State of Florida

ORIGINAL

Public Service Commission

-M-E-M-O-R-A-N-D-U-M-

DATE: March 16, 1999

TO: Division of Records and Reporting

FROM: Division of Legal Services (Vaccaro) TV

RE: Docket No. 990006-WS - Annual reestablishment of authorized range of returns on common equity for water and wastewater utilities, pursuant to Section 367.081(4)(f), F.S.

Please file the attached Comments of United Water Florida Inc., in the docket file for the above-referenced docket.

TV/dr

cc: Division of Water and Wastewater (Bethea)
Division of Auditing and Financial Analysis (Lester, Draper, Samaan)

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COMMENTS OF

UNITED WATER FLORIDA, INC.

Docket No. 990006-WS

Frank J. Hanley
President

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March 8, 1999

Walton F. Hill, Esquire
Vice President - Regulatory Business
United Water Management & Services
200 Old Hook Road
Harrington Park, NJ 07640

Re: Report Relative to the Leverage Formula
Utilized by the Florida PSC Relative to
Notice of Second Workshop Re: Docket No. 990006-WS

Dear Mr. Hill:

Pursuant to your request, I have prepared an analysis of the financial leverage formula utilized by the Florida Public Service Commission. In my analysis, I utilize much of the same data as the Commission Staff in its 1998 docket, thereby enabling a comparison between the 1998 actual results vis-a-vis the approach I recommend and the results shown in the accompanying report.

I believe that there are many positive aspects of the financial leverage model. Consequently, I have attempted to minimize the suggested changes to the model. The actual 1998 leverage formula produced a 9.85% common equity cost rate relative to a 40% common equity ratio. My recommended approach results in a pro forma 1998 leverage formula common equity cost rate of 11.35% relative to a 40% common equity ratio. I tested the results of both the actual and the pro forma leverage formulas against recent actual awards to 19 different water companies in 14 different jurisdictions and came to two basic conclusions. First, the actual 1998 leverage formula results in a significant understatement of common equity cost rate. Second, the pro forma 1998 leverage formula derived in the manner advocated in the accompanying report produces a realistic result that is in line with actual awards made to water companies operating in 14 different state jurisdictions.

If you have any questions regarding the foregoing comments or anything contained in the accompanying report, I will be pleased to discuss them with you at your convenience.

Respectfully submitted,

Frank J. Hanley

FJH/s
enc.

AUS

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

SECOND WORKSHOP TO PSC-REGULATED WATER AND WASTEWATER UTILITIES AND OTHER INTERESTED PERSONS

Docket No. 990006-WS

COMMENTS OF

UNITED WATER FLORIDA, INC.

PREPARED BY

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TABLE OF CONTENTS

TABLE OF CONTENTS

COMMENTS OF UNITED WATER FLORIDA, INC.
Docket No. 990006-WS

GENERAL COMMENTS ABOUT THE LEVERAGE FORMULA

The general concept of the leverage formula is a good one. With so many water and wastewater companies under the Commission's regulation, and many of them being quite small, the use of a formula which can eliminate considerable time and cost in the determination of the cost of capital and fair rate of return is highly desirable. The provision to not allow for returns greater than the level indicated at a 40% equity ratio is reasonable for the purposes of the leverage formula. If a company has legitimate reasons for its equity ratio to be less than 40%, at least in the short-run, special consideration could be given if the reasons are compelling. If so, then an added increment to the cost rate applicable to a 40% equity ratio could be made.

It is reasonable to utilize three different cost of equity models to estimate the return on equity required for the water and wastewater industry namely, the Discounted Cash Flow (DCF) model, the Capital Asset Pricing Model (CAPM) and the Risk Premium Model (RPM). The use of multiple models is consistent with the financial literature. Also, since modern financial theory is predicated upon the Efficient Market Hypothesis (EMH), it is reasonable to assume that investors are aware of these various models and take all of them into account in formulating their expected rate of return on common equity.

This report comments upon the leverage formula and makes suggestions for changes to it. This report is supported by Attachments 1 through 12. The accompanying Appendix A contains the professional qualifications of Frank J. Hanley, the author.

SUMMARY OF THE APPROACH RECOMMENDED IN THE APPLICATION OF THE LEVERAGE FORMULA AND THE RESULTS DERIVED THEREFROM

It is my belief, which is shared by many, that the leverage formula has been producing returns which are lower than those expected by investors in the marketplace as well as those awarded by regulatory commissions to water companies in other jurisdictions.

My approach proceeds from the premise that the use of the three different cost of equity models is appropriate in a general way. However, the present applications of those models result in substandard rates of return. As a result, I propose different applications of the models which are totally consistent with theory and supported by the financial literature. In addition, I recommend the elimination of the group of gas distribution companies as a proxy in the risk premium analysis. All of my recommendations and the reasoning for them are presented below.

For comparative purposes, I chose to analyze the results of the leverage formula update resulting from Docket No. 980006-WS. Consequently, I relied upon the information which would have been available to investors from publicly-available sources at that time, or about May 1, 1998.

As a result of my analyses, I conclude that an 11.35% common equity cost rate applicable to a 40% common equity ratio was appropriate at the same point in time when the actual application of the leverage formula in 1998 resulted in a 9.85% common equity cost rate applicable to a 40% common equity ratio. I believe that the use of a debt cost rate of 7.72% recommended in the 1998 Docket was reasonable at the time. I found the weighted overall cost of capital to have been 9.17% as summarized in Attachment 1. My finding of common equity cost rate based on a group of six water companies, the Water Index (i.e., the Value Line Investment Survey companies which I believe are appropriate for use in the leverage formula) is 11.26%. The 11.26% relates to the average common equity ratio of 40.92% for the group. An upward adjustment of nine basis points (.09) was necessary to reflect the cost rate applicable to a 40.0% common equity ratio, or an 11.35% cost rate. The basis of the 11.35% equity cost rate is summarized in Attachment 2. As shown, it is based upon a DCF cost rate of 10.10%, a RPM cost rate of 10.68%, and a CAPM cost rate of 10.90%. The average of all three models is 10.56%.

I believe that the bond yield differential of 45 basis points and the private placement premium of 25 basis points utilized in the 1998 leverage docket were then appropriate. Consequently, the addition of those adjustments to an average common equity cost rate of 10.56% results in an 11.26% common equity cost rate applicable to the average 40.92% common equity ratio of the six Value Line water companies (the Water Index).

APPLICATION OF THE DCF MODEL

I do not believe the use of an historical DCF calculation is appropriate for use in the leverage formula. Investors are concerned about future potential. The future is best reflected by analysts' forecasts. The 1998 historical DCF result contained in the leverage formula was 9.96% derived through the use of market value weighting. Market value weighting in any period places undue weight on the cost rates of the companies with the larger aggregate market values. This can easily result in a biased DCF cost rate. The best indication of the cost rate expected on average by investors is the unweighted arithmetic mean. I address in detail the importance of the arithmetic mean under the Risk Premium Model discussion which follows.

Analysts' forecasts of future earnings are undoubtedly the most important of the numerous factors which influence market prices. Studies have been made which show that analysts' forecasts of earnings per share (EPS) have far greater influence in predicting stock prices than extrapolations of growth from five or ten year historical periods. Attachments 7 and 8 are two articles from The Journal of Portfolio Management. Both articles concluded that analysts' forecasts of growth in EPS were superior to other measures for use in estimating the growth rate in the DCF model. The article by Gordon, Gordon & Gould (Attachment 8) confirms the superiority of analysts' forecasts in EPS.

One of those Gordons is Myron J. Gordon who is often referred to as the "father of the DCF model", at least the model used in utility rate regulation.

I encourage the use of a single stage growth DCF model. My application utilizes the dividends per share and the average stock prices contained in the 1998 Docket for the Water Index. I also utilize an average of the projected five-year EPS growth rate from Standard & Poor's (S&P) Earnings Guide as well as from Value Line available at the time. The S&P projected growth in EPS is the average growth rate of the reporting number of analysts for each company as obtained via the Institutional Brokerage Estimating System (I/B/E/S). The results of my DCF analysis are contained in Attachment 3. As shown, the average DCF cost rate is 10.10% for the Water Index.

I recognize that the leverage formula has utilized a two-stage growth DCF model. The use of a two-stage growth DCF model may be entirely appropriate for companies and/or industries which are in a significant stage of transition. For example, the electric industry is undergoing a significant transition as a result of moving from a regulated monopoly to a competitive environment. In that circumstance, the use of a two-stage growth DCF model is appropriate. The water and wastewater industries are mature. As such, the best expectation of future growth is from analysts' forecasts of EPS growth. Any extrapolations of retention growth determined from the Value Line projections are entirely dependent upon Value Line's five-year forecast in EPS growth and retention ratio. Consequently, any assumption that a retention growth rate so derived is an independent second stage growth rate (even if a second stage were appropriate which I believe is not) would be incorrect. It would be incorrect because it would be an exercise in circular reasoning as it is derived from the first stage growth rate, i.e., the five-year forecast growth in EPS times forecast retention ratio. Accordingly, I recommend the discontinuance of the two-stage growth DCF model and encourage reliance upon a single-stage growth model utilizing projected EPS as described above as the proxy for growth.

I recommend discontinuance of the quarterly compounding model. It is seldom used by regulators or expert witnesses and results in the need for unnecessary calculations. The use of an annual model which recognizes the discrete payment of dividends over the ensuing twelve months is overwhelmingly the most prevalent approach used in utility rate regulation. It recognizes the discrete payment of dividends and it is the approach that I recommend for application of the DCF model in the leverage formula.

I believe that the continued use of the Value Line publicly-traded water companies (Water Index) is appropriate for use in the leverage formula. Its use is reasonable because it is necessary to gain insight into analysts' forecasts for water companies whose common stocks are actively traded. While these entities of and by themselves are not identical in risk because they are larger and more geographically diverse does not mean that they cannot be useful. They are useful as long as recognition is made of the differences in risk between those companies and the typical operating system in Florida. Those risk differences are recognized through the bond yield differential and private placement premium increments.

RISK PREMIUM MODEL

While the use of the risk premium model is reasonable, there is no need to develop a risk premium analysis based upon an index of natural gas distribution utilities. The model should be applied to the Water Index; however, the manner in which it has been utilized in the leverage formula is flawed and can be improved significantly. For example, the determination of equity risk premium is dependent upon the cost of equity derived from application of the DCF model. For this discussion, it is irrelevant how the DCF model has been applied in the leverage formula. The very use of the DCF model in the determination of equity risk premium within the risk premium model constitutes an exercise in circular reasoning. It is circular reasoning because the risk premium is a result derived from a DCF cost rate, albeit one which is flawed. In addition, I believe that the use of an arbitrary ten-year historical period to determine equity risk premium is inherently biased for the reasons explained subsequently.

I believe it is best to begin the application of the RPM with the prospective yield on A rated public utility bonds. The bond rating process is comprehensive and takes into account all elements of diversifiable risk, specifically business and financial risks, as can be ascertained from the Standard & Poor's public utility bond rating criteria contained in Attachment 9. To the prospective yield on A rated public utility bonds an equity risk premium is added which is derived from analysis of actual market holding period returns over a very long historical time period. The use of a very long historical time period eliminates the bias inherent in the arbitrary selection of shorter periods. The market equity risk premium is then allocated to the Water Index through the use of beta, a logical way to allocate the market premium. The results of my RPM are summarized in Attachment 4, which consists of seven pages. Page 1 contains a summary of the results of the application which is 10.68%. It relies upon an average yield on A rated public utility bonds as derived from the consensus forecast of nearly 50 economists reported in the Blue Chip Financial Forecasts publication dated May 1, 1998. Pages 2, 3 and 4 of Attachment 4 contain information relative to bond yield and the average bond rating of the Water Index companies.

For purposes of determining an equity risk premium applicable to the Water Index, I believe it most appropriate to rely upon the actual long-term historical mean average holding period return on the broad-based market as measured by the Standard & Poor's 500 Composite Index. My analysis is summarized in Attachment 4, page 5. As shown, the arithmetic mean total return rate on the Standard & Poor's 500 Composite Index 1926-1997 was 13.0%, while the arithmetic mean total return rate on the high grade corporate bond index was 6.1%. This implied an historical market equity risk premium of 6.9% over an average Aaa/Aa rated high grade corporate bond. The use of a very long historical time period is appropriate as confirmed by Attachment 10 which contains excerpts from the Ibbotson Associates' 1998 Yearbook: Stocks, Bonds, Bills & Inflation relating to market results for 1926-1997. At page 7 of Attachment 10, Ibbotson Associates explain why the use of shorter, more recent time periods are suspect, namely, "because all periods contain unusual events." They go on to explain why many events have happened which people believed could not happen. Consequently, while it is not likely that specific events will repeat themselves, historical event-types do tend to repeat themselves and can reveal a great deal about the future. Thus, the use of very long-term holding period returns provides extremely valuable insight into the average future market equity risk premium. Moreover, because of a very long common stock investment horizon (in fact, the standard DCF model assumes infinity) the determination of equity risk premium derived therefrom provides valuable insight into that which may be expected over the long-term future investment horizon.

The use of the arithmetic and not the geometric (or compound) mean is appropriate for cost of capital purposes. Ibbotson Associates explain in detail why this is so as shown by the excerpt from their 1998 Yearbook at pages 7 through 9 of Attachment 11. Historical total returns and equity risk premiums differ in size and direction over time. The arithmetic mean is important because it provides insight into the variance and standard deviation of returns. Investors require insight into the potential for variance when contemplating making an investment because the potential for variance is a significant element of risk. Absent this valuable insight into the potential variance of returns, there can be no meaningful evaluation of prospective risk. Consequently, the use of a long-term historical market equity risk premium of 6.9% is appropriate.

As shown on Lines 4 and 5 of Attachment 4, page 5, the adjusted market equity risk premium related to A rated public utility bonds is 6.4%. On Line 6 of Attachment 4, page 5, I have shown the average Value Line beta for the Water Index of 0.59, the same beta utilized by Staff in its 1998 application. The use of beta is a logical way to allocate the market equity risk premium to the Water Index because beta is an indication of relative market risk. Attachment 11, an excerpt from Roger A. Morin's book Regulatory Finance: Utilities' Cost of Capital shows that it is appropriate to allocate the market risk premium to be utility-specific through the application of beta. As a result, the beta adjusted equity risk premium applicable to the water companies is 3.78% as shown on Attachment 4, Line 7, page 5.

The resultant risk premium model cost rate applicable to the A rated average of the Water Index is 10.68% as shown on Attachment 4, page 1.

I believe that the use of an assumed bond rating of Baa3 is reasonable in the leverage formula because of the average size of the regulated water/wastewater company which is very small. Smaller companies tend to be more risky and riskier companies pay more for capital, a concept consistent with the financial literature. I believe that the bond yield adjustment accurately reflects the difference in size between the Water Index companies and other Florida utilities. In addition, the increment for private placement premium is appropriate because it recognizes the lack of liquidity associated with small companies whose securities are not readily marketable.

CAPITAL ASSET PRICING MODEL

Generally, the same application problems of the RPM, as it has been applied to date in the leverage formula, are also applicable to the CAPM. The use of a relatively short arbitrary historical time period risk premium resulting from a circular process dependent on the DCF model is flawed. I suggest that the long-term mean total return rate on the Standard & Poor's 500 Composite Index be utilized from which the arithmetic mean income return rate on long-term government bonds is subtracted. The applications of the CAPM are summarized in Attachment 5. As shown on Lines 1 and 2, the long-term historical equity risk premium over long-term government bonds is 7.8%. The use of the Value Line adjusted beta of 0.59 (the same as used by Staff in its 1998 application of the leverage formula) results in a beta adjusted equity risk premium of 4.60% utilizing the traditional CAPM. For the expected risk-free rate, I recommend the use of the average consensus forecasted yield on 30-year Treasury Bonds from Blue Chip Financial Forecasts. As shown on Line 7, this results in a traditional CAPM cost rate of 10.50%. Also shown on Attachment 5 is the Empirical Capital Asset Pricing Model (ECAPM), the use of which I also recommend. The ECAPM is the result of many tests of the traditional CAPM to determine the extent to which security returns and betas are related in the manner predicted by the traditional CAPM. Attachment 12 contains excerpts from Roger Morin's text, Regulatory Finance: Utilities' Cost of Capital and relate to CAPM extensions, specifically the ECAPM. As shown at the bottom of Attachment 12, page 2, there are many empirical studies which have been conducted to determine to what extent security returns and betas are related in the manner predicted by the traditional CAPM. Morin states:

> With few exceptions, the empirical studies agree that the implied intercept term exceeds the risk-free rate and the slope term is less than predicted by the CAPM. That is, low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted.

At pages 5 through 8 of Attachment 12, Morin explains the ECAPM in detail. It is also interesting to note that on Attachment 12, page 7 in discussing equity risk premiums, Morin states:

> The actual historical relationship between risk premiums and the risk of a large population of common stocks can be observed over a long period and used to estimate the appropriate risk premium for a given utility.

Morin's statement provides additional affirmation that the use of a very long-term historical period can provide a meaningful insight into an appropriate risk premium for a given utility as long as the arithmetic mean of the distribution of returns is utilized. Morin also observes in Attachment 12, page 7 that:

> The value of x that best explains the observed relationship is between 0.25 and 0.30. If x equals 0.25, the equation becomes $k = R_f + 0.25\ (R_m - R_f) + 0.75\beta\ (R_m - R_f)$.

The foregoing 0.25 value for x is conservative as it is estimated to range between 0.25 and 0.30. In order to produce realistic CAPM results, I believe it is important to also utilize the ECAPM. Utilizing the ECAPM results in an indicated equity cost rate of 11.30% as also shown on Attachment 5. The average of the traditional CAPM and ECAPM is 10.90% which I believe is reasonable to use as the CAPM value in the leverage formula.

CONCLUSION OF COMMON EQUITY COST RATE AND PRO FORMA 1998 LEVERAGE FORMULA

As shown on Attachment 2, I conclude that had the 1998 leverage formula been applied in the manner described above, that the resultant equity cost rate applicable to a 40% common equity ratio would have been 11.35%. The pro forma 1998 leverage formula would have then been as follows:

Return on Common Equity = 7.72% + 1.449%/ER

and the resultant range of returns on common equity from 100% equity to 40% equity would have been as follows:

9.17% - 11.35%

TEST OF THE REASONABLENESS OF THE PRO FORMA 1998 LEVERAGE FORMULA (CALCULATED IN THE MANNER ADVOCATED IN THIS REPORT)

In order to obtain insight into whether the leverage formula applied in the manner advocated in this report would have produced reasonable results, I relied upon the rate decisions of water companies during the six months ended March 31, 1998 as a benchmark. The period chosen was one immediately preceding the period of time during which the leverage formula would have been applied and during which investors would have been formulating their expectations. During the period, there were 19 decisions involving 14 different state jurisdictions. The information resulted from quarterly surveys of rate case activity conducted by AUS Consultants - Utility Services for the National Association of Water Companies (NAWC). The NAWC provides its member companies with the details of the surveys. The details for the quarters ending December 31, 1997 and March 31, 1998 were, in turn, provided to me by United Waterworks, United Water Florida, Inc.'s parent company, a member company of the NAWC to whom these details had been provided by the NAWC.

As shown on Attachment 6, the average authorized return on common equity awarded during the six month period was 10.84% relative to an average authorized common equity ratio of 44.54%. Applying the pro forma 1998 leverage formula calculated herein to a 44.54% common equity ratio results in an equity cost rate of 10.97%, a rate that is only 13 basis points different than the average ROE of 10.84% awarded those 19 companies by 14 different state commissions. The average award of 10.84% provides evidence that the leverage formula as it has been applied results in an understatement of equity cost rate. Also shown on Attachment 6 are the average results if the two companies that had authorized common equity ratios under 40% were eliminated (Indiana-American Water Company and Pennichuck Water Works, Inc.). The average authorized return on common equity would have been 10.86% relative to an average authorized common equity ratio of 45.63%. Application of the pro forma 1998 leverage formula would have resulted in a 10.90% cost rate relative to a 45.63% equity ratio, a cost rate just 4 basis points different from the average awarded equity return rate to all those companies whose equity ratios were 40% or greater.

