REVENUES CONCENTRATED AT THE BEGINNING OF THE YEAR

		YEAR 1 COMMON EQUITY	MONTHLY EQUITY FACTOR	DOLLAR EARNINGS
BEGINNING BALANCE		$100,000.00		
MONTH	JANUARY	$102,114.23	0.0211423339	$2,114.23
	FEBRUARY	$104,038.24	0.0188416672	$1,924.00
	MARCH	$105,698.61	0.0159592227	$1,660.37
	APRIL	$106,594.45	0.0084754447	$895.84
	MAY	$107,497.88	0.0084754447	$903.44
	JUNE	$108,408.98	0.0084754447	$911.09
	JULY	$109,327.79	0.0084754447	$918.81
	AUGUST	$110,254.39	0.0084754447	$926.60
	SEPTEMBER	$111,188.85	0.0084754447	$934.45
	OCTOBER	$112,131.22	0.0084754447	$942.37
	NOVEMBER	$113,081.58	0.0084754447	$950.36
	DECEMBER	$114,040.00	0.0084754447	$958.42
TOTAL			0.132222226	$14,040.00
13-MONTH AVERAGE		$108,028.94		

REQUIRED RETURN ON EQUITY (EFFECTIVE RATE) = 14.04%

REQUIRED DOLLAR RETURN ON INITIAL INVESTMENT = 14.04% X $100,000 = $14,040

APPLICATION OF RATEMAKING RATE OF RETURN (WEIGHTED BY EXPECTED EARNINGS FLOW) = $14,040

RATEMAKING RATE OF RETURN ADJUSTED FOR 13-MONTH AVERAGE RATEBASE = $14,040/$108,028.94 = 12.9965174%

APPLICATION OF ADJUSTED RATEMAKING RATE OF RETURN TO 13-MONTH AVERAGE BALANCE = 12.9965174% X $108,937.57 = $14,040

Fig. 5. Revenues concentrated at the beginning of the year

What Others Think

Reconciling Rate Base and Capital Structure: The Balance Sheet Method

By Mark Cicchetti*

Under the rate base and rate of return approach of determining revenue requirements, the investment in plant and related items (rate base) is multiplied by the required overall rate of return (cost of capital) to produce the required net operating income. This required net operating income is then compared to the expected net operating income to determine, after an appropriate adjustment for taxes, the necessary revenue increase or decrease. Under this methodology, the revenue requirement will equal the total of: operations and maintenance expenses; depreciation; taxes; and the cost of capital invested in the rate base.

The reconciliation of the rate base and the capital structure is an integral, and often overlooked, segment of determining the required overall rate of return. The reasons why this is so, and an example of the balance sheet method of reconciling rate base and capital structure are presented in this article.

Figure 1

Cost of Capital Calculation

	Amount	Ratio	Cost Rate	Weighted Average Cost
Long-term Debt	$ 400	40%	10%	4.0%
Short-term Debt	50	5	8	.4
Preferred Stock	200	20	9	1.8
Common Equity	350	35	15	5.25
	$1,000	100%		11.45%

Rate of Return Calculation

Under the rate base and rate of return approach, the required rate of return is determined by multiplying the relative percentages of the capital structure components by their associated cost rates and then summing the weighted average costs. In this way, the relative cost contribution associated with each capital structure component is recognized. Figure 1 illustrates a simple cost of capital calculation.

It is obvious that any change in the relative percentage of a capital structure component or to its associated cost rate will change the weighted cost of the component and therefore change the required overall rate of return. The purpose of the reconciliation of rate base and capital structure is to determine what per cent of the jurisdictional rate base each capital structure component supports. The per books relative percentages of the capital structure components may not be appropriate due to rate base adjustments that can be traced to a specific source (or sources) of funds or to regulatory philosophy.

Reconciling Rate Base and Capital Structure

Under the balance sheet method, rate base is defined as: net plant in service; property held for future use; construction work in progress; and working capital. Capital structure is defined as the funds used by the company to support the rate base. By definition, the rate base and the capital structure are equal. This is shown in Figures 2 and 3. Figure 2 is a sample balance sheet and Figure 3 shows the various accounts related to the rate base and the capital structure based on the sample balance sheet.

By combining similar items, the rate base and capital structure can be presented as shown in Figure 4.

As adjustments are made to remove items from the rate base, corresponding adjustments must be made to the capital structure to keep the rate base and capital structure in balance. If a pro-rata adjustment is made to the capital structure (an adjustment to each capital structure component in proportion to its relative weight) there is no change in the required overall rate of return. However, if an adjustment is made to a specific capital structure component, the relative percentages change and the required overall rate of return changes.