The surveys conducted for the NAWC do not include any companies with annual revenues less than $2 million, a parameter established by the NAWC. Obviously, many of the companies in the survey are considerably larger. Thus, the pro forma 1998 leverage formula as applied in this report may actually still slightly understate the cost rate for the very small and inordinately risky Florida water/wastewater utilities.

If applied as suggested herein, the leverage formula should consistently produce a result which is appropriate for the majority of Florida water/wastewater utilities. Nonetheless, there are exceptions to every rule. If a very small company can demonstrate successfully that its marginal borrowing costs are significantly in excess of those embedded in the leverage formula, despite its best efforts to obtain lower cost capital, then it is suggested that consideration be given to an ad hoc increment to the cost of equity resulting from the application of the leverage formula for such company.

Marginal Cost of Investor Capital
Average Water and Wastewater Utility

Capital Component	Ratio	Marginal Cost Rate	Weighted Marginal Cost
Common Equity	40.92 % (1)	11.26 % (2)	4.61 %
Total Debt	59.08 (3)	7.72 (4)	4.56
Total	100.00		9.17 %

Marginal Cost of Investor Capital
Average Water and Wastewater Utility at a 40% Common Equity Ratio

Capital Component	Ratio	Marginal Cost Rate	Weighted Marginal Cost
Common Equity	40.00 %	11.35 % (5)	4.54 % (6)
Total Debt	60.00	7.72 (4)	4.63
Total	100.00		9.17 %

Notes:

(1) Average common equity ratio of the six Value Line water companies from Order No. PSC-98-0903-FOF-WS, Docket No. 980006-WS, p. 15, Attachment 1 - page 9 of 10.

(2) From Attachment 2, Line No. 7.

(3) 100.0% less 40.92% (average common equity ratio of the six Value Line water companies).

(4) From Order No. PSC-98-0903-FOF-WS, Docket No. 980006-WS, p. 8 - Attachment 1, page 2 of 10. Assumed Baa3 rate for April 1998 plus 25 basis points private placement

(5) Equal to the weighted marginal cost of common equity capital of 4.54% (derived in Note 6 below) divided by the common equity ratio of 40%. (11.35% = 4.54% / 40.00%).

(6) Equal to the marginal cost of capital of 9.13% minus the weighted marginal cost of debt capital of 4.63%. (4.54% = 9.17% - 4.63%)

Brief Summary of Common Equity Cost Rate

Line No.	Principal Methods	Water Index
1.	Discounted Cash Flow Model (1)	10.10 %
2.	Risk Premium Model (2)	10.68
3.	Capital Asset Pricing Model (3)	10.90
4.	Average Common Equity Cost Rate	10.56 %
5.	Bond Yield Differential (4)	0.45
6.	Private Placement Premium (4)	0.25
7.	Sub-Total	11.26 %
8.	Adjustment to Reflect Required Common Equity Return at a 40% Common Equity Ratio (5)	0.09
9.	Cost of Common Equity for an Average Florida Water and Wastewater Utility at a 40% Common Equity Ratio	11.35 %

Pro Forma 1998 Leverage Formula

Return on Common Equity	=	7.72% + 1.449% / ER
Range of Returns on Common Equity	=	9.17% - 11.35%

Notes:
(1) From Attachment 3.
(2) From page 1 of Attachment 4.
(3) From Attachment 5.
(4) From Order No. PSC-98-0903-FOF-WS, Docket No. 980006-WS, p. 7 - Attachment 1, page 1 of 10.
(5) From Attachment 1.

Discounted Cash Flow Model for the Water Index

Water Index	1 Standard & Poor's Projected Five-Year Growth Rate	2 Value Line Projected 1994-'96 to 2000-'02 Growth	3 Average Projected Growth Rate in EPS (1)	4 Dividends per Share (2)	5 Current Average Stock Price (2)	6 Dividend Yield (3)	7 Indicated Cost Rate of Common Equity (4)
American Water Works	7.00 %	10.00	8.50 %	$ 0.90	$ 30.66	2.94 %	11.44 %
Aquarion Company	3.00	4.00	3.50	1.67	32.50	5.14	8.64
California Water Service Group	3.00	6.50	4.75	1.11	27.53	4.03	8.78
Consumers Water Company	2.00	6.00	4.00	1.26	20.45	6.16	10.16
Philadelphia Suburban Corp.	5.00	9.00	7.00	0.67	21.03	3.19	10.19
United Water Resources Inc.	4.00	8.00	6.00	0.94	17.47	5.38	11.38
Average	4.00 %	7.25 %	5.63 %			4.47 %	10.10 %

Notes: (1) Average of Column 1 and Column 2.
(2) From Order No. PSC-98-0903-FOF-WS, Docket No. 980006-WS, p. 9 - Attachment 1, page 3 of 10.
(3) Column 4 / Column 5.
(4) Column 3 + Column 6.

Source of Information: Standard & Poor's Earnings Guide, April 1998
Value Line Investment Survey, February 6, 1998

Risk Premium Model for the Water Index

Line No.		Water Index
1.	Prospective Yield on A Rated Public Utility Bonds (1)	6.9 %
2.	Adjustment to Reflect Bond Rating Difference	0.0 (2)
3.	Adjusted Prospective Yield	6.9 %
4.	Equity Risk Premium (3)	3.78
5.	Risk Premium Derived Common Equity Cost Rate	10.68 %

Notes: (1) Average forecast based upon six quarterly estimates of A rated seasoned public utility bonds per the consensus of nearly 50 economists reported in Blue Chip Financial Forecasts dated May 1, 1998 (see page 2 of this Attachment). The estimates are detailed below.

Second Quarter 1998	7.0 %
Third Quarter 1998	7.0
Fourth Quarter 1998	6.9
First Quarter 1999	6.9
Second Quarter 1999	6.9
Third Quarter 1999	6.9
Average	6.9 %

(2) No adjustment necessary since the average Moody's bond rating of the Water Index is A2 (see page 3 of this Attachment).

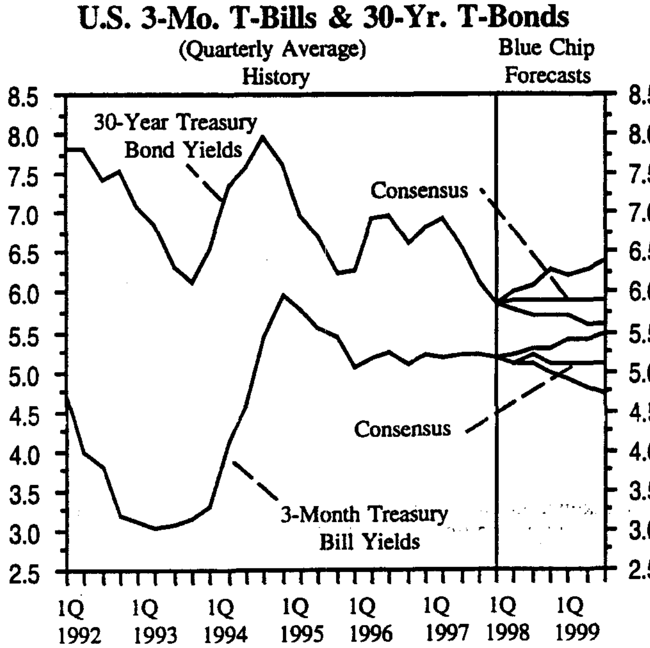
(3) From page 5 of this Attachment.

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

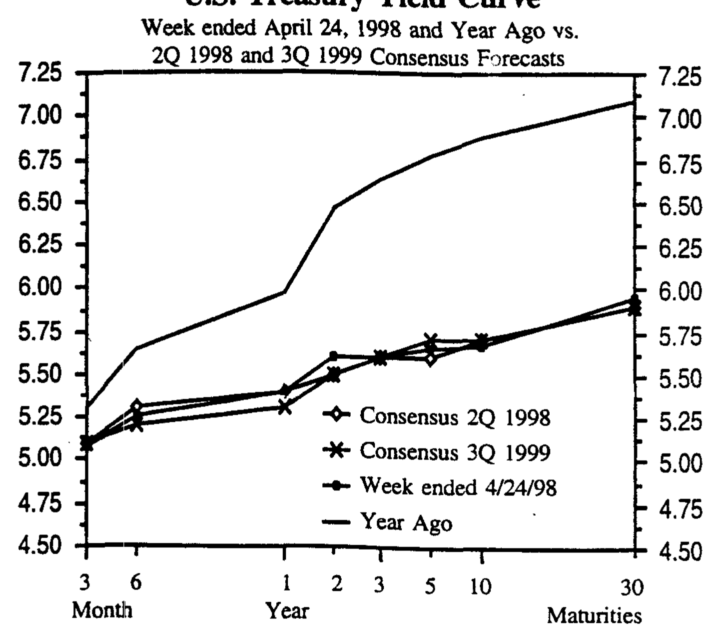
	History								Consensus Forecasts - Quarterly Avg.					
	Avg. For Week Ending				Month			Latest Q						
Interest Rates	Apr.24	Apr.17	Apr.10	Apr.3	Mar.	Feb.	Jan.	1Q 1998	2Q 1998	3Q 1998	4Q 1998	1Q 1999	2Q 1999	3Q 1999
Federal Funds Rate	5.37	5.47	5.48	5.60	5.49	5.51	5.56	5.52	5.5	5.5	5.5	5.4	5.4	5.3
Prime Rate	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.5	8.5	8.5	8.4	8.4	8.3
LIBOR, 3-mo.	5.68	5.68	5.69	5.69	5.66	5.63	5.63	5.64	5.7	5.7	5.6	5.6	5.6	5.5
Commercial Paper, 1-mo.	5.50	5.51	5.50	5.54	5.53	5.49	5.48	5.50	5.5	5.6	5.5	5.5	5.5	5.4
Treasury bill, 3-mo.	5.08	5.10	5.08	5.13	5.16	5.23	5.18	5.19	5.1	5.2	5.1	5.1	5.1	5.1
Treasury bill, 6-mo.	5.26	5.30	5.21	5.24	5.25	5.27	5.23	5.25	5.3	5.3	5.3	5.2	5.2	5.2
Treasury bill, 1 yr.	5.40	5.39	5.30	5.36	5.39	5.31	5.24	5.31	5.4	5.4	5.4	5.4	5.3	5.3
Treasury note, 2 yr.	5.60	5.56	5.47	5.55	5.56	5.42	5.36	5.45	5.5	5.5	5.5	5.5	5.5	5.5
Treasury note, 3 yr.	5.61	5.56	5.50	5.57	5.57	5.43	5.38	5.46	5.6	5.6	5.6	5.6	5.6	5.6
Treasury note, 5 yr.	5.65	5.59	5.52	5.58	5.61	5.49	5.42	5.51	5.6	5.6	5.7	5.6	5.7	5.7
Treasury note, 10 yr.	5.67	5.61	5.55	5.61	5.65	5.57	5.54	5.59	5.7	5.7	5.7	5.7	5.7	5.7
Treasury bond, 30 yr.	5.95	5.90	5.86	5.89	5.95	5.89	5.81	5.88	5.9	5.9	5.9	5.9	5.9	5.9
Corporate Aaa bond	6.73	6.67	6.64	6.67	6.72	6.67	6.61	6.67	6.7	6.7	6.7	6.7	6.7	6.7
A Utility bond	7.19	7.09	7.09	6.99	7.11	7.02	6.97	7.03	7.0	7.0	6.9	6.9	6.9	6.9
Home mortgage rate	7.15	7.17	7.09	7.15	7.13	7.04	6.99	7.05	7.1	7.0	7.1	7.0	7.0	7.0
	History								Consensus Forecasts - Quarterly Avg.					
Key Assumptions	2Q 1996	3Q 1996	4Q 1996	1Q 1997	2Q 1997	3Q 1997	4Q 1997	1Q 1998	2Q 1998	3Q 1998	4Q 1998	1Q 1999	2Q 1999	3Q 1999
Federal Reserve $ Index	87.5	87.1	87.9	93.7	95.7	98.7	97.4	100.3	100.3	100.2	99.4	98.7	98.4	97.9
Real GDP	6.0	1.0	4.3	4.9	3.3	3.1	3.7	4.2	2.4	2.2	2.4	2.3	2.3	2.3
GDP Chained Price Index	1.9	2.7	1.9	2.4	1.8	1.4	1.4	0.9	1.6	1.8	1.9	2.0	2.0	2.1
Consumer Price Index	3.7	2.6	3.3	2.0	1.5	1.8	2.3	0.5	1.7	2.1	2.2	2.2	2.3	2.3

[1]Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates (except LIBOR) is from Federal Reserve Release (FRSR) H. 15. LIBOR quotes available from The Wall Street Journal and Telerate. Definitions reported here are same as those in FRSR H. 15. All Treasury yields are reported on a constant maturity basis. Historical data for the Federal Reserve's trade-weighted U.S. dollar index is from FRSR G. 5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics. (BLS).

U.S. 3-Mo. T-Bills & 30-Yr. T-Bonds



U.S. Treasury Yield Curve



Comparison of Bond Ratings for the Water Index

Water Index	April 1998 Moody's Bond Rating		April 1998 Standard & Poor's Bond Rating	
	Bond Rating	Numerical Weighting (1)	Bond Rating	Numerical Weighting (1)
American Water Works (2)	A3	7.0	A+ / A	5.5
Aquarion Company (1)	NR	- -	A+	5.0
California Water Service Group (4)	Aa3	4.0	AA-	4.0
Consumers Water Company	NR	- -	NR	- -
Philadelphia Suburban Corp. (5)	NR	- -	AA-	4.0
United Water Resources Inc. (6)	A2 / A3	6.5	A+ / A	5.5
Average	A2	5.8	A+	4.8

NR = Not Rated

Notes:
(1) Numerical weightings derived from page 4 of this Attachment.
(2) Ratings are a composite of those of New Jersey-American Water Company, Inc. and Pennsylvania-American Water Company, Inc.
(3) Ratings are a composite of those of BHC Company and Stamford Water Company.
(4) Ratings are those of California Water Service Company.
(5) Ratings are those of Philadelphia Suburban Water Company.
(6) Ratings are a composite of those of United Water New Jersey, United Water New York and United Waterworks.

Source of Information: Moody's Investors Service
Standard & Poor's Global Utility Rating Service

Numerical Assignment for
Moody's and Standard & Poor's Bond Ratings

Moody's Bond Rating	Numerical Bond Weighting	Standard & Poor's Bond Rating
Aaa	1	AAA
Aa1	2	AA+
Aa2	3	AA
Aa3	4	AA-
A1	5	A+
A2	6	A
A3	7	A-
Baa1	8	BBB+
Baa2	9	BBB
Baa3	10	BBB-
Ba1	11	BB+
Ba2	12	BB
Ba3	13	BB-

Derivation of Equity Risk Premium Based on the Total Market Approach
Using the Beta for the Water Index

Line No.		Water Index
1.	Arithmetic mean total return rate on the Standard & Poor's 500 Composite Index - 1926-1997 (1)	13.0 %
2.	Arithmetic mean total return rate on the Salomon Brothers Long-Term High-Grade Corporate Bond Index 1926-1997 (1)	(6.1)
3.	Historical Market Equity Risk Premium	6.9 %
4.	Adjustment to reflect yield spread between A rated public utility bonds and Aaa and Aa, i.e., high grade, rated corporate bonds (2)	(0.5) %
5.	Adjusted Market Equity Risk Premium	6.4
6.	Value Line Beta for the Six Value Line Water Companies (3)	0.59
7.	Beta Adjusted Equity Risk Premium Applicable to the Six Value Line Water Companies	3.78 %

Notes: (1) From Stocks, Bonds, Bills and Inflation - 1998 Yearbook - Market Results for 1926-1997, Ibbotson Associates, Inc., Chicago, IL, 1998. See page 7 of this Attachment. Total return rate on corporate bonds used since income return is not available from Stocks, Bonds, Bills and Inflation.

(2) From page 6 of this Attachment

(3) From Order No. PSC-98-0903-FOF-WS, Docket No. 980006-WS, p. 11 - Attachment 1, page 5 of 10.

Derivation of Yield Spread Difference Between Corporate and Public Utility Bonds for the Years 1926 - 1997, Inclusive

	Average Annual Yields, Aaa Rated Corporate Bonds	Average Annual Yields, Aa Rated Corporate Bonds	Average Annual Yields, Aaa and Aa Rated Corporate Bonds	Average Annual Yields, A Rated Public Utility Bonds	Yield Spread - Aaa / Aa Rated Corporate Bonds and A Rated Public Utility Bonds
1997	7.26 %	7.47 %	7.37 %	7.60 %	
1996	7.37	7.55	7.46	7.75	
1995	7.59	7.72	7.66	7.89	
1994	7.97	8.15	8.06	8.31	
1993	7.22	7.40	7.31	7.59	
1992	8.14	8.46	8.30	8.69	
1991	8.77	9.05	8.91	9.36	
1990	9.32	9.56	9.44	9.86	
1989	9.26	9.46	9.36	9.77	
1988	9.71	9.94	9.83	10.49	
1987	9.38	9.68	9.53	10.10	
1986	9.02	9.47	9.25	9.58	
1985	11.37	11.82	11.60	12.47	
1984	12.71	13.31	13.01	14.03	
1983	12.04	12.42	12.23	13.66	
1982	13.79	14.41	14.10	15.86	
1981	14.17	14.75	14.46	15.95	
1980	11.94	12.50	12.22	13.34	
1979	9.63	9.94	9.79	10.49	
1978	8.73	8.92	8.83	9.29	
1977	8.02	8.24	8.13	8.61	
1976	8.43	8.75	8.59	9.29	
1975	8.83	9.17	9.00	10.09	
1974	8.57	8.84	8.71	9.50	
1973	7.44	7.66	7.55	7.84	
1972	7.21	7.48	7.35	7.72	
1971	7.39	7.78	7.59	8.16	
1970	8.04	8.32	8.18	8.69	
1969	7.03	7.20	7.12	7.54	
1968	6.18	6.38	6.28	6.51	
1967	5.51	5.66	5.59	5.87	
1966	5.13	5.23	5.18	5.39	
1965	4.49	4.57	4.53	4.58	
1964	4.40	4.49	4.45	4.52	
1963	4.26	4.39	4.33	4.39	
1962	4.33	4.47	4.40	4.54	
1961	4.35	4.48	4.42	4.62	
1960	4.41	4.56	4.49	4.78	
1959	4.38	4.51	4.45	4.78	
1958	3.79	3.94	3.87	4.20	
1957	3.89	4.03	3.96	4.24	
1956	3.36	3.45	3.41	3.56	
1955	3.06	3.16	3.11	3.22	
1954	2.90	3.06	2.98	3.16	
1953	3.20	3.31	3.26	3.49	
1952	2.96	3.04	3.00	3.24	
1951	2.86	2.91	2.89	3.11	
1950	2.62	2.69	2.66	2.79	
1949	2.66	2.75	2.71	2.90	
1948	2.82	2.90	2.86	3.02	
1947	2.61	2.70	2.66	2.78	
1946	2.53	2.62	2.58	2.71	
1945	2.62	2.71	2.67	2.87	
1944	2.72	2.81	2.77	2.97	
1943	2.73	2.86	2.80	2.99	
1942	2.83	2.98	2.91	3.09	
1941	2.77	2.94	2.86	3.07	
1940	2.84	3.02	2.93	3.24	
1939	3.01	3.22	3.12	3.52	
1938	3.19	3.56	3.38	3.90	
1937	3.26	3.46	3.36	3.98	
1936	3.24	3.46	3.35	4.08	
1935	3.60	3.95	3.78	4.61	
1934	4.00	4.44	4.22	5.55	
1933	4.49	5.23	4.86	6.32	
1932	5.01	5.98	5.50	6.46	
1931	4.58	5.05	4.82	5.12	
1930	4.55	4.77	4.66	5.06	
1929	4.83	4.93	4.88	5.22	
1928	4.55	4.71	4.63	4.95	
1927	4.57	4.77	4.67	5.02	
1926	4.73	4.97	4.85	5.17	
Average: 1926-1997	5.93 %	6.17 %	6.06 %	6.52 %	0.46 %

Source of Information: Moody's Investors Service

Table 6-7 **Total Returns, Income Returns, and Capital Appreciation of the Basic Asset Classes**

Summary Statistics of Annual Returns

From 1926 to 1997

Series	Geometric Mean	Arithmetic Mean	Standard Deviation	Serial Correlation
Large Company Stocks				
Total Returns	11.0 %	13.0 %	20.3 %	0.00
Income	4.5	4.5	1.3	0.81
Capital Appreciation	6.2	8.1	19.7	0.00
Small Company Stocks				
Total Returns	12.7	17.7	33.9	0.09
Long-Term Corporate Bonds				
Total Returns	5.7	6.1	8.7	0.09
Long-Term Government Bonds				
Total Returns	5.2	5.6	9.2	-0.03
Income	5.2	5.2	2.9	0.96
Capital Appreciation	-0.1	0.2	8.0	-0.18
Intermediate-Term Government Bonds				
Total Returns	5.3	5.4	5.7	0.18
Income	4.7	4.8	3.1	0.96
Capital Appreciation	0.3	0.4	4.4	-0.20
Treasury Bills				
Total Returns	3.8	3.8	3.2	0.92
Inflation	3.1	3.2	4.5	0.64

Total return is equal to the sum of three component returns: income return, capital appreciation return, and reinvestment return. Annual reinvestment returns for select asset classes are provided in Table 2-6.