Pro-rata Reduction versus Tracing Funds

Sources of particular funds are readily traceable but the uses of particular funds are not. Debt, equity, deferred taxes, and other capital structure components are all sources of funds available to a company and readily traceable to their source (the bond issue, the shares of stock, the plant purchased, et cetera). The funds made available to a company are placed in a cash account, or if you will, the cash register. When a dollar is taken out of the cash account or cash register, one cannot tell whether one is holding an equity dollar or a debt dollar, or some other kind of dollar. Therefore, the sources of particular funds are traceable but the uses of particular funds are not.

The capital structure of a utility company represents the funds used by the company to finance the rate base. When it is determined that an

*Staff member, auditing and financial analysis, Florida Public Service Commission. Views expressed are the author's and do not necessarily reflect those of the Florida Public Service Commission.

Figure 2

Sample Balance Sheet

Line No.	Account No.	Account Name	Company Total Per Books (000)
		Utility Plant	
1	101	Electric Plant in Service	$ 1,124,498
2	105	Electric Plant Held for Future Use	18,669
3	106	Completed Construction not classified – Electric*	*
4	107	Construction Work in Progress – Electric	315,305
5	108	Accum. Prov. for Depr. of Elec. Utility Plant	(316,409)
6	111	Accum. Prov. for Amort. of Elec. Utility Plant	(285)
7			1,141,778
8		**Other Property and Investments**	
9	121	Nonutility Property	307
10	122	Accum. Prov. for Depre. of Nonutility Property	(34)
11	128	Other Special Funds	1
12			274
13		**Current and Accrued Assets**	
14	125	Sinking Funds	99
15	131	Cash	6,918
16	134	Other Special Deposits	182
17	135	Working Funds	146
18	136	Temporary Cash Investments	0
19	141	Notes Receivable	0
20	142	Customer Accounts Receivable	53,840
21	143	Other Accounts Receivable	7,149
22	144	Accum. Provision for Uncollectible Accounts	(530)
23	145	Notes Receivable from Associated Companies	0
24	146	Accounts Receivable from Associated Companies	128
25	151	Fuel Stock	67,474
26	152	Fuel Stock Expenses Undistributed	0
27	153	Residuals	0
28	154	Plant Materials and Operating Supplies	26,294
29	156	Other Materials and Supplies	34
30	163	Stores Exp. Undistributed	12
31	165	Prepayments	1,105
32	171	Interest and Dividends Receivable	2,372
33	173	Unbilled Revenue Receivable	13,248
34			173,640
35		**Deferred Debits**	
36	181	Unamortized Debt Expense	4,608
37	182	Extraordinary Property Loss	226
38	183	Preliminary Survey and Investigation	1,405
39	184	Clearing Accounts	110
40	186	Deferred Debits	4,195
41	188	Research and Development Expenditures	49
42	190	Deferred Income Tax	2,498
43			13,091
44		Total Assets and Other Debits	$ 1,333,574

*Included in 101.

asset should be removed from rate base, it is logical to want to remove the cost associated with financing the asset from the capital structure. However, should we remove the cost from equity? debt? deferred taxes? Since we cannot trace which funds were used to purchase the asset, it is only logical (and fair) to remove the item from the capital structure on a pro-rata basis. By making pro-rata adjustments, the relative percentages of the capital structure components remain intact and we get as accurate a reflection as possible of the cost of capital.

There is a school of thought that believes although the dollar cannot be traced, it is desirable to trace the benefits. In other words, all customer deposits, investment tax credits, and deferred taxes should be fully reflected in the jurisdictional capital structure. In addition to violating the tracing of funds co[illegible] this method does not allow th[illegible] ity company to recover its [illegible] capital costs. This may result i[illegible] company underearning and i[illegible] sible higher future capital cos[illegible] actly the opposite of what th[illegible] losophy set out to accomplis[illegible]

Although most adjustment [illegible] cannot be traced to a sp[illegible] source (or sources) of funds, [illegible] be desirable to adjust a sp[illegible]

Sample Balance Sheet — (Continued)