Capital Asset Pricing Model for the Water Index

Line No.		Traditional Capital Asset Pricing Model	Empirical Capital Asset Pricing Model
1.	Arithmetic mean total return rate on the Standard & Poor's 500 Composite Index - 1926-1997 (1)	13.0 %	13.0 %
2.	Arithmetic mean income return rate on Long-Term Government Bonds 1926-1997 (1)	(5.2)	(5.2)
3.	Historical Equity Risk Premium	7.8 %	7.8 %
4.	Adjusted Value Line Beta (2)	0.59	0.59
5.	Beta Adjusted Equity Risk Premium	4.60 % (3)	5.40 % (4)
6.	Projected Yield on 30-year U. S. Treasury Bonds (5)	5.9	5.9
7.	Capital Asset Pricing Model Derived Common Equity Cost Rate	10.50 %	11.30 %
8.	Midpoint	10.90 %	

Notes:

(1) From Stocks, Bonds, Bills and Inflation - 1998 Yearbook - Market Results for 1926-1997, Ibbotson Associates, Inc., Chicago, IL, 1998. See page 7 of Attachment 4.

(2) From Order No. PSC-98-0903-FOF-WS, Docket No. 980006-WS, p. 11 - Attachment 1, page 5 of 10.

(3) Line No. 3 x Line No. 4.

(4) (0.25 x Line No. 3) + (0.75 x Line No. 4 x Line No. 3) = (0.25 x 7.4%) + (0.75 x (0.59 x 7.4%)) = 1.8% + 3.3% = 5.1%.

(5) Average forecast based upon six quarterly estimates of 30-year U. S. Treasury bonds per the consensus of nearly 50 economists reported in Blue Chip Financial Forecasts dated May 1, 1998 (see page 2 of Attachment 4). The estimates are detailed below.

Second Quarter 1998	5.9 %
Third Quarter 1998	5.9
Fourth Quarter 1998	5.9
First Quarter 1999	5.9
Second Quarter 1999	5.9
Third Quarter 1999	5.9
Average	5.9 %

Rate Decisions of Water Companies for the Six Months Ended March 31, 1998
Authorized Returns on Common Equity and Authorized Common Equity Ratios

Company	Jurisdiction	Authorized Return on Common Equity	Authorized Common Equity Ratio
United Water Arkansas	AR	10.75 %	47.00 %
California-American Water Company - Los Angeles District	CA	10.30	45.00
Park Water Co.	CA	10.00	58.60
Southern California Water Company	CA	10.40	50.60
Birmingham Utilities	CT	12.16	41.00
Illinois-American Water Company	IL	10.60	51.06
Indiana-American Water Company	IN	11.00	38.94
Kentucky-American Water Company	KY	11.00	40.40
Maryland-American Water Company	MD	10.90	43.93
Missouri-American Water Company	MO	11.00	41.62
Heater Utilities, Inc.	NC	10.80	46.32
Pennichuck Water Works, Inc.	NH	10.35	31.70
Middlesex Water Company	NJ	11.00	49.00
United Water New Rochelle	NY	10.70	40.95
Ohio-American Water Company	OH	11.50	40.76
Consumers Pennsylvania Water Company - Shenango Division	PA	10.75	44.00
Consumers Pennsylvania Water Company - Roaring Creek Division	PA	10.98	47.60
Pennsylvania-American Water Company	PA	10.72	40.50
United Water Pennsylvania	PA	11.00	47.35
Average		10.84 %	44.54 %

Return on Common Equity Relative to a Water and Wastewater Utility at a 44.54% Common Equity Ratio Using the 1998 Leverage Formula as modified herin: 7.72% + 1.449% / ER (1)

7.72% + 1.449% / 44.54% =

7.72% + 3.25% =

10.97%

Average for Those Water Companies with Common Equity Ratios Greater than 40.00%		10.86 %	45.63 %

Return on Common Equity Relative to a Water and Wastewater Utility at a 45.63% Common Equity Ratio Using the 1998 Leverage Formula as modified herin: 7.72% + 1.449% / ER (1)

7.72% + 1.449% / 45.63% =

7.72% + 3.18% =

10.90%

Notes: (1) From Attachment 2.

Source of Information: Quarterly Surveys of Rate Case Activity conducted by AUS Consultants - Utility Services for the National Association of Water Companies, the details of which were provided to Mr. Hanley by United Waterworks.

Investor growth expectations: Analysts vs. history

Analysts' growth forecasts dominate past trends in predicting stock prices.

James H. Vander Weide and Willard T. Carleton

For the purposes of implementing the Discounted Cash Flow (DCF) cost of equity model, the analyst must know which growth estimate is embodied in the firm's stock price. A study by Cragg and Malkiel (1982) suggests that the stock valuation process embodies analysts' forecasts rather than historically based growth figures such as the ten-year historical growth in dividends per share or the five-year growth in book value per share. The Cragg and Malkiel study is based on data for the 1960s, however, a decade that was considerably more stable than the recent past.

As the issue of which growth rate to use in implementing the DCF model is so important to applications of the model, we decided to investigate whether the Cragg and Malkiel conclusions continue to hold in more recent periods. This paper describes the results of our study.

STATISTICAL MODEL

The DCF model suggests that the firm's stock price is equal to the present value of the stream of dividends that investors expect to receive from owning the firm's shares. Under the assumption that investors expect dividends to grow at a constant rate, g, in perpetuity, the stock price is given by the following simple expression:

$$P_s = \frac{D(1+g)}{k-g} \quad (1)$$

where:

- P_s = current price per share of the firm's stock;
- D = current annual dividend per share;
- g = expected constant dividend growth rate; and
- k = required return on the firm's stock.

Dividing both sides of Equation (1) by the firm's current earnings, E, we obtain:

$$\frac{P_s}{E} = \frac{D}{E} \cdot \frac{(1+g)}{k-g} \quad (2)$$

Thus, the firm's price/earnings (P/E) ratio is a nonlinear function of the firm's dividend payout ratio (D/E), the expected growth in dividends (g), and the required rate of return.

To investigate what growth expectation is embodied in the firm's current stock price, it is more convenient to work with a linear approximation to Equation (2). Thus, we will assume that:

$$P/E = a_0(D/E) + a_1 g + a_2 k. \quad (3)$$

(Cragg and Malkiel found this assumption to be reasonable throughout their investigation.)

Furthermore, we will assume that the required

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rate of return, k, in Equation (3) depends on the values of the risk variables B, Cov, Rsq, and Sa, where B is the firm's Value Line beta; Cov is the firm's pretax interest coverage ratio; Rsq is a measure of the stability of the firm's five-year historical EPS; and Sa is the standard deviation of the consensus analysts' five-year EPS growth forecast for the firm. Finally, as the linear form of the P/E equation is only an approximation to the true P/E equation, and B, Cov, Rsq, and Sa are only proxies for k, we will add an error term, e, that represents the degree of approximation to the true relationship.

With these assumptions, the final form of our P/E equation is as follows:

$$P/E = a_0(D/E) + a_1 g + a_2 B + a_3 Cov + a_4 Rsq + a_5 Sa + e. \quad (4)$$

The purpose of our study is to use more recent data to determine which of the popular approaches for estimating future growth in the Discounted Cash Flow model is embodied in the market price of the firm's shares.

We estimated Equation (4) to determine which estimate of future growth, g, when combined with the payout ratio, D/E, and risk variables B, Cov, Rsq, and Sa, provides the best predictor of the firm's P/E ratio. To paraphrase Cragg and Malkiel, we would expect that growth estimates found in the best-fitting equation more closely approximate the expectation used by investors than those found in poorer-fitting equations.

DESCRIPTION OF DATA

Our data sets include both historically based measures of future growth and the consensus analysts' forecasts of five-year earnings growth supplied by the Institutional Brokers Estimate System of Lynch, Jones & Ryan (IBES). The data also include the firm's dividend payout ratio and various measures of the firm's risk. We include the latter items in the regression, along with earnings growth, to account for other variables that may affect the firm's stock price.

The data include:

Earnings Per Share. Because our goal is to determine which earnings variable is embodied in the firm's market price, we need to define this variable with care. Financial analysts who study a firm's financial results in detail generally prefer to "normalize" the firm's reported earnings for the effect of extraordinary items, such as write-offs of discontinued operations, or mergers and acquisitions. They also attempt, to the extent possible, to state earnings for different firms using a common set of accounting conventions.

We have defined "earnings" as the consensus analyst estimate (as reported by IBES) of the firm's earnings for the forthcoming year.[1] This definition approximates the normalized earnings that investors most likely have in mind when they make stock purchase and sell decisions. It implicitly incorporates the analysts' adjustments for differences in accounting treatment among firms and the effects of the business cycle on each firm's results of operations. Although we thought at first that this earnings estimate might be highly correlated with the analysts' five-year earnings growth forecasts, that was not the case. Thus, we avoided a potential spurious correlation problem.

Price/Earnings Ratio. Corresponding to our definition of "earnings," the price/earnings ratio (P/E) is calculated as the closing stock price for the year divided by the consensus analyst earnings forecast for the forthcoming fiscal year.

Dividends. Dividends per share represent the common dividends declared per share during the calendar year, after adjustment for all stock splits and stock dividends). The firm's dividend payout ratio is then defined as common dividends per share divided by the consensus analyst estimate of the earnings per share for the forthcoming calendar year (D/E). Although this definition has the deficiency that it is obviously biased downward — it divides this year's dividend by next year's earnings — it has the advantage that it implicitly uses a "normalized" figure for earnings. We believe that this advantage outweighs the deficiency, especially when one considers the flaws of the apparent alternatives. Furthermore, we have verified that the results are insensitive to reasonable alternative definitions (see footnote 1).

Growth. In comparing historically based and consensus analysts' forecasts, we calculated forty-one different historical growth measures. These included the following: 1) the past growth rate in EPS as determined by a log-linear least squares regression for the latest year,[2] two years, three years, . . ., and ten years; 2) the past growth rate in DPS for the latest year, two years, three years, . . ., and ten years; 3) the past growth rate in book value per share (computed as the ratio of common equity to the outstanding common equity shares) for the latest year, two years, three years, . . ., and ten years; 4) the past growth rate in cash flow per share (computed as the ratio of pretax income, depreciation, and deferred taxes to the outstanding common equity shares) for the latest year, two years, three years, . . ., and ten years; and 5) plowback growth (computed as the firm's retention ratio for the current year times the firm's latest annual return on common equity).

We also used the five-year forecast of earnings per share growth compiled by IBES and reported in mid-January of each year. This number represents the consensus (i.e., mean) forecast produced by analysts from the research departments of leading Wall Street and regional brokerage firms over the preceding three months. IBES selects the contributing brokers "because of the superior quality of their research, professional reputation, and client demand" (IBES *Monthly Summary Book*).

Risk Variables. Although many risk factors could potentially affect the firm's stock price, most of these factors are highly correlated with one another. As shown above in Equation (4), we decided to restrict our attention to four risk measures that have intuitive appeal and are followed by many financial analysts: 1) B, the firm's beta as published by Value Line; 2) Cov, the firm's pretax interest coverage ratio (obtained from Standard & Poor's Compustat); 3) Rsq, the stability of the firm's five-year historical EPS (measured by the R^2 from a log-linear least squares regression); and 4) Sa, the standard deviation of the consensus analysts' five-year EPS growth forecast (mean forecast) as computed by IBES.

After careful analysis of the data used in our study, we felt that we could obtain more meaningful results by imposing six restrictions on the companies included in our study:

1. Because of the need to calculate ten-year historical growth rates, and because we studied three different time periods, 1981, 1982, and 1983, our study requires data for the thirteen-year period 1971-1983. We included only companies with at least a thirteen-year operating history in our study.
2. As our historical growth rate calculations were based on log-linear regressions, and the logarithm of a negative number is not defined, we excluded all companies that experienced negative EPS during any of the years 1971-1983.
3. For similar reasons, we also eliminated companies that did not pay a dividend during any one of the years 1971-1983.
4. To insure comparability of time periods covered by each consensus earnings figure in the P/E ratios, we eliminated all companies that did not have a December 31 fiscal year-end.
5. To eliminate distortions caused by highly unusual events that distort current earnings but not expected future earnings, and thus the firm's price/earnings ratio, we eliminated any firm with a price/earnings ratio greater than 50.
6. As the evaluation of analysts' forecasts is a major part of this study, we eliminated all firms that IBES did not follow.

Our final sample consisted of approximately sixty-five utility firms.[3]

RESULTS

To keep the number of calculations in our study to a reasonable level, we performed the study in two stages. In Stage 1, all forty-one historically oriented approaches for estimating future growth were correlated with each firm's P/E ratio. In Stage 2, the historical growth rate with the highest correlation to the P/E ratio was compared to the consensus analyst growth rate in the multiple regression model described by Equation (4) above. We performed our regressions for each of three recent time periods, because we felt the results of our study might vary over time.

First-Stage Correlation Study

Table 1 gives the results of our first-stage correlation study for each group of companies in each of the years 1981, 1982, and 1983. The values in this table measure the correlation between the historically oriented growth rates for the various time periods and the firm's end-of-year P/E ratio.

The four variables for which historical growth rates were calculated are shown in the left-hand column: EPS indicates historical earnings per share growth, DPS indicates historical dividend per share growth, BVPS indicates historical book value per share growth, and CFPS indicates historical cash flow per share growth. The term "plowback" refers to the product of the firm's retention ratio in the currennt year and its return on book equity for that year. In all, we calculated forty-one historically oriented growth rates for each group of firms in each study period.

The goal of the first-stage correlation analysis was to determine which historically oriented growth rate is most highly correlated with each group's year-end P/E ratio. Eight-year growth in CFPS has the highest correlation with P/E in 1981 and 1982, and ten-year growth in CFPS has the highest correlation with year-end P/E in 1983. In all cases, the plowback estimate of future growth performed poorly, indicating that — contrary to generally held views — plowback is not a factor in investor expectations of future growth.

Second-Stage Regression Study

In the second stage of our regression study, we ran the regression in Equation (4) using two different measures of future growth, g: 1) the best historically oriented growth rate (g_h) from the first-stage correlation study, and 2) the consensus analysts' forecast (g_a) of five-year EPS growth. The regression results, which are shown in Table 2, support at least

TABLE 1

Correlation Coefficients of All Historically Based Growth Estimates by Group and by Year with P/E

Current Year		*Historical Growth Rate Period in Years* 1	2	3	4	5	6	7	8	9	10
1981											
	EPS	−0.02	0.07	0.03	0.01	0.03	0.12	0.08	0.09	0.09	0.09
	DPS	0.05	0.18	0.14	0.15	0.14	0.15	0.19	0.23	0.23	0.23
	BVPS	0.01	0.11	0.13	0.13	0.16	0.18	0.15	0.15	0.15	0.15
	CFPS	−0.05	0.04	0.13	0.22	0.28	0.31	0.30	0.31	−0.57	−0.54
	Plowback	0.19									
1982											
	EPS	−0.10	−0.13	−0.06	−0.02	−0.02	−0.01	−0.03	−0.03	0.00	0.00
	DPS	−0.19	−0.10	0.03	0.05	0.07	0.08	0.09	0.11	0.13	0.13
	BVPS	0.07	0.08	0.11	0.11	0.09	0.10	0.11	0.11	0.09	0.09
	CFPS	−0.02	−0.08	0.00	0.10	0.16	0.19	0.23	0.25	0.24	0.07
	Plowback	0.04									
1983											
	EPS	−0.06	−0.25	−0.25	−0.24	−0.16	−0.11	−0.05	0.00	0.02	0.02
	DPS	0.03	−0.10	−0.03	0.08	0.15	0.21	0.21	0.21	0.22	0.24
	BVPS	0.03	0.10	0.04	0.09	0.15	0.16	0.19	0.21	0.22	0.21
	CFPS	−0.08	0.01	0.02	0.08	0.20	0.29	0.35	0.38	0.40	0.42
	Plowback	−0.08									

two general conclusions regarding the pricing of equity securities.

First, we found overwhelming evidence that the consensus analysts' forecast of future growth is superior to historically oriented growth measures in predicting the firm's stock price. In every case, the R^2 in the regression containing the consensus analysts' forecast is higher than the R^2 in the regression containing the historical growth measure. The regression coefficients in the equation containing the consensus analysts' forecast also are considerably more significant than they are in the alternative regression. These results are consistent with those found by Cragg and Malkiel for data covering the period 1961-1968. Our results also are consistent with the hypothesis that investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy–and–sell decisions.

TABLE 2

Regression Results
Model I

Part A: *Historical*

$$P/E = a_0 + a_1 D/E + a_2 g_h + a_3 B + a_4 Cov + a_5 Rsq + a_6 Sa$$

Year	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	$\hat{a}_3$	$\hat{a}_4$	$\hat{a}_5$	$\hat{a}_6$	R^2	F Ratio
1981	−6.42*	10.31*	7.67*	3.24	0.54*	1.42*	57.43	0.83	46.49
	(5.50)	(14.79)	(2.20)	(2.86)	(2.50)	(2.85)	(4.07)		
1982	−2.90*	9.32*	8.49*	2.85	0.45*	−0.42	3.63	0.86	65.53
	(2.75)	(18.52)	(4.18)	(2.83)	(2.60)	(0.05)	(0.26)		
1983	−5.96*	10.20*	19.78*	4.85	0.44*	0.33	32.49	0.82	45.26
	(3.70)	(12.20)	(4.83)	(2.95)	(1.89)	(0.50)	(1.29)		

Part B: *Analysis*

$$P/E = a_0 + a_1 D/E + a_2 g_a + a_3 B + a_4 Cov + a_5 Rsq + a_6 Sa$$

Year	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	$\hat{a}_3$	$\hat{a}_4$	$\hat{a}_5$	$\hat{a}_6$	R^2	F Ratio
1981	−4.97*	10.62*	54.85*	−0.61	0.33*	0.63*	4.34	0.91	103.10
	(6.23)	(21.57)	(8.56)	(0.68)	(2.28)	(1.74)	(0.37)		
1982	−2.16*	9.47*	50.71*	−1.07	0.36*	−0.31	119.05*	0.90	97.62
	(2.59)	(22.46)	(9.31)	(1.14)	(2.53)	(1.09)	(1.60)		
1983	−8.47*	11.96*	79.05*	2.16	0.56*	0.20	−34.43	0.87	69.81
	(7.07)	(16.48)	(7.84)	(1.55)	(3.08)	(0.38)	(1.44)		

Notes:
* Coefficient is significant at the 5% level (using a one-tailed test) and has the correct sign. T-statistic in parentheses.

Second, there is some evidence that investors tend to view risk in traditional terms. The interest coverage variable is statistically significant in all but one of our samples, and the stability of the operating income variable is statistically significant in six of the twelve samples we studied. On the other hand, the beta is never statistically significant, and the standard deviation of the analysts' five-year growth forecasts is statistically significant in only two of our twelve samples. This evidence is far from conclusive, however, because, as we demonstrate later, a significant degree of cross-correlation among our four risk variables makes any general inference about risk extremely hazardous.