Line No.	Account No.	Account Name	Company Total Per Books (000)
		Proprietary Capital	
1	201	Common Stock Issued	$ 119,697
2	204	Preferred Stock Issued	84,956
3	202	Capital Stock Subscribed	0
4	207	Premium on Capital Stock	19
5	210	Gain on Resale or Cancel. of Reacq. Capital Stock	28
6	211	Miscellaneous Paid in Capital	154,932
7	214	Capital Stock Expense	(1,589)
8	216	Unapprop. Retained Earnings	182,586
9			540,629
10		**Long-term Debt**	
11	211	Bonds	407,953
12	225	Unpaid Premium on Long-term Debt	695
13			408,648
14		**Current and Accrued Liabilities**	
15	231	Notes Payable	65,790
16	232	Accounts Payable	20,754
17	233	Notes Payable to Associated Companies	0
18	234	Accounts Payable to Associated Companies	4,823
19	235	Customer Deposits	14,756
20	236	Taxes Accrued	5,003
21	237	Interest Accrued	10,369
22	238	Dividends Declared	4,136
23	241	Tax Collections Payable	2,292
24	242	Miscellaneous Current and Accrued Liabilities	9,000
25			136,923
26		**Deferred Credits**	
27	253	Other Deferred Credits	18,094
28	255	Accumulated Deferred Investment Tax Credit	66,059
29			84,153
30		**Operating Reserve**	
31	262	Injuries and Damages Reserves	1,026
32			1,026
33		**Accumulated Deferred Income Tax**	
34	281	Accum. Deferred Income Tax — Amort. Property	7,543
35	282	Accum. Deferred Income Tax — Other Property	110,914
36	283	Accum. Deferred Income Tax — Other	43,738
37			162,195
38		Total Liabilities and Other Credits	$ 1,333,574

source (or sources) of funds for accounting or regulatory purposes. For example, an item that is being recovered through a separate clause should have all its effects removed from the balance sheet. This would affect particular accounts and therefore particular capital structure components. Deferred taxes is the capital structure component most often affected by this type of adjustment.

If a regulatory authority desires to minimize any possible negative effects to ratepayers resulting from a utility financing nonutility property or nonregulated subsidiary, then all nonutility property and nonregulated subsidiary should be removed from the capital structure directly from equity. (This may increase the required return on equity.)

Also, if a regulatory authority decides to use the effective cost rates for the various capital structure components in calculating the required overall rate of return, then consistency dictates that items such as unamortized debt expense and prepaid interest on short-term debt be removed from long-term debt and short-term debt, respectively, and their cost rates adjusted accordingly.

Since the purpose of removing an item from a specific capital structure component is to remove the effect of that item from the capital structure, all pro-rata adjustments should be made using ratios calculated after the adjustments to specific capital structure components have been made.

Figure 3

Relation of Accounts to Rate Base and Capital Structure

Rate Acct. No.	Base Amount	Capital Structure Acct. No.	Amount
101	$ 1,124,498	201	$ 119,697
105	18,669	204	84,956
107	315,305	207	19
108	(316,409)	210	28
111	(285)	211	154,932
121	307	214	(1,589)
122	(34)	216	182,586
128	1	211	407,953
125	59	225	695
131	6,918	231	65,790
134	182	235	14,756
135	146	255	66,059
142	53,840	281	7,543
143	7,149	282	110,914
144	(530)	283	43,738
146	128	190	(2,498)
151	67,474		
154	26,294	Total	$ 1,255,579
156	34		
163	12		
165	1,105		
171	2,372		
173	13,248		
182	226		
183	1,405		
184	110		
186	4,195		
188	49		
232	(20,754)		
234	(4,823)		
236	(5,003)		
237	(10,369)		
238	(4,136)		
241	(2,292)		
242	(9,000)		
253	(18,094)		
262	(1,026)		
181	4,608		
Total	$ 1,255,579		

Figure 4

Rate Base

Net Plant in Service	808,078
CWIP — No AFUDC	315,305
Plant held for future use	18,669
Working Capital	113,527
	1,255,579

Capital Structure

Long-term Debt	408,648
Short-term Debt	65,790
Preferred Stock	84,956
Customer Deposits	14,756
Common Equity	455,673
Tax Credits — O Cost	3,272
Tax Credits — WTD. Cost	62,787
Accumulated Def. Inc. Taxes	159,697
	1,255,579

Jurisdictional Separation Factors

For rate base items, the jurisdictional separation factors represent the per cent of the system amount that is jurisdictional. For capital structure purposes the jurisdictional separation factor is simply a plug number that maintains the relative capital structure component percentages when going from a system amount to a jurisdictional amount as shown in Figure 5.