Possible Misspecification of Risk

The stock valuation theory says nothing about which risk variables are most important to investors. Therefore, we need to consider the possibility that the risk variables of our study are only proxies for the "true" risk variables used by investors. The inclusion of proxy variables may increase the variance of the parameters of most concern, which in this case are the coefficients of the growth variables.[4]

To allow for the possibility that the use of risk proxies has caused us to draw incorrect conclusions concerning the relative importance of analysts' growth forecasts and historical growth extrapolations, we have also estimated Equation (4) with the risk variables excluded. The results of these regressions are shown in Table 3.

Again, there is overwhelming evidence that the consensus analysts' growth forecast is superior to the historically oriented growth measures in predicting the firm's stock price. The R^2 and t-statistics are higher in every case.

CONCLUSION

The relationship between growth expectations and share prices is important in several major areas of finance. The data base of analysts' growth forecasts collected by Lynch, Jones & Ryan provides a unique opportunity to test the hypothesis that investors rely more heavily on analysts' growth forecasts than on historical growth extrapolations in making security buy-and-sell decisions. With the help of this data base, our studies affirm the superiority of analysts' forecasts over simple historical growth extrapolations in the stock price formation process. Indirectly, this finding lends support to the use of valuation models whose input includes expected growth rates.

[1] We also tried several other definitions of "earnings," including the firm's most recent primary earnings per share prior to any extraordinary items or discontinued operations. As our results were insensitive to reasonable alternative definitions of "earnings" we report only the results for the IBES consensus.

TABLE 3

Regression Results
Model II

Part A: *Historical*

$P/E = a_0 + a_1 D/E + a_2 g_h$

Year	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	R^2	F Ratio
1981	−1.05	9.59	21.20	0.73	82.95
	(1.61)	(12.13)	(7.05)		
1982	0.54	8.92	12.18	0.83	167.97
	(1.38)	(17.73)	(6.95)		
1983	−0.75	8.92	12.18	0.77	107.82
	(1.13)	(12.38)	(7.94)		

Part B: *Analysis*

$P/E + a_0 + a_1 D/E + a_2 g_a$

Year	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	R^2	F Ratio
1981	3.96	10.07	60.53	0.90	274.16
	(8.31)	(8.31)	(20.91)	(15.79)	
1982	−1.75	9.19	44.92	0.88	246.36
	(4.00)	(4.00)	(21.35)	(11.06)	
1983	−4.97	10.95	82.02	0.83	168.28
	(6.93)	(6.93)	(15.93)	(11.02)	

Notes:
• Coefficient is significant at the 5% level (using a one-tailed test) and has the correct sign. T-statistic in parentheses.

[2] For the latest year, we actually employed a point-to-point growth calculation because there were only two available observations.

[3] We use the word "approximately," because the set of available firms varied each year. In any case, the number varied only from zero to three firms on either side of the figures cited here.

[4] See Maddala (1977).

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Choice among methods of estimating share yield

The search for the growth component in the discounted cash flow model.

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The yield at which a share of stock is selling, also called its expected return or required return, is an important statistic in finance. Firms use it in choosing among investment opportunities and financing alternatives, and investors use it in making portfolio decisions. Nevertheless, the yield at which a share is selling is a difficult quantity to measure, which has limited its use in the practice of finance. This paper develops and tests a basis for choice among alternative methods of estimating a share's yield.

A share's yield, like a bond's yield, is the discount rate that equates its expected future payments with its current price. A bond's yield is easy to measure under the common practice of ignoring default risk, as the future payments are then known with certainty. The future payments on a share, however, are dividends and market price, and these payments are uncertain.

The common practice is to represent these future dividend payments with estimates of two numbers: One is the coming dividend, and the other is a growth rate. The latter can be an estimate of the long-run growth rate in the dividend or of the growth rate in price over the coming period. In the latter case, the estimate is called the expected holding-period return (EHPR); in the former case, it is called the discounted cash flow yield (DCFY).[1] In either case, the estimate of a share's yield reduces to the sum of its dividend yield and a future growth rate, with the latter inferred in some way from historical data.

There is a wide variety of acceptable methods for using historical data to estimate future growth. This variation in method is illustrated in the testimony of expert witnesses before public utility commissions on the fair return for a public utility. In these cases, the estimates and the methods used are a matter of public record. Some idea of the various methods can be found in Morin (1984) and Kolbe, Read, and Hall (1984). The performance of alternative estimating methods has been examined in Gordon (1974), Kolbe, Read, and Hall (1984), Brigham, Shome, and Vinson (1985), and Harris (1986).

We have derived our basis for comparing the accuracy of alternative methods for estimating the DCFY on a share from the generally accepted propositions that yield should vary according to risk, and that beta is the best estimate of risk. Hence, the DCFY should vary among shares with beta, and, between two methods for estimating growth, the superior method is the one for which the variation in yield among shares is explained better by the variation in beta among the shares.

First we present simple, plausible, and objective measurement rules for implementing four popular and/or attractive methods for estimating the DCFY. We then describe how sample statistics may be used to judge the accuracy of each method. We also describe how the CAPM model has been used to estimate share yield and explain why we do not compare it with the various DCFY methods. The following section carries out the comparison with samples of utility and industrial shares, and the last section pre-

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sents the conclusions that may be drawn from the findings.

ALTERNATIVE MEASUREMENT RULES FOR A SHARE'S YIELD

Under the DCF method or model for estimating the expected return on a stock, the yield for the jth stock is:

$$DCFY_{jt} = DYD_{jt} + GR_{jt}, \qquad (1)$$

where:

$DCFY_{jt}$ = DCF yield on the jth stock at time t,

DYD_{jt} = dividend yield on the jth stock at time t, and

GR_{jt} = long-run growth rate in the dividend on the jth stock that investors expect at time t.

In what follows, we omit the time and firm subscripts on the variables when they are not required. Also, DCFY will refer to the unknown true yield on a share.

The difficult problem in arriving at the DCFY is estimation of the long-run growth rate that investors expect. Four estimates of that quantity are:

EGR = rate of growth in earnings per share over a prior time period, usually the last five years;

DGR = rate of growth in dividend per share over a prior time period, usually the last five years;

FRG = consensus among security analyst forecasts of the growth rate in earnings, over the next five years; and

BRG = an average over the prior five years of the product of the retention rate b and rate of return on common equity r on a stock.

The estimate of share yield that incorporates each of these estimates of growth is denoted KEGR, KDGR, KFRG, and KBRG, respectively.

A case can be made for each of the four methods for estimating growth. KEGR, KDGR, and KBRG have been widely used in public utility testimony and in research on stock valuation models. The rationale for KEGR is the belief that the past growth rate in earnings is the best predictor of future growth in earnings and dividends. The rationale for KDGR is that the future growth rate in dividends is the statistic we want to estimate, and the past dividend record is free of the noise in past earnings.[2] The rationale for KBRG is that all variables will grow at this rate if the firm earns r and retains b. Furthermore, as Gordon and Gould (1980) show, KEGR and KDGR will be biased in one direction or another if r and b have changed over the last five years. As for KFRG, security analysts are professionals employed to forecast future performance; their forecasts are widely accepted by investors. The IBES collection of forecast growth rates of security analysts compiled by Lynch, Jones, and Ryan has increased the popularity of this estimate.

As stated earlier, we may also take the yield on a share as the sum of the dividend yield and the expected rate of growth in price over the coming period. This estimate of a share's yield is widely used in testing the CAPM, with the average HPR over the prior five years commonly used in such empirical work. On the other hand, this estimate of a share's yield varies so widely among firms and over time as to be patently in error as an estimate of share yield.[3]

BASIS OF COMPARISON

To compare the accuracy of the four estimates of the DCFY stated above, we regress the data under each estimate on beta for a sample of shares. If KEGR is the estimate,

$$KEGR_j = \alpha_0 + \alpha_1 BETA_j + \epsilon_j. \qquad (2)$$

The rationale for this expression lies in the risk premium theory of share yield, where the share yield is equal to the interest rate plus a risk premium that varies with the share's relative risk. Hence, if BETA is an error-free index of relative risk, α_0 is equal to the interest rate, and α_1 is the risk premium on the market portfolio or standard share.[4]

The higher the correlation between KEGR and BETA, assuming that α_1 is positive, the greater the confidence we may have in KEGR as an estimate of DCFY. We cannot rely solely on the correlation, though, in selecting among the methods for estimating DCFY. Errors in KEGR as a basis for estimating the DCFY on the jth share have random and systematic components. The former is ϵ_j, and its average value can be taken as the root mean square error of the regression (MSE). The larger the root MSE of the regression, the less attractive KEGR is as an estimate of share yield, because the error makes the problem of choice between $KEGR_j$ and $KEGR_j - \epsilon_j$ more acute. (That problem will be discussed shortly.)

The systematic error is the difference between the unknown true yield on the jth share, $DCFY_j$, and the value predicted by Equation (2). There is no obvious measure of the systematic error, as we do not know $DCFY_j$, but sample values of α_0 may provide information on its average value. The difference between α_0 and the interest rate is an indicator of systematic error, because the difference is zero under the risk premium theory. Error in the measurement of BETA biases α_0 upward, but, with the same BETA for each share used in all four regressions, differences in α_0 are indicators of systematic error.[5]

In addition to regression statistics, the sample mean and standard deviation of KEGR is a source of information on its accuracy as a method for the estimation of DCFY. If the mean departs radically from the long-term bond rate, or if the standard deviation indicates an unreasonable range of variation among shares, the accuracy of the method is open to question. Also, the sample mean may be a source of information on the systematic error for a method of estimation. Hence, sample values for the mean, standard deviation, correlation, root MSE, and constant term all contribute to a judgment on a method's accuracy for estimating the DCFY on a share. Unfortunately, there is no simple criterion for choice among the alternatives.

Once a conclusion is reached on the most accurate method for estimating DCFY — say, KEGR — we then have the problem of choice between $KEGR_j$ and $KEGR_j - \epsilon_j$ for the jth share. If the random error in $KEGR_j$ is due to error in its measurement for the jth share, we simply use the value predicted by Equation (2), which is $KEGR_j - \epsilon_j$. On the other hand, KEGR and DCFY may vary among shares with other (omitted) variables as well as BETA, in which case ϵ_j is also due to the omitted variables, and $KEGR_j$ may be the better estimate of DCFY. Unfortunately, we have no basis for choice among these two hypotheses, and the smaller the root MSE the less troublesome the problem of choice between them.

A more favorable tax treatment of capital gains over dividends should make investors prefer capital gains to dividends. As Brennan (1973) has shown, the yield investors require on a share would then vary with the excess of its dividend yield over the interest rate. To recognize this, Equation (2) becomes

$$KEGR_j = \alpha_0 + \alpha_1 BETA_j + \alpha_2 DMI_j + \epsilon_j, \qquad (3)$$

with DMI_j the excess of the dividend yield over the interest rate for the jth firm. Although the tax effect should make α_2 positive, its information in DMI on share risk would tend to make α_2 negative. That is, dividend yield varies inversely with expected growth, and we would find α_2 negative insofar as growth is risky. To the extent that these two influences of the dividend yield offset each other, α_2 will tend toward zero.

The CAPM theory of how expected return varies among shares has been proposed as an alternative to the DCF model for measuring yield. Its value for the jth stock is

$$EHPR_j = INTR + BETA_j[EHPR_m - INTR], \qquad (4)$$

where:

$EHPR_j$ = expected holding-period return on the jth share,

$INTR$ = one-period risk-free interest rate,

$EHPR_m$ = expected holding-period return on the market portfolio.

There is an important difference between this CAPM model of share yield and the DCF model represented by Equation (1). The latter is merely an instrument for measuring share yield: There is nothing in the DCF model that explains the variation in yield among shares. The CAPM, on the other hand, is a theory on why and how yield varies among shares, but one must go outside of the theory to estimate the variables on the right-hand side of Equation (4). Given rules for estimating the variables, EHPR and BETA, empirical work then provides a joint test of the theory and the estimating rules, such as we are carrying out here.[6]

The CAPM nonetheless has been used to estimate share yield in testimony before regulatory commissions by assigning numbers to each of the quantities on the right-hand side of Equation (4). For INTR, a long-term bond yield is sometimes used instead of a one-period rate. BETA is estimated by conventional methods.

The big problem is the expected return on the market portfolio. Here the practice has been to use the average realized risk premium over a period of about fifty years as the estimate of $EHPR_m - INTR$ in Equation (4). Although the implicit assumption is that the risk premium is a constant over time, we would expect the premium to change from one period to the next for various reasons, among them changes in the interest rate, the risk premium on the market portfolio, and the relative taxation of interest and share income. Hence, this estimate of share yield is more or less in error at any particular time, but we have no way of estimating this error and comparing the method with the others.

COMPARATIVE PERFORMANCE

We carried out our empirical work with a sample of 75 large electric and gas utility firms and a sample of 244 firms that includes 169 industrial firms drawn from the S&P 400. We obtained share yield under the four methods for estimating it as of the start of the year for the years 1984, 1985, and 1986.

For the explanatory variables, BETA for each share on each date was obtained by regressing the monthly HPRs for the share on the monthly HPRs for the S&P 500 over the prior five years. DMI for a share is its dividend yield less the interest rate on the one-month Treasury bill at the start of each year. EGR and DGR are the growth rates in earnings and in dividends per share, respectively, over the prior five years as reported on the Value Line Tape. BRG is a weighted average of the retention growth rates over the prior five years,[7] and FRG is the average of forecast growth rates in earnings over the next five years reported by IBES. The corresponding estimates of share yield were obtained by adding the dividend yield at the start of each year to the estimate of growth.

Table 1 presents the statistics that we obtained with KBRG and KFRG as the estimates of DCFY for the sample of utility shares and of all shares. The means of KBRG for the utility shares seems reasonable, with the interest rate on ten-year government bonds the standard of comparison, the latter being 11.67%, 10.43%, and 9.19% at the start of 1984, 1985, and 1986, respectively.[8] The standard deviations for KBRG are small enough to make its range of variation well within the bounds of reason. The lower means for all shares reveal that the means for industrial shares are below the means for utility shares.[9] This casts doubt on the accuracy of KBRG as a basis for estimating the DCFY on industrial shares, because industrials are riskier than utility shares.

The beta model explains none of the variation in KBRG among utility shares, but the two-factor model is a substantial improvement. The DMI coefficient, α_2, is positive and significant in every year, meaning that the unfavorable tax effect of a high dividend yield dominates the favorable risk effect. The coefficient on BETA is positive and significant in two of the three years. The only disturbing feature of the data is the sharp fall in R^2 and the corresponding rise in the root MSE relative to the standard deviation of KBRG as we go from 1984 to 1986.

The KBRG statistics for all shares are substantially inferior to the utility share statistics. This forces the unhappy conclusion that, for industrial shares, BETA is a poor measure of risk, or KBRG is a poor measure of DCFY, or both.

The KFRG statistics for the utility sample are superior to the KBRG statistics. The means are reasonable under the two criteria of being above the interest rate and moving with it. The range of variation of KFRG suggested by its standard deviations seems reasonable. The statistics for the beta model are a slight improvement on the corresponding statistics for KBRG. Furthermore, the two-factor model does a good job of explaining the variation in KFRG among

TABLE 1

Sample and Regression Statistics for KBRG and KFRG, Utility Shares and All Shares, 1984, 1985, and 1986

	KBRG			KFRG		
	1984	1985	1986	1984	1985	1986
			UTILITY SHARES (75)			
Mean	14.84	14.38	12.93	15.64	14.56	12.93
Standard Deviation	2.51	1.87	1.80	2.26	1.43	1.42
Beta Model α_0	14.26	13.96	13.05	15.14	13.48	12.74
α_1	1.44	1.21	−0.28	1.25	3.09	0.42
t-statistic	(0.97)	(1.12)	(0.19)	(0.93)	(4.14)	(0.37)
Root MSE	2.52	1.87	1.81	2.26	1.29	1.43
R^2	0.013	0.017	0.001	0.012	0.190	0.002
Two-Factor Model α_0	12.45	12.75	12.42	13.30	12.46	11.97
α_1	3.45	2.11	0.11	3.28	3.85	0.89
t-statistic	(3.13)	(2.19)	(0.08)	(3.83)	(6.33)	(0.88)
α_2	0.68	0.45	0.34	0.68	0.38	0.41
t-statistic	(8.22)	(4.88)	(2.81)	(10.73)	(6.52)	(4.65)
Root MSE	1.82	1.63	1.73	1.41	1.03	1.26
R^2	0.491	0.262	0.100	0.620	0.491	0.232
			ALL SHARES (244)			
Mean	12.98	13.19	11.86	16.17	15.87	14.31
Standard Deviation	3.86	3.21	3.52	2.60	2.32	2.30
Beta Model α_0	15.00	14.71	13.90	15.56	14.50	12.57
α_1	−2.47	−1.91	−2.40	0.74	1.72	2.05
t-statistic	(4.23)	(4.15)	(4.25)	(1.83)	(5.29)	(5.70)
Root MSE	3.73	3.10	3.40	2.59	2.20	2.16
R^2	0.069	0.066	0.069	0.014	0.104	0.118
Two-Factor Model α_0	14.34	14.42	13.95	15.40	14.61	12.75
α_1	0.09	−1.18	−2.51	1.37	1.44	1.61
t-statistic	(0.13)	(2.04)	(3.45)	(2.69)	(3.52)	(3.49)
α_2	0.48	0.17	−0.02	0.12	−0.06	−0.10
t-statistic	(6.04)	(2.09)	(0.24)	(2.01)	(1.12)	(1.53)
Root MSE	3.49	3.08	3.41	2.57	2.20	2.16
R^2	0.191	0.083	0.070	0.030	0.108	0.127

utility shares. The R^2s are higher here than for KBRG in every year. Finally, α_2 is positive and significant in every year, and α_1 is not significant only in 1986.

The implicit means of KFRG for the industrial shares seem high but not beyond reason. On the other hand, the regression statistics for the all-shares sample are not good, which leads to the same unhappy conclusion for industrial shares as we reached for KBRG.

Table 2 presents the statistics that we obtained using KEGR and KDGR as estimates of the DCFY on the shares in our samples. Comparison of the regression statistics with those in Table 1 reveals that KEGR and KDGR, particularly the former, fall short by a wide margin of the performance of KBRG and KFRG as estimates of the DCFY on a share.

CONCLUSION

We have compared the accuracy of four methods for estimating the growth component of the discounted cash flow yield on a share: past growth rate in earnings (KEGR), past growth rate in dividends (KDGR), past retention growth rate (KBRG), and forecasts of growth by security analysts (KFRG). Criteria for the comparison were the reasonableness of sample means and standard deviations and the success of beta and dividend yield in explaining the variation in DCF yield among shares. For our sample of utility shares, KFRG performed well, with KBRG, KDGR, and KEGR following in that order, and with KEGR a distant fourth. If we had used past growth in price, it would have been an even more distant fifth. Nevertheless, none of the four estimates of growth performed well under the criteria for a sample that included industrial shares.

Before closing, we have three observations to make. First, the superior performance by KFRG should come as no surprise. All four estimates of growth rely upon past data, but in the case of KFRG a larger body of past data is used, filtered through a group of security analysts who adjust for abnormalities that are not considered relevant for future growth. We assume this is done by any analyst who develops retention growth estimates of yield for a firm. If we had done this for all seventy-five firms in our utility sample, it is likely that the correlations

TABLE 2

Sample and Regression Statistics for KEGR and KDGR, Utility Shares and All Shares, 1984, 1985, and 1986

	KEGR			KDGR		
	1984	1985	1986	1984	1985	1986
UTILITY SHARES (75)						
Mean	16.16	0.32	14.91	16.49	15.76	14.13
Standard Deviation	3.31	3.47	4.66	3.12	2.41	2.21
Beta Model α_0	15.45	16.18	0.51	15.75	14.53	12.30
α_1	1.75	0.40	−7.87	1.83	3.53	3.99
t-statistic	(0.89)	(0.20)	(2.16)	(0.99)	(2.64)	(2.32)
Root MSE	3.32	3.49	4.55	3.12	2.32	2.15
R^2	0.010	0.001	0.060	0.013	0.087	0.069
Two-Factor Model α_0	14.20	15.83	18.76	14.10	13.56	12.64
α_1	3.13	0.66	−8.03	3.65	4.25	3.78
t-statistic	(1.66)	(0.32)	(2.18)	(2.23)	(3.26)	(2.20)
α_2	0.47	0.13	−0.13	0.61	0.35	−0.18
t-statistic	(3.32)	(0.66)	(0.42)	(5.02)	(2.86)	(1.21)
Root MSE	3.11	3.50	4.58	2.70	2.21	2.14
R^2	0.142	0.007	0.063	0.269	0.180	0.087
ALL SHARES (244)						
Mean	11.14	9.42	7.88	15.08	13.63	11.35
Standard Deviation	10.67	11.67	11.45	6.08	6.30	6.71
Beta Model α_0	15.96	18.28	19.55	15.15	0.04	15.39
α_1	−5.90	−11.16	−13.70	−0.09	−1.78	−4.74
t-statistic	(3.62)	(7.07)	(8.10)	(0.09)	(1.92)	(4.41)
Root MSE	10.41	10.65	10.18	6.09	6.27	6.47
R^2	0.051	0.171	0.213	0.000	0.015	0.074
Two-Factor Model α_0	14.84	18.01	19.91	14.31	14.11	14.79
α_1	−1.56	−10.49	−14.62	3.17	0.63	−3.25
t-statistic	(0.77)	(5.27)	(6.72)	(2.73)	(0.55)	(2.36)
α_2	0.81	0.15	−0.21	0.61	0.55	0.34
t-statistic	(3.51)	(0.55)	(0.67)	(4.57)	(3.47)	(1.72)
Root MSE	10.18	10.67	10.19	5.86	6.13	6.45
R^2	0.097	0.172	0.215	0.080	0.062	0.085

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would have been as good or better than those obtained with the analyst forecasts of growth.

Second, we examined shares and not portfolios, because our objective is to estimate the DCFY for shares and not for portfolios. As common practice in testing the CAPM has been to execute tests on portfolios instead of shares, we classified our population of shares into ten portfolios on the basis of their beta values. Regression statistics were substantially unchanged, except that correlations increased dramatically.

Finally, we must acknowledge that we have no basis for estimating the expected HPR or DCF yield for industrial shares with any confidence. Theories on financial decision-making in industrial corporations that rely on that statistic have a weak empirical foundation.

[1] The EHPR is a one-period return, while the DCFY is a yield to maturity measure. The two may differ in actuality because of measurement problems, but they also may differ in theory. That is, they may differ in the same way that interest rates on bonds of different maturities may differ. See Gordon and Gould (1984a). This source of difference between EHPR and DCFY will be ignored here.

[2] A widely accepted hypothesis is that dividends contain information on earnings, because management sets the dividend to pay out a stable fraction of normal or permanent earnings.

[3] Over a five-year period, there may even be a negative rate of growth in price for a large number of firms. Furthermore, this negative growth rate may be larger in absolute value than the dividend yield, which leads to the conclusion that investors are holding such shares to earn a negative return. The frequency of negative rates of growth in price is reduced as the prior time period used in its calculation increases in length. As that takes place, however, the estimate of the expected return for a firm approaches a constant or a constant plus the dividend yield. The expected return on a share is one statistic for which it is an error to assume that expectations are on average realized.

[4] Equation (2) is similar to the CAPM according to Sharpe, Lintner, and Mossin. They arrived at this expression under very rigorous assumptions. The heuristic risk premium model is adequate for our purposes.

[5] It may be thought that Theil's (1966) decomposition of the difference between the actual and predicted values of a variable can be used here, but in fact that decomposition applies to a different problem. It assumes that the observed (actual) past values of a variable are free of error, and it decomposes the error in a model that is employed to explain the past values. The purpose of Theil's decomposition is to cast light on the possible error in using the model to predict future values of the dependent variable. Our problem is to determine which set of observed values is closest to the true values, with the risk premium theory of share yield and BETA as the source of information on the true values. Theil's method would be appropriate for decomposing the difference between the actual and predicted values of the *realized* holding-period return on a share. The actual values here can be observed without error.

[6] There is an enormous volume of empirical work devoted to discovering whether the theory is true, but this empirical work does not provide useful estimates of the EHPR on a share. To test the truth of Equation (4), the practice has been to regress EHPR on BETA for a sample of firms with the average realized HPR over the prior five or so years used as an estimate of the EHPR. Because of the large error in the realized HPR over a prior time period, as noted earlier, neither the actual values of the dependent variable nor the values predicted by the model are usable as estimates of share yield. See Fama and MacBeth (1973) and Friend, Westerfield, and Granito (1978).

[7] BRG for a year is earnings less dividend divided by the end-of-year book value. The estimate of the expected value as of the start of 1986 is 0.3BRG85 + 0.25BRG84 + 0.20BRG83 + 0.15BRG83 + 0.10BRG82. If any value of BRG was negative, it was set equal to zero.

[8] We expect the yields on shares to be above the risk-free interest rate, but with a high enough interest rate the more favorable tax treatment of shares can reduce the yield below the interest rate. Interest rates were not that high in these years. See Gordon and Gould (1984b).

[9] The statistics reported for all shares and for utility shares were also obtained for industrial shares. All methods of estimation performed so poorly for industrial shares, however, as to suggest no confidence can be placed in any of them. To save space, we do not present statistics for the industrial shares. Whatever we want to know about them can be deduced by comparing the data for all shares and utility shares.

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Utilities

The utilities rating methodology encompasses two basic components: business risk analysis and financial analysis. Evaluation of industry characteristics, the utility's position within that industry, its regulation, and its management provides the context for assessing a firm's financial condition.

Historical analysis is a tool for identifying strengths and weaknesses, and provides a starting point for evaluating financial condition. Business position assessment is the qualitative measure of a utility's fundamental creditworthiness. It focuses on the forces that will shape the utilities' future.

Utilities credit analysis factors

Business risk	Financial risk
• Markets and service area economy	• Earnings protection
• Competitive position	• Capital structure
• Operations	• Cash flow adequacy
• Regulation	• Financial flexibility/capital attraction
• Management	
• Fuel, power, and water supply	
• Asset concentration	

The credit analysis of utilities is quickly evolving, as utilities are treated less as regulated monopolies and more as entities faced with a host of challengers in a competitive environment. Marketplace dynamics are supplanting the power of regulation, making it critically important to reduce costs and/or market new services in order to thwart competitors' inroads.

Markets and service area economy

Assessing service territory begins with the economic and demographic evaluation of the area in which the utility has its franchise. Strength of long-term demand for the product is examined from a macroeconomic perspective. This enables Standard & Poor's to evaluate the affordability of rates and the staying power of demand.

Standard & Poor's tries to discern any secular consumption trends and, more importantly, the reasons for them. Specific items examined include the size and growth rate of the market, strength of the franchise, historical and projected sales growth, income levels and trends in population, employment, and per capita income. A utility with a healthy economy and customer base—as illustrated by diverse employment opportunities, average or above-average wealth and income statistics, and low unemployment—will have a greater capacity to support its operations.

For electric and gas utilities, distribution by customer class is scrutinized to assess the depth and diversity of the utility's customer mix. For example, heavy industrial concentration is viewed cautiously, since a utility may have significant exposure to cyclical volatility. Alternatively, a large residential component yields a stable and more predictable revenue stream. The largest utility customers are identified to determine their importance to the bottom line and assess the risk of their loss and potential adverse effect on the utility's financial position. Credit concerns arise when individual customers represent more than 5% of revenues. The company or industry may play a significant role in the overall economic base of the service area. Moreover, large customers may turn to cogeneration or alternative power supplies to meet their energy needs, potentially leading to reduced cash flow for the utility (even in cases where a large customer pays discounted rates and is not a profitable account for the utility). Customer concentration is less significant for water and telecommunication utilities.

Competitive position

As competitive pressures have intensified in the utilities industry, Standard & Poor's analysis has deepened to include a more thorough review of competitive position.

Electric utility competition

For electric utilities, competitive factors examined include: percentage of firm wholesale revenues that are most vulnerable to competition; industrial load concentration; exposure of key customers to alternative suppliers; commercial concentrations; rates for various customer classes; rate design and flexibility; production costs, both marginal and fixed; the regional capacity situation; and transmission constraints. A regional focus is evident, but high costs and rates relative to national averages are also of significant concern because of the potential for electricity substitutes over time.

Mounting competition in the electric utility industry derives from excess generating capacity, lower barriers to entering the electric generating business, and marginal costs that are below embedded costs. Standard & Poor's has already witnessed declining prices in wholesale markets, as *de facto* retail competition is already being seen in several parts of the country. Standard & Poor's believes that over the coming years more and more customers will want and demand lower prices. Initial concerns focus on the largest industrial loads, but other customer classes will be increasingly vulnerable. Competition will not necessarily be driven by legislation. Other pressures will arise from global competition and improving technologies, whether it be the declining cost of incremental generation or advances in transmission capacity or substitute energy sources like the fuel cell. It is impossible to say precisely when wide-open retail competition will occur; this will be evolutionary. However, significantly greater competition in retail markets is inevitable.

Gas utility competition

Similarly, gas utilities are analyzed with regard to their competitive standing in the three major areas of demand: residential, commercial, and industrial. Although regulated as holders of monopoly power, natural gas utilities have for some time been actively competing for energy market share with fuel oil, electricity, coal, solar, wood, etc. The long-term staying power of market demand for natural gas cannot be taken for granted. In fact, as the electric utility industry restructures and reduces costs, electric power will become more cost competitive and threaten certain gas markets. In addition, independent gas marketers have made greater inroads behind the city gate and are competing for large gas users. Moreover, the recent trend by state regulators to unbundle utility services is creating opportunities for outsiders to market niche products. Distributors still have the upper hand, but those who do not reduce and control costs, and thus rates, could find competition even more difficult.

Natural gas pipelines are judged to carry a somewhat higher business risk than distribution companies because they face competition in every one of their markets. To the extent a pipeline serves utilities versus industrial end users, its stability is greater. Over the next five years, pipeline competition will heat up since many service contracts with customers are expiring. Most distributor or end-use customers are looking to reduce pipeline costs and are working to improve their load factor to do so. Thus, pipelines will likely find it difficult to recontract all capacity in coming years. Being the pipeline of choice is a function of attractive transportation rates, diversity and quality of services provided, and capacity available in each particular market. In all cases though, periodic discounting of rates to retain customers will occur and put pressure on profitability.

Water utility competition

As the last true utility monopoly, water utilities face very little competition and there is currently no challenge to the continuation of franchise areas. The only exceptions have been cases where investor-owned water companies have been subject to condemnation and municipalization because of poor service or political motivations. In that regard, Standard & Poor's pays close attention to costs and rates in relation to neighboring utilities and national averages. (In contrast, the privatization of public water facilities has begun, albeit at a slower pace than anticipated. This is occurring mostly in the form of operating contracts and public/private partnerships, and not in asset transfers. This trend should continue as cities look for ways to balance their tight budgets.) Also, water utilities are not fully immune to the forces of competition; in a few instances wholesale customers can access more than one supplier.

Telephone competition

The Telecommunications Act of 1996 accelerates the continuing challenge to the local exchange companies' (LECs) century-old monopoly in the local loop. Competitive access providers (CAPs), both facilities-based and resellers, are aggressively pursuing customers, generally targeting metropolitan areas, and promising lower rates and better service.

Most long-distance calls are still originated and terminated on the local telephone company network. To complete such a call, the long-distance provider (including AT&T, MCI, Sprint and a host of smaller interexchange carriers or "IXCs") must pay the local telephone company a steep "access" fee to compensate the local phone company for the use of its local network. CAPs, in contrast, build or lease facilities that directly connect customers to their long-distance carrier, bypassing the local telephone company and avoiding access fees, and thereby can offer lower long-distance rates. But the LECs are not standing still; they are combating the loss of business to CAPs by lowering access fees, thereby reducing the economic incentive for a high usage long-distance customer to use a CAP. LECs are attempting to make up for the loss of revenues from lower access fees by increasing basic local service rates (or at least not lowering them), since basic service is far less subject to competition. LECs are improving operating efficiency and marketing high margin, value-added new services. Additionally, in the wake of the Telecommunications Act, LECs will capture at least some of the inter-LATA long-distance market. As a result of these initiatives, LECs continue to rebuild themselves—from the traditional utility monopoly to leaner, more marketing oriented organizations.

While LECs, and indeed all segments of the telecommunications sector, face increasing competition, there are favorable industry factors that tend to offset heightened business risk and auger for overall ratings stability for most LECs. Importantly, telecommunications is a declining-cost business. With increased deployment of fiber optics, the cost of transport has fallen dramatically and digital switching hardware and software have yielded more capable, trouble-free and cost-efficient networks. As a result, the cost of network maintenance has dropped sharply, as illustrated by the ratio of employees per 10,000 access lines, an oft cited measurement of efficiency. Ratios as low as 25 employees per 10,000 lines are being seen, down from the typical 40 or more employees per 10,000 ratio of only a few years ago.

In addition, networks are far more capable. They are increasingly digitally switched and able to accommodate high-speed communications. The infrastructure needed to accommodate switched broadband services will be built into telephone networks over the next few years. These advanced networks will enable telephone companies to look to a greater variety of high-margin, value-added services. In addition to those current services such as call waiting or caller ID, the delivery of hundreds of broadcast and interactive video channels will be possible. While these services offer the potential of new revenue streams, they will simultaneously present a formidable challenge. LECs will be entering the new (to them) arena of multimedia entertainment and will have to develop expertise in marketing and entertainment programming acumen; such skills stand in sharp contrast to LECs' traditional strengths in engineering and customer service.

Operations

Standard & Poor's focuses on the nature of operations from the perspective of cost, reliability, and quality of service. Here, emphasis is placed on those areas that require management attention in terms of time or money and which, if unresolved, may lead to political, regulatory, or competitive problems.

Operations of electric utilities

For electrics, the status of utility plant investment is reviewed with regard to generating plant availability and utilization, and also for compliance with existing and contemplated environmental and other regulatory standards. The record of plant outages, equivalent availability, load factors, heat rates, and capacity factors are examined. Also important is efficiency, as defined by total megawatt hour per employee and customers per employee. Transmission interconnections are evaluated in terms of the number of utilities to which the utility in question has access, the cost structures and available generating capacity of these other utilities, and the price paid for wholesale power.

Because of mounting competition and the substantial escalation in decommissioning estimates, significant weight is given to the operation of nuclear facilities. Nuclear plants are becoming more vulnerable to high production costs that make their rates uneconomic. Significant asset concentration may expose the utility to poor performance, unscheduled outages or premature shutdowns, and large deferrals or regulatory assets that may need to be written off for the utility to remain competitive. Also, nuclear facilities tend to represent significant portions of their operators' generating capability and assets. The loss of a productive nuclear unit from both power supply and rate base can interrupt the revenue stream and create substantial additional costs for repairs and improvements and replacement power. The ability to keep these stations running smoothly and economically directly influences the ability to meet electric demand, the stability of revenues and costs, and, by extension, the ability to maintain adequate creditworthiness. Thus, economic operation, safe operation, and long-term operation are examined in depth. Specifically, emphasis is placed on operation and maintenance costs, busbar costs, fuel costs, refueling outages, forced outages, plant statistics, NRC evaluations, the potential need for repairs, operating licenses, decommissioning estimates and amounts held in external trusts, spent fuel storage capacity, and management's nuclear experience. In essence, favorable nuclear operations offer significant opportunities but, if a nuclear unit runs poorly or not at all, the attendant risks can be great.

Operations of gas utilities

For gas pipeline and distribution companies, the degree of plant utilization, the physical condition of the mains and lines, adequacy of storage to meet seasonal needs, "lost and unaccounted for" gas levels, and per-unit nongas operating and construction costs are important factors. Efficiency statistics such as load factor, operating costs per customer, and operating income per employee are also evaluated in comparison to other utilities and the industry as a whole.

Operations of water utilities

As a group, water utilities are continually upgrading their physical plant to satisfy regulations and to develop additional supply. Over the next decade, water systems will increasingly face the task of maintaining compliance, as drinking water regulations change and infrastructure ages. Given that the Safe Drinking Water Act was authorized in 1974, the first generation of treatment plants built to conform with these rules are almost 20 years old. Additionally, because the focus during this period was on satisfying environmental standards, deferred maintenance of distribution systems has been common, especially in older urban areas. The increasing cost of supplying treated water argues against the high level of unaccounted for water witnessed in the industry. Consequently, Standard & Poor's anticipates capital plans for rebuilding distribution lines and major renewal and replacement efforts aimed at treatment plants.

Operations of telephone companies

For telephone companies, cost-of-service analysis focuses on plant capability and measures of efficiency and quality of service. Plant capability is ascertained by looking at such parameters as percentage of digitally switched lines; fiber optic deployment, in particular in those portions of the plant key to network survival; and the degree of broadband capacity fiber and coaxial deployment and broadband switching capacity. Efficiency measures include operating margins, the ratio of employees per 10,000 access lines, and the extent of network and operations consolidation. Quality of service encompasses examination of quantitative measures, such as trouble reports and repeat service calls, as well as an assessment of qualitative factors, that may include service quality goals mandated by regulators.

Regulation

Regulatory rate-setting actions are reviewed on a case-by-case basis with regard to the potential effect on creditworthiness. Regulators' authorizing high rates of return is of little value unless the returns are earnable. Furthermore, allowing high returns based on noncash items does not benefit bondholders. Also, to be viewed positively, regulatory treatment should allow consistent performance from period to period, given the importance of financial stability as a rating consideration.

The utility group meets frequently with commission and staff members, both at Standard & Poor's offices and at commission headquarters, demonstrating the importance Standard & Poor's places on the regulatory arena for credit quality evaluation. Input from these meetings and from review of rate orders and their impact weigh heavily in Standard & Poor's analysis.

Standard & Poor's does not "rate" regulatory commissions. State commissions typically regulate a number of diverse industries, and regulatory approaches to different types of companies often differ within a single regulatory jurisdiction. This makes it all but impossible to develop inclusive "ratings" for regulators.

Standard & Poor's evaluation of regulation also encompasses the administrative, judicial, and legislative processes involved in state and federal regulation. These can affect rate-setting activities and other aspects of the business, such as competitive entry, environmental and safety rules, facility siting, and securities sales.

As the utility industry faces an increasingly deregulated environment, alternatives to traditional rate-making are becoming more critical to the ability of utilities to effectively compete, maintain earnings power, and sustain creditor protection. Thus, Standard & Poor's focuses on whether regulators, both state and federal, will help or hinder utilities as they are exposed to greater competition. There is much that regulators can do, from allocating costs to more captive customers to allowing pricing flexibility—and sometimes just stepping out of the way.

Under traditional rate-making, rates and earnings are tied to the amount of invested capital and the cost of capital. This can sometimes reward companies more for justifying costs than for containing them. Moreover, most current regulatory policies do not permit utilities to be flexible when responding to competitive pressures of a deregulated market. Lack of flexible tariffs for electric utilities may lure large customers to wheel cheaper power from other sources.

In general, a regulatory jurisdiction is viewed favorably if it permits earning a return based on the ability to sustain rates at competitive levels. In addition to performance-based rewards or penalties, flexible plans could include market-based rates, price caps, index-based prices, and rates premised on the value of customer service. Such rates more closely mirror the competitive environment that utilities are confronting.

Electric industry regulation

The ability to enter into long-term arrangements at negotiated rates without having to seek regulatory approval for each contract is also important in the electric industry. (While contracting at reduced rates constrains financial performance, it lessens the potential adverse impact in the event of retail wheeling. Since revenue losses associated with this strategy are not likely to be recovered from ratepayers, utilities must control costs well enough to remain competitive if they are to sustain current levels of bondholder protection.)

Natural gas industry regulation

In the gas industry, too, several state commission policies weigh heavily in the evaluation of regulatory support. Examples include stabilization mechanisms to adjust revenues for changes in weather or the economy, rate and service unbundling decisions, revenue and cost allocation between sales and transportation customers, flexible industrial rates, and the general supportiveness of construction costs and gas purchases.