If a regulatory authority decides that the jurisdictional separation factor for customer deposits should be 100 per cent, then the capital structure jurisdictional separation factor is calculated as shown in Figure 6.

Conclusion

The reconciliation of rate base and capital structure is an integral part of determining the required overall rate of return. Since the required overall rate of return directly affects the revenue requirement, examining the logic behind capital structure adjustments is time well spent. A several basis point change in the required overall rate of return can mean a difference of several million dollars to a large utility.

By using the balance sheet method of reconciling the rate base and capital structure, one can analyze, on a step-by-step basis, the adjustments made to rate base and how they affect the capital structure and required overall rate of return. A sample rate base and capital structure reconciliation, with a limited number of adjustments, is presented in Figure 7. All accounts are assumed to be 100 per cent jurisdictional.

Figures 5, 6, and 7 follow on next page.

Figure 5

Rate Base

	System Amount	Jurisdictional Separation Factor	Jurisdictional Amount
Net Plant in Service	$ 808,078	.81115	$ 655,472
CWIP – No AFUDC	315,305	.95025	299,619
Plant Held for Future Use	18,669	.98000	18,296
Working Capital	113,527	.99000	112,392
	$1,255,579	.864764	$1,085,779

Capital Structure

	Amount	Jurisdictional Separation Factor	Jurisdictional Amount
Long-term Debt	$ 408,648	.864764	$ 353,384
Short-term Debt	65,790	.864764	56,893
Preferred Stock	84,956	.864764	73,467
Customer Deposits	14,756	.864764	12,760
Common Equity	455,673	.864764	394,049
Tax Credits – O Cost	3,272	.864764	2,830
Tax Credits – WTD Cost	62,787	.864764	54,296
Accumulated Def. Inc. Taxes	159,697	.864764	138,100
	$1,255,579		$1,085,779

Figure 6

Calculation of Jurisdictional Amount

	Amount	Jurisdictional Separation Factor	Jurisdictional Amount
Long-term Debt	$ 408,648	.863155	$ 352,727
Short-term Debt	65,790	.863155	56,787
Preferred Stock	84,956	.863155	73,330
Customer Deposits	14,756	1.0000	14,756
Common Equity	455,673	.863155	393,317
Tax Credits – O Cost	3,272	.863155	2,824
Tax Credits – WTD Cost	62,787	.863155	54,195
Accumulated Def. Inc. Taxes	159,697	.863155	137,843
	$1,255,579		$1,085,779

1,255,579	1,085,779			
– 14,756	– 14,756	1,071,023	=	.863155
1,240,823	1,071,023	1,240,823		

Figure 7

Sample Reconciliation

($000)

	Amount Per Books	Non-Utility	Unamort. Debt Expense	Prepaid Interest Short-Term Debt	CWIP	Adjusted Amount
Net Plant in Service	808,078	–273				807,805
CWIP – No AFUDC	315,305				–129,159	186,146
Plant Held for Future Use	18,669					18,669
Working Capital	113,527		–4,608	–392		108,527
	1,255,579	–273	–4,608	–392	–129,159	1,121,147

Rate Base Adjustments	
Nonutility	–273
Unamor. Debt. Ex.	–4,608
Pre. Int. Std.	–392
CWIP	–129,159

Component	Amount Per Books	Non-Utility	Unamort. Debt Expense	Prepaid Interest Short-Term Debt	Amount	Per Cent	CWIP	Adjusted Amount	Per Cent	Cost Rate	Weighted Average Cost Rate
Long-term Debt	408,648		–4,608		404,040	32.3153	–41,738	362,302	32.3153	9.89%	3.1960%
Short-term Debt	65,790			-392	65,398	5.2306	–6,756	58,643	5.2306	7.96	0.4164
Preferred Stock	84,956				84,956	6.7948	–8,776	76,180	6.7948	9.00	0.6155
Customer Deposits	14,756				14,756	1.1802	–1,524	13,232	1.1802	7.88	0.0930
Common Equity	455,673	–273			455,400	36.4231	–47,044	408,356	36.4231	15.00	5.4635
Tax Credits – O	3,272				3,272	0.2617	–338	2,934	0.2617	0.00	0.0000
Tax Credits – WTD	62,787				62,787	5.0217	–6,486	56,301	5.0217	10.30	0.5171
Def. Income Taxes	159,697				159,697	12.7726	–16,497	143,200	12.7726	0.00	0.0000
	1,255,579	–273	–4,608	-392	1,250,306	1	–129,159	1,121,147	1		10.2974%