Water industry regulation

In all water utility activities, federal and state environmental regulations continue to play a critical role. The legislative timetable to effect the 1986 amendments to the Safe Drinking Water Act of 1974 was quite aggressive. But environmental standards-setting has actually slowed over the past couple of years due largely to increasing sentiment that the stringent, costly standards have not been justified on the basis of public health. A moratorium on the promulgation of significant new environmental rules is anticipated.

Telecommunications industry regulation

Despite the advances in telecommunications deregulation, analysis of regulation of telephone operators will continue to be a key rating determinant for the foreseeable future. The method of regulation may be either classic rate-based rate of return or some form of price cap mechanism. The most important factor is to assess whether the regulatory framework—no matter which type—provides sufficient financial incentive to encourage the rated company to maintain its quality of service and to upgrade its plant to accommodate new services while facing increasing competition from wireless operators and cable television companies.

Where regulators do still set tariffs based on an authorized return, Standard & Poor's strives to explore with regulators their view of the rate-of-return components that can materially impact reported versus regulatory earnings. Specifically these include the allowable base upon which the authorized return can be earned, allowable expenses, and the authorized return. Since regulatory oversight runs the gamut from strict, adversarial relationships with the regulated operating companies to highly supportive postures, Standard & Poor's probes beyond the apparent regulatory environment to ascertain the actual impact of regulation on the rated company.

Management

Evaluating the management of a utility is of paramount importance to the analytical process since management's abilities and decisions affect all areas of a company's operations. While regulation, the economy, and other outside factors can influence results, it is ultimately the quality of management that determines the success of a company.

With emerging competition, utility management will be more closely scrutinized by Standard & Poor's and will become an increasingly critical component of the credit evaluation. Management strategies can be the key determinant in differentiating utilities and in establishing where companies lie on the business position spectrum. It is imperative that managements be adaptable, aggressive, and proactive if their utilities are to be viable in the future; this is especially important for utilities that are currently uncompetitive.

The assessment of management is accomplished through meetings, conversations, and reviews of company plans. It is based on such factors as tenure, industry experience, grasp of industry issues, knowledge of customers and their needs, knowledge of competitors, accounting and financing practices, and commitment to credit quality. Management's ability and willingness to develop workable strategies to address their systems' needs, to deal with the competitive pressures of free market, to execute reasonable and effective long-term plans, and to be proactive in leading their utilities into the future are assessed. Management quality is also indicated by thoughtful balancing of public and private priorities, a record of credibility, and effective communication with the public, regulatory bodies, and the financial community. Boards of directors will receive ever more attention with respect to their role in setting appropriate management incentives.

With competition the watchword, Standard & Poor's also focuses on management's efforts to enhance financial condition. Management can bolster bondholder protection by taking any number of discretionary actions, such as selling common equity, lowering the common dividend payout, and paying down debt. Also important for the electric industry will be creativity in entering into strategic alliances and working partnerships that improve efficiency, such as central dispatching for a number of utilities or locking up at-risk customers through long-term contracts or expanded flexible pricing agreements. Proactive management teams will also seek alternatives to traditional rate-base, rate-of-return rate-making, move to adopt higher depreciation rates for generating facilities, segment customers by individual market preferences, and attempt to create superior service organizations.

In general, management's ability to respond to mounting competition and changes in the utility industry in a swift and appropriate manner will be necessary to maintain credit health.

Fuel, power, and water supply

Assessment of present and prospective fuel and power supply is critical to every electric utility analysis, while gauging the long-term natural gas supply position for gas pipeline and distribution companies and the water resources of a water utility is equally important. There is no similar analytical category for telephone utilities.

Electric utilities

For electric utilities emphasis is placed on generating reserve margins, fuel mix, fuel contract terms, demand-side management techniques, and purchased power arrangements. The adequacy of generating margins is examined nationally, regionally, and for each individual company. However, the reserve margin picture is muddied by the imprecise nature of peak-load growth forecasting, and also supply uncertainty relating to such things as Canadian capacity availability and potential plant shutdowns due to age, new NRC rules, acid rain remedies, fuel shortages, problems associated with nontraditional technologies, and so forth. Even apparently ample reserves may not be what they seem. Moreover, the quality of capacity is just as important as the size of reserves. Companies' reserve requirements differ, depending upon individual operating characteristics.

Fuel diversity provides flexibility in a changing environment. Supply disruptions and price hikes can raise rates and ignite political and regulatory pressures that ultimately lead to erosion in financial performance. Thus, the ability to alter generating sources and take advantage of lower cost fuels is viewed favorably.

Dependence on any single fuel means exposure to that fuel's problems: electric utilities that rely on oil or gas face the potential for shortages and rapid price increases; utilities that own nuclear generating facilities face escalating costs for decommissioning; and coal-fired capacity entails environmental problems stemming from concerns over acid rain and the "greenhouse effect."

Buying power from neighboring utilities, qualifying facility projects, or independent power producers may be the best choice for a utility that faces increasing electricity demand. There has been a growing reliance on purchased power arrangements as an alternative to new plant construction. This can be an important advantage, since the purchasing utility avoids potential construction cost overruns as well as risking substantial capital. Also, utilities can avoid the financial risks typical of a multiyear construction program that are caused by regulatory lag and prudence reviews. Furthermore, purchased power may enhance supply flexibility, fuel resource diversity, and maximize load factors. Utilities that plan to meet demand projections with a portfolio of supply-side options also may be better able to adapt to future growth uncertainties. Notwithstanding the benefits of purchasing, such a strategy has risks associated with it. By entering into a firm long-term purchased power contract that contains a fixed-cost component, utilities can incur substantial market, operating, regulatory, and financial risks. Moreover, regulatory treatment of purchased power removes any upside potential that might help offset the risks. Utilities are not compensated through incentive rate-making; rather, purchased power is recovered dollar-for-dollar as an operating expense.

To analyze the financial impact of purchased power, Standard & Poor's first calculates the net present value of future annual capacity payments (discounted at 10%). This represents a potential debt equivalent—the off-balance-sheet obligation that a utility incurs when it enters into a long-term purchased power contract. However, Standard

& Poor's adds to the utility's balance sheet only a portion of this amount, recognizing that such a contractual arrangement is not entirely the equivalent of debt. What percentage is added is a function of Standard & Poor's qualitative analysis of the specific contract and the extent to which market, operating, and regulatory risks are borne by the utility (the risk factor). For unconditional, take-or-pay contracts, the risk factor range is from 40%-80%, with the average hovering around 60%. A lower risk factor is typically assigned for system purchases from coal-fired utilities and a higher risk factor is usually designated for unit-specific nuclear purchases. The range for take-and-pay performance obligations is between 10%-50%.

Gas utilities

For gas distribution utilities, long-term supply adequacy obviously is critical, but the supply role has become even more important in credit analysis since the Federal Energy Regulatory Commission's Order 636 eliminated the interstate pipeline merchant business. This thrust gas supply responsibilities squarely on local gas distributors. Standard & Poor's has always believed distributor management has the expertise and wherewithal to perform the job well, but the risks are significant since gas costs are such a large percentage of total utility costs. In that regard, it is important for utilities to get preapprovals of supply plans by state regulators or at least keep the staff and commissioners well informed. To minimize risks, a well-run program would diversify gas sources among different producers or marketers, different gas basins in the U.S. and Canada, and different pipeline routes. Also, purchase contracts should be firm, with minimal take-or-pay provisions, and have prices tied to an industry index. A modest percentage of fixed-price gas is not unreasonable. Contracts, whether of gas purchases or pipeline capacity, should be intermediate term. Staggering contract expirations (preferably annually) provides an opportunity to be an active market player. A modest degree of reliance on spot purchases provides flexibility, as does the use of market-based storage. Gas storage and on-property gas resources such as liquefied natural gas or propane air are effective peak-day and peak-season supply management tools.

Since pipeline companies no longer buy and sell natural gas and are just common carriers, connections with varied reserve basins and many wells within those basins are of great importance. Diversity of sources helps offset the risks arising from the natural production declines eventually experienced by all reserve basins and individual wells. Moreover, such diversity can enhance a pipeline's attractiveness as a transporter of natural gas to distributors and end users seeking to buy the most economical gas available for their needs.

Water utilities

Nearly all water systems throughout the U.S. have ample long-term water supplies. Yet to gain comfort, Standard & Poor's assesses the production capability of treatment plants and the ability to pump water from underground aquifers in relation to the usage demands from consumers. Having adequate treated water storage facilities has become important in recent years and has helped many systems meet demands during peak summer periods. Of interest is whether the resources are owned by the utility or purchased from other utilities or local authorities. Owning properties with water rights provides more supply security. This is especially so in states like California where water allocations are being reduced, particularly since recent droughts and environmental issues have created alarm. Since the primary cost for water companies is treatment, it makes little difference whether raw water is owned or bought. In fact, compliance with federal and state water regulations is very high, and the overall cost to deliver treated water to consumers remains relatively affordable.

Asset concentration in the electric utility industry

In the electric industry, Standard & Poor's follows the operations of major generating facilities to assess if they are well managed or troubled. Significant dependence on one generating facility or a large financial investment in a single asset suggests high risk. The size or magnitude of a particular asset relative to total generation, net plant in service, and common equity is evaluated. Where substantial asset concentration exists, the financial profile of a company may experience wide swings depending on the asset's performance. Heavy asset concentration is most prevalent among utilities with costly nuclear units.

Earnings protection

In this category, pretax cash income coverage of all interest charges is the primary ratio. For this calculation, allowance for funds used during construction (AFUDC) is removed from income and interest expense. AFUDC and other such noncash items do not provide any protection for bondholders. To identify total interest expense, the analyst reclassifies certain operating expenses. The interest component of various off-balance-sheet obligations, such as leases and some purchased-power contracts, is included in interest expense. This provides the most direct indication of a utility's ability to service its debt burden.

While considerable emphasis in assessing credit protection is placed on coverage ratios, this measure does not provide the entire earnings protection picture. Also important are a company's earned returns on both equity and capital, measures that highlight a firm's earnings performance. Consideration is given to the interaction of embedded costs, financial leverage, and pretax return on capital.

Capital structure

Analyzing debt leverage goes beyond the balance sheet and covers quasi-debt items and elements of hidden financial leverage. Noncapitalized leases (including sale/leaseback obligations), debt guarantees, receivables financing, and purchased-power contracts are all considered debt equivalents and are reflected as debt in calculating capital structure ratios. By making debt level adjustments, the analyst can compare the degree of leverage used by each utility company.

Furthermore, assets are examined to identify undervalued or overvalued items. Assets of questionable value are discounted to more accurately evaluate asset protection.

Some firms use short-term debt as a permanent piece of their capital structure. Short-term debt also is considered part of permanent capital when it is used as a bridge to permanent financing. Seasonal, self-liquidating debt is excluded from the permanent debt amount, but this situation is rare—with the exception of certain gas utilities. Given the long life of almost all utility assets, short-term debt may expose these companies to interest-rate volatility, remarketing risk, bank line backup risk, and regulatory exposure that cannot be readily offset. The lower cost of shorter-term obligations (assuming a positively sloped yield curve) is a positive factor that partially mitigates the risk of interest-rate variability. As a rule of thumb, a level of short-term debt that exceeds 10% of total capital is cause for concern.

Similarly, if floating-rate debt and preferred stock constitute over one-third of total debt plus preferred stock, this level is viewed as unusually high and may be cause for concern. It might also indicate that management is aggressive in its financial policies.

A layer of preferred stock in the capital structure is usually viewed as equity—since dividends are discretionary and the subordinated claim on assets provides a cushion for providers of debt capital. A preferred component of up to 10% is typically viewed as a permanent wedge in the capital structure of utilities. However, as rate-of-return regulation is phased out, preferred stock may be viewed by utilities—as many industrial firms would—as a temporary option for companies that are not current taxpayers that do not benefit from the tax deductibility of interest. Even now, floating-rate preferred and money market perpetual preferred are problematic; a rise in the rate due to deteriorating credit quality tends to induce a company to take out such preferred stock with debt. Structures that convey tax deductibility to preferred stock have become very popular and do generally afford such financings with equity treatment.

Cash flow adequacy

Cash flow adequacy relates to a company's ability to generate funds internally relative to its needs. It is a basic component of credit analysis because it takes cash to pay expenses, fund capital spending, pay dividends, and make interest and principal payments. Since both common and preferred dividend payments are important to maintain capital market access, Standard & Poor's looks at cash flow measures both before and after dividends are paid.

To determine cash flow adequacy, several quantitative relationships are examined. Emphasis is placed on cash flow relative to debt, debt service requirements, and capital spending. Cash flow adequacy is evaluated with respect to a firm's ability to meet all fixed charges, including capacity payments under purchased-power contracts. Despite the conditional nature of some contracts, the purchaser is obligated to pay a minimum capacity charge. The ratio used is funds from operations plus interest and capacity payments divided by interest plus capacity payments.

Financial flexibility/capital attraction

Financing flexibility incorporates a utility's financing needs, plans, and alternatives, as well as its flexibility to accomplish its financing program under stress without damaging creditworthiness. External funding capability complements internal cash flow. Especially since utilities are so capital intensive, a firm's ability to tap capital markets on an ongoing basis must be considered. Debt capacity reflects all the earlier elements: earnings protection, debt leverage, and cash flow adequacy. Market access at reasonable rates is restricted if a reasonable capital structure is not maintained and the company's financial prospects dim. The analyst also reviews indenture restrictions and the impact of additional debt on covenant tests.

Standard & Poor's assesses a company's capacity and willingness to issue common equity. This is affected by various factors, including the market-to-book ratio, dividend policy, and any regulatory restrictions regarding the composition of the capital structure.

Attachment 10
Page 1 of 9

STOCKS BONDS BILLS AND INFLATION

SBBI

1998 YEARBOOK

MARKET RESULTS FOR 1926-1997

IBBOTSON ASSOCIATES

Chapter 2 The Long Run Perspective

Motivation

A long view of capital market history, exemplified by the 72-year period (1926–1997) examined here, uncovers the basic relationships between risk and return among the different asset classes, and between nominal and real (inflation-adjusted) returns. The goal of this study of asset returns is to provide a period long enough to include most or all of the major types of events that investors have experienced and may experience in the future. Such events include war and peace, growth and decline, bull and bear markets, and inflation and deflation, as well as less dramatic events that affect asset returns.

By studying the past, one can make inferences about the future. While the actual events that occurred in 1926–1996 will not be repeated, the event-types (not specific events) of that period can be expected to recur. It is sometimes said that one period or another is unusual—such as the crash of 1929–1932 and World War II. This logic is suspicious because all periods are unusual. One of the most unusual events of the century—the stock market crash of 1987—took place during the last decade; the equally remarkable inflation of the 1970s and early 1980s took place just over a decade ago. From the perspective that historical event-types tend to repeat themselves, a 72-year examination of past capital market returns reveals a great deal about what may be expected in the future. [See Chapters 8 and 9.]

Historical Returns on Stocks, Bonds, Bills, and Inflation

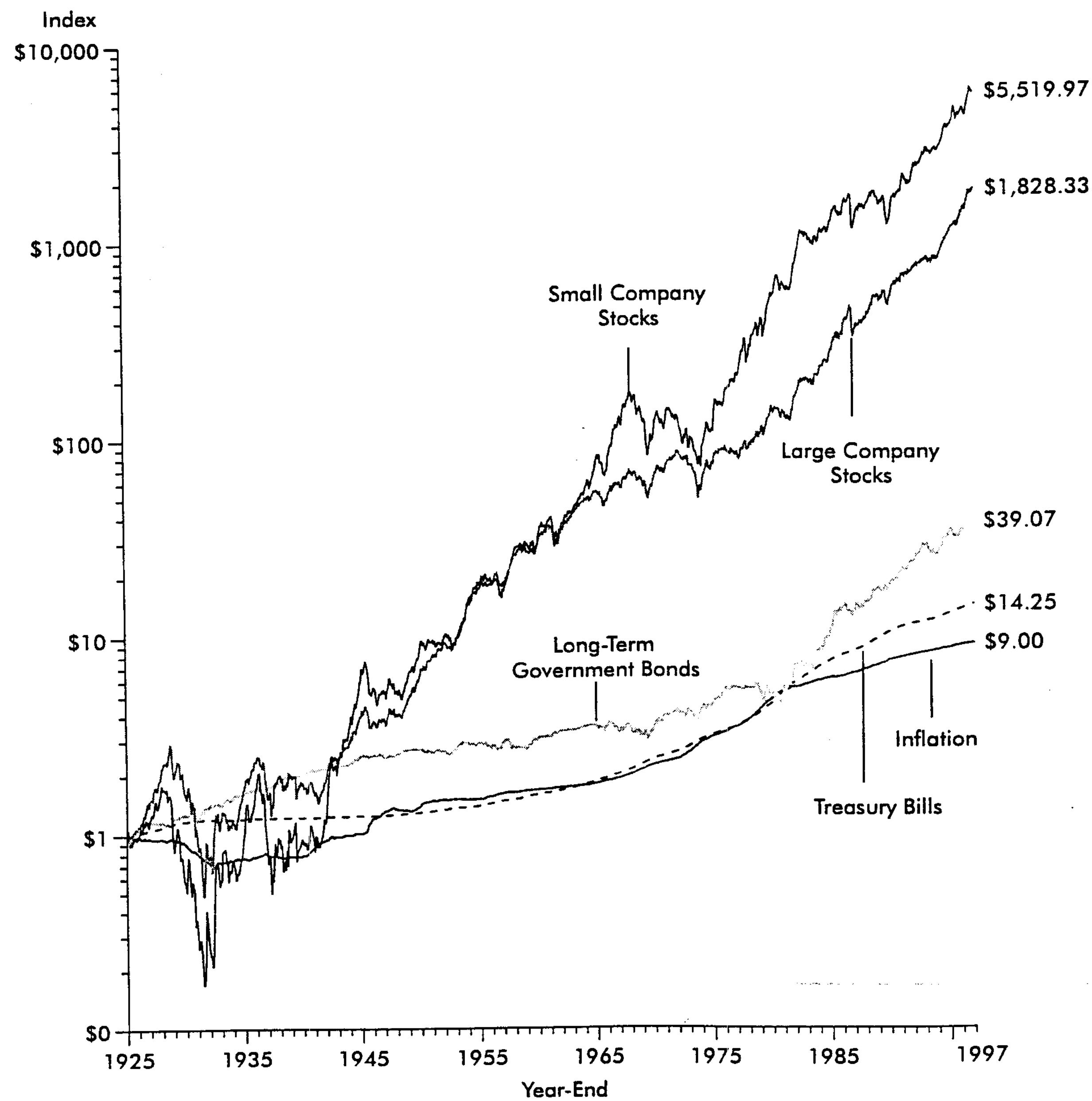
Graph 2-1 graphically depicts the growth of $1.00 invested in large company stocks, small company stocks, long-term government bonds, Treasury bills, and a hypothetical asset returning the inflation rate over the period from the end of 1925 to the end of 1997. All results assume reinvestment of dividends on stocks or coupons on bonds and no taxes. Transaction costs are not included, except in the small stock index starting in 1982.

Each of the cumulative index values is initialized at $1.00 at year-end 1925. The graph vividly illustrates that large company stocks and small company stocks were the big winners over the entire 72-year period: investments of $1.00 in these assets would have grown to $1,828.33 and $5,519.97, respectively, by year-end 1997. This phenomenal growth was earned by taking substantial risk. In contrast, long-term government bonds (with an approximate 20-year maturity), which exposed the holder to much less risk, grew to only $39.07.

Graph 2-1 **Wealth Indices of Investments in the U.S. Capital Markets**

Year-End 1925 = $1.00

From 1925 to 1997

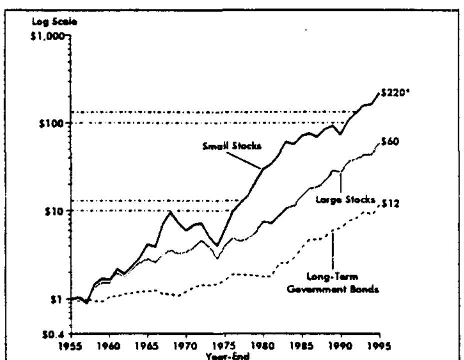


The lowest-risk strategy over the past 72 years (for those with short-term time horizons) was to buy U.S. Treasury bills. Since Treasury bills tended to track inflation, the resulting real (inflation-adjusted) returns were near zero for the entire 1926–1997 period.

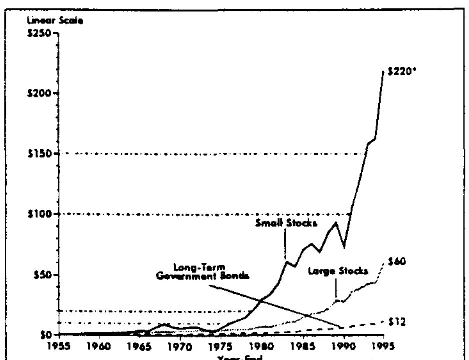
Logarithmic Scale on the Index Graphs

A logarithmic scale is used on the vertical axis of our index graphs. The date appears on the horizontal axis.

A logarithmic scale allows for the direct comparison of the series' behavior at different points in time. Specifically, the use of a logarithmic scale allows the following interpretation of the data: The same vertical distance, no matter where it is measured on the graph, represents the same percentage change in the series. On the log scale shown below, a 50 percent gain from $10 to $15 occupies the same vertical distance as a 50 percent gain from $100 to $150. On the linear scale, the same percentage gains look different.



*All ending index values have been rounded.



*All ending index values have been rounded.

A logarithmic scale allows the viewer to compare investment performance across different time periods, concentrating on rate of return, without worrying about the number of dollars invested at any given time. An additional benefit of the logarithmic scale is the way the scale spreads the action out over time. This allows the viewer to more carefully examine the fluctuations of the individual time series in different periods.

Expected Equity Risk Premium

Unlike the yield on a bond, the expected equity risk premium is unobservable in the market and must be estimated, typically by using historical data.[15] It can be calculated by subtracting the long-term average of the income return on the riskless asset from the long-term average stock market return (measured over the same period as for the riskless asset). The maturity (or duration) of the riskless asset from which r_f is taken must be the same as that used to estimate ERP. When calculating the equity risk premium, some analysts subtract a long-term Treasury bond's *total return*—rather than its income return—from the total return on the overall stock market. The income return is the better measure of return to be subtracted from the stock market total return for two reasons:

1. It is the completely riskless portion of the issues' returns (Treasury securities are subject to price risk).

2. Bond yields have risen historically, causing capital losses in fixed-income securities (including U.S. Treasury issues). These capital losses caused bonds' total returns to be lower than the returns that investors expected. In other words, had the investor held the bond to maturity, the investor would have realized the yield on the bond as the total return; but in a constant maturity portfolio such as those used to measure bond returns in this book, bonds are sold before maturity (at a capital loss if the market yield has risen since the time of purchase). There is no evidence that investors expect bond capital losses to be repeated in the future (otherwise bond prices would be adjusted accordingly), so that historical total returns are biased downward as indicators of future expectations. Historical income returns, in contrast, are unbiased estimators of the returns that investors expected.

Since the market provides a clear measure of what investors in Treasury obligations expected—the bonds' yields or income returns—this information should be used to estimate the riskless rate for the purpose of calculating the expected equity risk premium.

As with β_s, the expected equity risk premium is usually estimated using historical information. Implicit in using history to forecast the future is the assumption that investors' expectations conform to that which is actually realizable. This method

15 It should be noted that from a valuation specialist's point of view, the stock market returns presented in this book are after corporate taxes but before personal taxes, and should be applied to cash flows calculated on the same basis.

assumes that the price of taking on risk changes only slowly, if at all, over time. The "future equals past" assumption is applicable to a random time-series variable.

A time-series variable is random if its value in one period is independent of its value in other periods. This is important because empirical research suggests that the yearly difference between the stock market total return and the U.S. Treasury income return in any particular year is random. (The actual, observed difference between the return on the stock market and the riskless rate is known as the *realized* equity risk premium.) This means that the realized equity risk premium next year will not be dependent on the realized risk premium from this or any previous year. For example, if this year's difference between the riskless rate and the return on the stock market is higher than last year's, that does not imply that next year's will be higher than this year's. It is as likely to be higher as it is lower.[16] The best estimate of the expected value of a variable that has behaved randomly in the past is the average (or arithmetic mean) of its past values.

The short-horizon, intermediate-horizon and long-horizon equity risk premia shown in Table 8-1 are computed over the period from 1926 to 1997 (using annual data). The estimate of the expected risk premium depends on the length of the data series studied. A proper estimate of the expected risk premium requires a long data series, long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical risk premium is relatively stable.[17] Furthermore, because an average of the realized equity risk premia is quite volatile when calculated using a

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16 The serial correlation coefficient for the total return on the overall stock market less long-term government bond income returns over the 72-year period 1926 to 1997 is nearly zero, based on yearly returns. (That is, there is no discernible pattern in the realized risk premium—implying that it is virtually impossible to forecast next year's realized risk premium based on the premia in previous years.) This result is powerful evidence in favor of treating the equity risk premium as a random variable. These results have been independently confirmed by a number of other academic studies.

17 This assertion is further corroborated by data presented in *Global Investing: The Professional's Guide to the World Capital Markets* (by Roger G. Ibbotson and Gary P. Brinson and published by McGraw-Hill, New York). Ibbotson and Brinson constructed a stock market total return series back to 1790. Even with some uncertainty about the accuracy of the data before the mid-19th century, the results are remarkable in that the real (adjusted for inflation) returns that investors received during the three 50-year periods and one 51-year period between 1790 and 1990 did not differ greatly (that is, in a statistically significant amount) from one another, nor did they differ greatly from the overall 201-year average. This finding implies that because real stock market returns have been reasonably consistent over time, investors can use these past returns as reasonable bases for forming their expectations of future returns.

short series, using a long series makes it less likely that the analyst can justify any number he or she wants.

Some analysts calculate the expected equity risk premium over a shorter, more recent time period on the basis that more recent events are more likely to be repeated in the near future; furthermore, the 1920s, 1930s, and 1940s contain too many unusual events. This view is suspect because all periods contain unusual events. Some of the most "unusual" events of this century took place quite recently. These events include the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high yield bond market, the major contraction and consolidation of the thrift industry, and the collapse of the Soviet Union—all of which happened in the past 20 years. Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. More generally, the 72-year period starting with 1926 is representative of what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect "unusual" events to occur from time to time and their return expectations reflect this.

The equity risk premium data presented in this publication are derived from data on publicly traded companies, a majority of whom are minority held. There is no evidence to suggest that the equity risk premium represents a minority interest risk premium. The equity risk premium data make no distinction between majority or minority ownership interests.

Calculating the Expected Equity Risk Premium

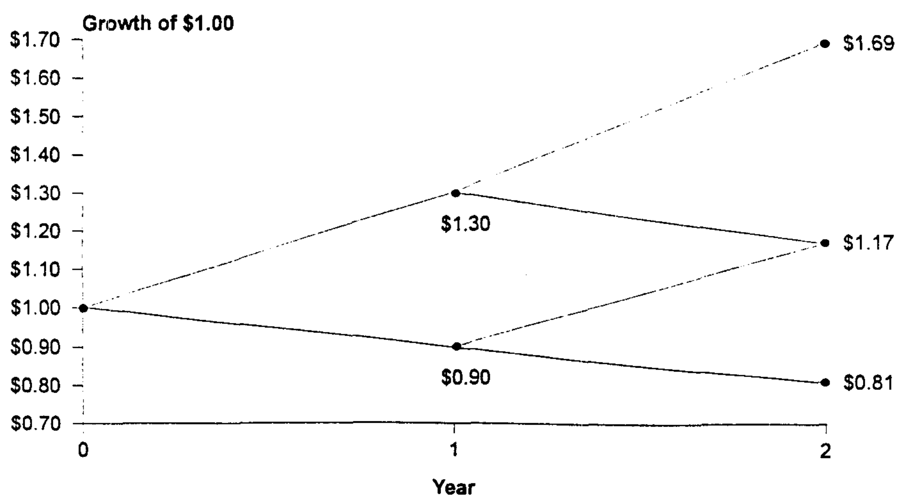
Arithmetic Versus Geometric Differences

For use as the expected equity risk premium in the CAPM, the *arithmetic* or *simple difference* of the *arithmetic means* of stock market returns and riskless rates is the relevant number. This is because the CAPM is an additive model where the cost of capital is the sum of its parts. Therefore, the CAPM expected equity risk premium must be derived by arithmetic, *not geometric*, subtraction.

Arithmetic Versus Geometric Means

The expected equity risk premium should always be calculated using the arithmetic mean. The arithmetic mean is the rate of return which, when compounded over multiple periods, gives the mean of the probability distribution of ending wealth values. (A simple example given below shows that this is true.) This makes the arithmetic mean return appropriate for computing the cost of capital. The discount rate that equates expected (mean) future values with the present value of an investment is that investment's cost of capital. The logic of using the discount rate as the cost of capital is reinforced by noting that investors will discount their expected (mean) ending wealth values from an investment back to the present using the arithmetic mean, for the reason given above. They will, therefore, require such an expected (mean) return prospectively (that is, in the present looking toward the future) to commit their capital to the investment.

For example, assume a stock has an expected return of +10 percent in each year and a standard deviation of 20 percent. Assume further that only two outcomes are possible each year— + 30 percent and -10 percent (that is, the mean plus or minus one standard deviation), and that these outcomes are equally likely. (The arithmetic mean of these returns is 10 percent, and the geometric mean is 8.2 percent.) Then the growth of wealth over a two-year period occurs as shown below:



Note that the median (middle outcome) and mode (most common outcome) are given by the geometric mean, 8.2 percent, which compounds up to 17 percent over a 2-year period (hence a terminal wealth of $1.17). However, the *expected value,* or probability-weighted average of all possible outcomes, is equal to:

	(.25	x	1.69)	=	0.4225
+	(.50	x	1.17)	=	0.5850
+	(.25	x	0.81)	=	0.2025
TOTAL					1.2100

Now, the rate that must be compounded up to achieve a terminal wealth of $1.21 after 2 years is 10 percent; that is, the expected value of the terminal wealth is given by compounding up the *arithmetic*, not the geometric mean. Since the arithmetic mean equates the expected future value with the present value, it is the discount rate.

Stated another way, the arithmetic mean is correct because an investment with uncertain returns will have a higher expected ending wealth value than an investment that earns, with certainty, its compound or geometric rate of return every year. In the above example, compounding at the rate of 8.2 percent for two years yields a terminal wealth of $1.17, based on $1.00 invested. But holding the uncertain investment, with a possibility of high returns (two +30 percent years in a row) as well as low returns (two -10 percent years in a row), yields a higher expected terminal wealth, $1.21. In other words, more money is gained by higher-than-expected returns than is lost by lower-than-expected returns. Therefore, in the investment markets, where returns are described by a probability distribution, the arithmetic mean is the measure that accounts for uncertainty, and is the appropriate one for estimating discount rates and the cost of capital.

Arbitrage Pricing Theory

APT is a model of the expected return on a security. It was originated by Stephen A. Ross, and elaborated by Richard Roll. APT treats the expected return on a security (*i.e.*, its cost of capital) as the sum of the payoffs for an indeterminate number of risk factors, where the amount of each risk factor inherent in a given security is estimated. Like the CAPM, APT is a model that is consistent with equilibrium and does not attempt to outguess the market. APT may be viewed as an extended CAPM with multiple "betas" and multiple risk premia.

REGULATORY FINANCE:

UTILITIES' COST OF CAPITAL

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Lisa Todd Hillman

1994
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long-term Treasury bonds instead of corporate bonds. There are a myriad of well-known academic and professional research studies published on the subject, using expected rates of return. Studies by Friend and Blume (1975), Malkiel (1979), Brigham and Shome (1982), and Brennan (1982) are examples.

One potential problem in the above approach is that historical growth may not be reflective of expected growth. Instead, the average 5-year earnings growth forecast of analysts reported by IBES for a large number of publicly-traded stocks can be used as a more suitable proxy for the expected growth on the overall market.

One drawback to this approach is that the Dow Jones Industrials Average may not be representative of the overall equity market, and that a more diversified cross-section of American industry may be preferable. On the other hand, the data requirements for application of the Brigham, Shome, and Vinson approach to each company in a large diversified index are computationally prohibitive.

Risk Adjustments. The risk premium estimate derived from a composite market index must be adjusted for any risk differences between the equity market index employed in deriving the risk premium and a specified utility common stock. Several methods can be used to effect the proper risk adjustment.

First, the beta risk measure for the subject utility or the beta of a group of equivalent risk companies can serve as an adjustment device. The market risk premium, RP_M, is multiplied by the beta of the utility, β_i, to find the utility's own risk premium, RP_i:

$$RP_i = \beta_i \; RP_M$$

and the beta-adjusted risk premium is added to the bond yield to arrive at the utility's own cost of equity capital. For example, if the risk premium on the average stock is 5% over the bond yield, based on a broad-based index such as Value Line's Composite Market Index, and if the subject utility has a beta of 0.60, the adjusted risk premium is 5% x 0.60 = 3%. This method is very similar to the Empirical Capital Asset Pricing Model approach discussed in Chapter 13.

A second risk adjustment approach is to scale the risk premium up or down based on a comparison of the utility's risk relative to that of the overall market. Any of the objective quantitative measures of risk described in Chapter 3 are adequate for this purpose. For example, the ratio of the utility's standard deviation of returns to the average standard deviation of the individual component stocks of the index can be computed and serve as a basis for relative risk adjustment. Alternately, in the case of non-publicly-traded utility stocks, the utility's average deviation around trend of earnings per share or of book return on equity relative to that of the market index could serve as the basis for the risk adjustment. The scaling can also be performed judgmentally on the basis of qualitative risk measures, such as relative bond ratings, Standard & Poor's stock ratings, and Value Line's safety ratings.

A third approach is to estimate a utility risk premium directly using an aggregate utility stock market index. Several examples of this approach appear in the next section.

Utility Industry Risk Premiums

Another way of tailoring the risk premium approach to a specific group of companies, such as regulated utilities, is to estimate a specialized risk premium for securities in a given industry, and then to base the risk premium for a specific company on the industry-wide risk premium. Example 11-4 illustrates this approach.

Company-Specific Risk Premium

Instead of relying on an aggregate stock market index or an industry specific index, the risk premium can be estimated by focusing on company specific data directly. Under this approach, a forward-looking risk premium can be estimated by computing the required market rate of return for the company's stock based on the DCF method for each month, or quarter, over a specified period, and then subtracting from these returns the spot yield on the utility's bond at the end of the same month or quarter.

Computation of the expected equity return is based on the standard DCF model, whereby the expected dividend yield is added to the long-run expected growth rate for each month. The latter can be proxied by a simple average of stock analysts' estimates of the long-term growth rate of the company's earnings and/or dividends during the past six months if such forecasts are available, or else on historical growth. The company's own risk premium is obtained for each month by subtracting from the equity return estimate the yield to maturity of its bonds for that month. The monthly risk premiums are averaged to produce the mean historical risk premium for the company.

One drawback of this approach is that the risk premium estimate is only as good as the DCF estimate of equity return used in deriving it and is thus susceptible to the singular vagaries of that particular company. An

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Chapter 13
CAPM Extensions

13.1 Empirical Validation

The last chapter showed that the practical difficulties of implementing the CAPM approach are surmountable. Conceptual and empirical problems remain, however.

At the conceptual level, the CAPM has been submitted to criticisms by academicians and practitioners.[1] Contrary to the core assumption of the CAPM, investors may choose not to diversify, and bear company-specific risk if abnormal returns are expected. A substantial percentage of individual investors are indeed inadequately diversified. Short selling is somewhat restricted, in violation of CAPM assumptions. Factors other than market risk (beta) may also influence investor behavior, such as taxation, firm size, and restrictions on borrowing.

At the empirical level, there have been countless tests of the CAPM to determine to what extent security returns and betas are related in the manner predicted by the CAPM.[2] The results of the tests support the idea that beta is related to security returns, that the risk-return tradeoff is positive, and that the relationship is linear. The contradictory finding is that the empirical Security Market Line (SML) is not as steeply sloped as the predicted SML. With few exceptions, the empirical studies agree that the implied intercept term exceeds the risk-free rate and the slope term is less than predicted by the CAPM. That is, low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted. This is shown in Figure 13-1.

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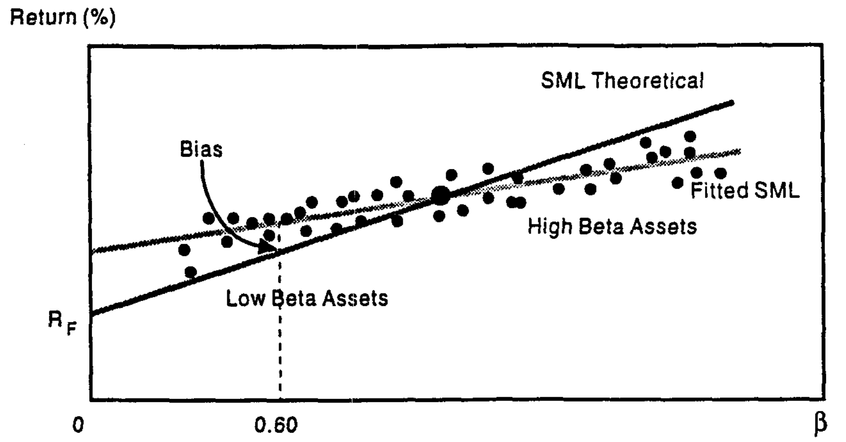
[1] The use of the CAPM in regulatory proceedings has not escaped criticism. See for example Malko and Enholm (1985), Chartoff, Mayo, and Smith (1982), and the Autumn 1978 issue of *Financial Management*, in which several prominent finance scholars address the use of the CAPM in regulatory proceedings.

[2] For a summary of the empirical evidence on the CAPM, see Jensen (1972) and Ross (1978). The major empirical tests of the CAPM were published by Friend and Blume (1975), Black, Jensen, and Scholes (1972), Miller and Scholes (1972), Blume and Friend (1973), Blume and Husic (1973), Fama and Macbeth (1973), Basu (1977), Reinganum (1981B), Litzenberger and Ramaswamy (1979), Banz (1981), Gibbons (1982), Stambaugh (1982), and Shanken (1985). CAPM evidence in the Canadian context is available in Morin (1981).

FIGURE 13-1
THEORETICAL V. EMPIRICAL ESTIMATE OF THE CAPM



The slope is less than predicted by the CAPM, and the intercept term is greater than the risk-free rate. This result is particularly pertinent for public utilities whose betas are typically less than 1.00. Based on the evidence, as shown in Figure 13-1, a CAPM-based estimate of the cost of capital underestimates the return required from such securities.

The empirical evidence also demonstrates that the SML is highly unstable over short periods and differs significantly from the long-run relationship. This evidence underscores the potential for error in cost of capital estimates that apply the CAPM using historical data over short time periods. The evidence[3] also shows that the addition of specific company risk, as measured by standard deviation, adds explanatory power to the risk-return relationship.

Roll (1977) argued that the CAPM has never been tested and that such a test is infeasible. Roll argued, moreover, that the market index proxy used in empirical tests of the CAPM is inadequate; since a true comprehensive market index is unavailable, such tests will be biased in the direction shown by the actual empirical results. Deviations of empirical results from the predictions of the CAPM does not necessarily mean that the CAPM is misspecified, but rather that the market index used in testing is inefficient. Roll's conclusion is that the CAPM is not testable unless the exact composition of the true market portfolio is known and used in the tests. Moreover,

[3] See Friend, Westerfield, and Granito (1978) and Morin (1980).

the CAPM is a forward-looking expectational model and to test the model it is necessary to predict investor expectations correctly. Any empirical test of the CAPM is thus a test of the joint hypothesis of the model's validity and of the function used to generate expected returns from historical returns.

In short, the currently available empirical evidence indicates that the simple version of the CAPM does not provide a perfectly accurate description of the process determining security returns. Explanations for this shortcoming include some or all of the following:

1. The CAPM excludes other important variables that are important in determining security returns, such as size, skewness, taxes, and uncertain inflation.
2. The market index used in the tests excludes important classes of securities, such as bonds, mortgages, and business investments.
3. Constraints on investor borrowing exist contrary to the assumption of the CAPM.
4. Investors may value the hedging value of assets in protecting them against shifts in later investment opportunities. See Merton (1973) and Morin (1981).

Revised CAPM models have been proposed relaxing the above constraints, each model varying in complexity, each model attempting to inject more realism into the assumptions. Ross (1978) and, more recently, Tallman (1989) presented excellent surveys of the various asset pricing theories and related empirical evidence. These enhanced CAPMs produce broadly similar expressions for the relationship between risk and return and a SML that is flatter than the CAPM prediction. Section 13.2 focuses on the more tractable extensions of the CAPM that possess some applicability to public utility regulation.

13.2 CAPM Extensions

Several attempts to enrich the model's conceptual validity and to salvage the CAPM's applicability have been advanced. In this section, extensions of the CAPM and pragmatic solutions to safeguard the model's applicability are discussed. The first explanation of the CAPM's inability to explain security returns satisfactorily is that beta is insufficient and that other systematic risk factors affect security returns. The implication is that the effects of these other independent variables should be quantified and used in estimating the cost of equity capital. The impact of the supplementary variables can be expressed as an additive element to the standard CAPM equation as follows:

$$K = R_Z + \beta (R_M - R_F) \qquad (13\text{-}4)$$

The model is analogous to the standard CAPM, but with the return on a minimum risk portfolio that is unrelated to market returns, R_Z, replacing the risk-free rate, R_F. The model has been empirically tested by Black, Jensen, and Scholes (1972), who found a flatter than predicted SML, consistent with the model and other researchers' findings.

The zero-beta CAPM cannot be literally employed in cost of capital projections, since the zero-beta portfolio is a statistical construct difficult to replicate. Attempts to estimate the model are formally equivalent to estimating the constants, a and b, in Equation 13-2.

13.3 Empirical CAPM

Whatever the explanation for the flatter than predicted SML, whether it be dividend yield, skewness, size, missing assets, or constrained borrowing effects, the general suggestion is that the empirical relationship between returns and betas should be estimated empirically rather than asserted on an a priori basis. Equation 13-2 has gradually evolved to become known as the Empirical Capital Asset Pricing Model (ECAPM), and represents a pragmatic solution to the limitations of the standard CAPM, whether it be data limitations, unrealistic assumptions, or omitted variables. All the potential vagaries of the model are telescoped into the 2 constants, a and b, which must be estimated econometrically from market data. The technique is formally applied by Litzenberger, Ramaswamy, and Sosin (1980) to public utilities in order to rectify the CAPM's basic shortcomings. Not only do they summarize the criticisms of the CAPM insofar as they affect public utilities, but they also describe the econometric intricacies involved and the methods of circumventing the statistical problems. Essentially, the average monthly returns over a lengthy time period on a large cross-section of securities grouped into portfolios, are related to their corresponding betas by statistical regression techniques; that is, Equation 13-2 is estimated from market data. The utility's beta value is substituted into the equation to produce the cost of equity figure. Their own results demonstrate how the standard CAPM underestimates the cost of equity capital of public utilities because of the utilities' high dividend yield and return skewness.

As discussed in Section 13.1, empirical tests of the CAPM have shown that the risk-return tradeoff is not as steeply sloped as that predicted by the CAPM. That is, low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted.

Several finance scholars have developed refined and expanded versions of the standard CAPM by relaxing the constraints imposed on the CAPM, such as dividend yield, size, and skewness effects. In doing so, they obtained broadly similar expressions for the relationship between risk and expected return. These enhanced CAPMs typically produce a risk-return relationship that is flatter than the CAPM prediction. In other words, they obtained a result that is closer to the actual risk-return relationship.[5]

The empirical CAPM formula described below produces a risk-return trade-off that is flatter than the predicted tradeoff, and approximates the observed relationship between risk and return on capital markets. The empirical approximation to the CAPM is consistent with both theory and empirical evidence, and has the added advantage of computational simplicity. Whereas the traditional version of the CAPM is given by the following:

$$K = R_F + \beta\,(R_M - R_F)$$

the empirical evidence found by Morin (1989) indicates that the expected return on a security over the period 1926-1984 was actually given by:

$$\text{RETURN} = .0829 + .0520\beta$$

Given that the risk-free rate over the estimation period was approximately 6%, this relationship implies that the intercept of the risk-return relationship is higher than the 6% risk-free rate, contrary to the CAPM's prediction. Given the Ibbotson Associates' result that the average return on an average risk stock exceeded the risk-free rate by about 8% during the period from 1926 through 1984, that is $(R_M - R_F) = 8\%$, the intercept of the observed relationship between return and beta exceeds the risk-free rate by about 2%, or 1/4 of 8%, and that the slope of the relationship, .0520, is close to 3/4 of 8%. Therefore, the empirical evidence suggests that the expected return on a security is related to its risk by the following approximation:

$$K = R_F + x\,(R_M - R_F) + (1 - x)\,\beta\,(R_M - R_F) \qquad (13\text{-}5)$$

where x is a fraction to be determined empirically. The value of x is actually derived by systematically varying the constant x in that equation from zero

[5] An excellent overview of variants of the CAPM is provided in the corporate finance textbook by Brealey and Myers (1991A), Chapter 8, and particularly in the accompanying instructor's manual (1991B).

to 1.00 in steps of 0.05 and choosing that value of x that minimized the mean square error between the observed relationship,

$$\text{RETURN} = .0829 + .0520\,\beta$$

and the empirical shortcut CAPM formula.[6] The value of x that best explains the observed relationship is between 0.25 and 0.30. If $x = 0.25$, the equation becomes:

$$K = R_F + 0.25\,(R_M - R_F) + 0.75\,\beta\,(R_M - R_F) \tag{13-6}$$

Using a simple numerical example, assuming a risk-free rate of 7%, a market risk premium of 7%, and a beta of 0.80, the empirical CAPM equation above yields a cost of equity estimate of 12.95% as follows:

$$K = 7\% + 0.25\,(14\% - 7\%) + 0.75 \times 0.80\,(14\% - 7\%)$$

$$= 7\% + 1.75\% + 4.2\%$$

$$= 12.95\%$$

The actual historical relationship between risk premiums and the risk of a large population of common stocks can be observed over a long time period and used to estimate the appropriate risk premium for a given utility. The utility's cost of equity can then be estimated as the yield on long-term Treasury bonds plus the estimated risk premium. To illustrate, the actual relationship between risk premiums and betas on common stocks over a long time period can be estimated, and this historical relationship be used to estimate the risk premium on the utility's common equity, on the grounds that over long time periods, investors' expectations are realized.

To execute this method, monthly rates of return for all common stocks listed on the New York Stock Exchange from 1926 to the present are obtained from the University of Chicago's Center for Research in Security Prices (CRISP) data tapes. Five-year betas are then computed for each month for each company. For each month, the securities are assigned to one of 10 portfolios on the basis of ranked betas, from the lowest to the highest beta. Monthly returns for each of the portfolios are compounded to produce annual rates of return on each of the 10 portfolios from 1931 to the

6 The corresponding evidence for Canadian capital markets is scant. For studies of the relationship between return and risk in Canada, see Morin (1980) and Jobson and Korkie (1985)

present. Historical risk premiums for each of the 10 portfolios are calculated for the period 1931 to the present by averaging the difference between the portfolio's annual rate of return and the government bond yield. For example, if the following hypothetical relationship between the risk premium and the portfolios' betas is obtained for the period 1931 - 1992[7]:

$$Risk\ Premium = 4.21\% + (3.94\%\ x\ Beta)$$

Using the utility's beta of 0.60, for example, the risk premium for the hypothetical utility is:

$$4.21\% + (3.94\%\ x\ 0.60) = 6.6\%$$

A long-term cost of equity capital estimate for the company is obtained by adding the risk premium of 6.6% to the current yield on long-term Treasury bonds or to the projected long-term yield implied by the closing prices on the Treasury bond futures contract traded on the Chicago Board of Trade. The latter measures the consensus long-term interest rate expectation of investors.[8] If the yield on long-term Treasury bonds is 6%, then the cost of equity implied by the empirical relationship is 6.00% + 6.60% = 12.60%. A similar procedure could be developed based on the standard deviation of return rather than on beta as risk measure.

13.4 Conclusions

Although financial theory has shown that beta is a sufficient risk measure for diversified investors and although most of the empirical literature has confirmed its importance in determining expected return, there are notable exceptions. Over the course of its history, the death of beta has been peridically announced, inevitably followed by its rebirth. The Fama and French (1992) article is a case in point. These authors found little explanatory power in beta. But here again the autopsy of beta was premature, and "reports of beta's death are greatly exaggerated." For one thing, the CAPM specifies a relationship between expected returns and beta, whereas Fama and French employed realized returns. Moreover, in a subsequent re-

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[7] See Litzenberger (1988) for an excellent example of this empirical CAPM technique.

[8] The average market forecasts of rates in the form of interest rate Treasury securities futures contracts data can be used as a proxy for the expected risk-free rate.

compensation for beta risk and little relation to M/B ratios, unlike Fama and French. They also found that market risk premiums are much larger when betas are estimated using annual rather than monthly data.

On the positive side, as a tool in the regulatory arena, the CAPM is a rigorous conceptual framework, and is logical insofar as it is not subject to circularity problems, since its inputs are objective, market-based quantities, largely immune to regulatory decisions. The data requirements of the model are not prohibitive, although the amount of data analysis required can be substantial, especially if CAPM extensions are implemented.

On the negative side, the input quantities required for implementing the CAPM are difficult to estimate precisely. These problems are not insurmountable, however, provided that judgment is exercised and that the logic underlying the methodology is well supported. The techniques outlined in this chapter should prove helpful in this regard. Sensitivity analysis over a reasonable range of risk-free rate, market return, and beta is strongly recommended to enhance the credibility of the estimates.

The standard form of the CAPM must be used with some caution. There is strong evidence that the CAPM does not describe security returns perfectly, especially for public utilities. Beta is helpful in explaining security returns only when complemented with other risk indicators, such as dividend yield, size, and skewness variables. Rather than theorize on the effects of such extraneous variables, a more expedient approach to estimating the cost of equity capital is to estimate directly the empirical relationship between return and beta, and let the capital markets speak for themselves as to the relative impact of such variables. The empirical form of the CAPM provides an adequate model of security returns. If a utility's beta can be estimated for a given period, then by knowing the empirical relationship between risk and return, the security's expected return, or cost of capital, can be estimated. Here again, the cost of capital estimates produced by an ECAPM procedure should be sensitized to produce a range of estimates.

The CAPM is one of several tools in the arsenal of techniques to determine the cost of equity capital. Caution, appropriate training in finance and econometrics, and judgment are required for its successful execution, as is the case with the DCF or risk premium methodologies.

It is only natural that the next generation of CAPM models formally account for the presence of several factors influencing security returns. A new finance theory, which extends the standard CAPM to include sensitivity to several market factors other than market risk, has been proposed to replace the CAPM. Proponents of the Arbitrage Pricing Model (APM) contend that APM provides better results than does the CAPM and is not plagued by the shortcomings of the CAPM, while retaining its basic intuition. Chapter 15 discusses this latest paradigm in financial theory, and explores its pertinence in cost of capital determination. But first, Chapter 14 presents numerous applications of the CAPM that are relevant to utilities.

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APPENDIX A

PROFESSIONAL QUALIFICATIONS

OF

FRANK J. HANLEY, PRESIDENT

AUS CONSULTANTS - UTILITY SERVICES

PROFESSIONAL QUALIFICATIONS OF FRANK J. HANLEY

EDUCATIONAL BACKGROUND

I am a graduate of Drexel University where I received a Bachelor of Science Degree from the College of Business Administration. The principal courses required for this Degree include accounting, economics, finance and other related courses. I am also Certified by the Society of Utility and Regulatory Financial Analysts, formerly the National Society of Rate of Return Analysts, as a Rate of Return Analyst (CRRA).

PROFESSIONAL EXPERIENCE

In 1959, I was employed by American Water Works Service Company, Inc., which is a wholly-owned subsidiary of American Water Works Company, Inc., the largest investor-owned water works operation in the United States. I was assigned to its Treasury Department in Philadelphia until 1961. During that period of time, I was heavily involved in the development of cash flow projections and negotiations with banks for the establishment of lines of credit for all of the operating and subholding companies in the system, which normally aggregated more than $100 million per year.

In 1961, I was assigned to its Accounting Department where I remained until 1963. During that two-year period, I became intimately familiar with all aspects of a service company accounting system, the nature of the services performed, and the methods of allocating costs. In 1963, I was reassigned to its Treasury Department as a Financial Analyst. My duties consisted of those previously performed, as well as the expanded responsibilities of assisting in the preparation of testimony and exhibits to be presented to various public utility commissions in regard to fair rate of return and other financial matters. I also designed and recommended financing programs for many of American's operating subsidiaries and negotiated sales of long-term debt securities and preferred stock on their behalf either directly with institutional investors or through investment bankers. I was elected Assistant Treasurer of a number of operating subsidiaries in the Fall of 1967, just prior to accepting employment with the Communications and Technical Services Division of the Philco-Ford Corporation located in Fort Washington, Pennsylvania. While in the employ of the Philco-Ford organization, as a Senior Financial Analyst, I had responsibility for the pricing negotiations and analysis of acceptable rates of return to the corporation for all types of contract proposals with various agencies of the U.S.

Government and foreign governments.

In the Summer of 1969, I accepted a position with the Financial Division of The Philadelphia National Bank. I was elected Financial Planning Officer of the bank in December 1970. While employed with The Philadelphia National Bank, my responsibilities included preparation of the annual and five-year profit plans. In the compilation of these plans, I had to perform detailed analyses and measure the various levels of profitability for each organizational unit. I also assisted correspondent banks in matters of recapitalization and merger, made recommendations and studies for their use before the various regulatory bodies having jurisdiction over them.

In September 1971, I joined AUS Consultants - Utility Services Group as Vice President. I was elected Senior Vice President in May 1975. I was elected President in September 1989.

EXPERT WITNESS QUALIFICATIONS

I have offered testimony as an expert witness on the subjects of fair rate of return and utility financial matters before the Alaska Public Utilities Commission, the Arizona Corporation Commission, the Arkansas Public Service Commission, the California Public Utilities Commission, the Public Utilities Control Authority of Connecticut, the Delaware Public Service Commission, the Florida Public Service Commission, Hawaii Public Utilities Commission, the Idaho Public Utilities Commission, the Indiana Public Utility Regulatory Commission, the Iowa Utilities Board, the Public Service Commission of Kentucky, the Maryland Public Service Commission, the Massachusetts Department of Public Utilities, the Michigan Public Service Commission, the Missouri Public Service Commission, the Public Service Commission of Nevada, the New Jersey Board of Public Utilities, the New Mexico State Corporation Commission, the Public Service Commission of the State of New York, the North Carolina Utilities Commission, the Ohio Public Utilities Commission, the Oklahoma Corporation Commission, the Pennsylvania Public Utility Commission, the Rhode Island Public Utilities Commission, the Tennessee Public Service Commission, the Public Service Board of the State of Vermont, the Virginia State Corporation Commission, the Washington Utilities and Transportation Commission, the Public Service Commission of West Virginia, the Wisconsin Public Service Commission, the Federal Power Commission and its successor the Federal Energy Regulatory Commission. I have testified before the New Jersey Division of Tax Appeals and the United States Bankruptcy Court - Middle District of

Pennsylvania with regard to the economic valuation of utility property. Also, I have testified before the U.S. Tax Court in Washington D.C. as an expert witness on the value of closely held utility common stock in a contested Federal Estate Tax case.

In addition, I have appeared as a Staff rate of return witness for the Arizona Corporation Commission and the Delaware Public Service Commission in a number of proceedings. I have testified on the fair rate of return on behalf of the City of New Orleans, Louisiana, and also acted as project manager for my firm in representing the City in the 1980-1981 rate proceeding of New Orleans Public Services, Inc. The City of New Orleans then had, as it does now, regulatory authority with regard to the retail rates charged by New Orleans Public Service, Inc., for electric and natural gas service. I have also acted as a consultant to the District of Columbia Public Service Commission itself -- not in the capacity of Staff.

I have testified before a number of local and county regulatory bodies in various states on the subject of fair rate of return on behalf of cable television companies as well as before an arbitration panel in Ohio and a State District Court in Texas. I have testified before the Public Works Committee of the Nebraska State Senate in relation to Legislative Bill 731 which proposed permitting Public Power Districts and Municipalities to enter the Cable Television field.

PROFESSIONAL ASSOCIATIONS, PUBLICATIONS AND GUEST SPEAKER APPEARANCES

I am a Member and Director of the Society of Utility and Regulatory Financial Analysts (SURFA), formerly known as the National Society of Rate of Return Analysts. I am a Certified Rate of Return Analyst (CRRA), Founding Member. I am on the Advisory Council of New Mexico State University's Center for Public Utilities which is endorsed by the National Association of Regulatory Utility Commissioners (NARUC). I am also a member of the American Gas Association, The Pennsylvania Gas Association, and the National Association of Water Companies, of which I am a member of its Finance Committee. I often attend SURFA meetings during which considerable information on the subject of rate of return is exchanged. I have also attended corporate bond rating seminars held by Standard & Poor's Corporation. I continuously review financial publications of institutions such as Standard & Poor's, Moody's Investors' Service, Value Line Investment Survey, and periodicals of various agencies of the U.S. Government.

I co-authored an article with A. Gerald Harris entitled "Does Diversification Increase the Cost of Equity Capital?" which was published in the July 15, 1991 issue of Public Utilities Fortnightly. Also, an article which I co-authored with Pauline M. Ahern entitled "Comparable Earnings: New Life for an Old Precept" was published in the American Gas Association's Financial Quarterly Review, Summer 1994. I also authored an article entitled "Why Performance-Based Incentives Are Essential" which was published in THE CITY GATE, Fall 1995, a magazine published by the Pennsylvania Gas Association.

I have appeared as a guest speaker before an annual convention of the Mid-American Cable Television Association in Kansas City, Missouri and as a guest panelist on the small water companies' operation seminar of the National Association of Water Companies' 77th Annual Convention in Hollywood, Florida. I addressed the Second Annual Seminar on Regulation of Water Utilities sponsored by N.A.R.U.C., at the University of South Florida's St. Petersburg campus. I have spoken on fair rate of return to the Third and Fourth Annual Utilities Conferences, as well as the special conference on the cost of capital in El Paso, Texas sponsored by New Mexico State University. In 1983 I also made a presentation on the Cost of Capital in Atlantic City, New Jersey, at a seminar co-sponsored by Temple University. I have also addressed the Public Utility Law Section of the American Bar Association's Third Institute on Fundamentals of Ratemaking which was held in Washington, D.C. and I addressed a Conference on Cable Television sponsored by The University of Texas School of Law at Austin, Texas. Also, I addressed a meeting of the New England Water Works Association at Boxborough, Massachusetts, on the subject of Enterprise Financing. In addition, I was a speaker and mock witness in three different Utility Workshops for Attorneys sponsored by the Financial Accounting Institute held in Boston and Washington, D.C. I also was on a panel at the 23rd Financial Forum sponsored by the National Society of Rate of Return Analysts. The topic was Rate of Return Determination in the Diversified and/or Partially Deregulated Environment. I addressed the 83rd Annual Meeting of the Pennsylvania Gas Association in Hershey, PA. My topic was the Cost of Capital Implications of Demand Side Management. In June 1993, I lectured on the cost of capital at the American Gas Association's Gas Rate Fundamentals Course. In October 1993, I was a guest speaker at the University of Wisconsin's Center for Public Utilities -- my topic was "Diversification and Corporate Restructuring in the Electric Utility Industry - Trends and Cost of Capital Implications." In October 1994, I was a guest speaker on a panel at the Fourteenth Annual Electric & Natural

Gas Conference in Atlanta, Ga., sponsored by the Bonbright Utilities Center of the University of Georgia and the Georgia Public Service Commission. The panel topic was "Responses to Competition and Incentive Rates." In October 1994, I was a guest speaker on a panel at a conference and workshop called "Navigating the Shoals of Cable Rate Regulation" sponsored by EXNET in Washington, D.C. The panel topic was "Rate of Return." Also, in March 1995, I was a guest speaker on a panel at a conference entitled, "Current Issues Challenging the Regulatory Process" sponsored by New Mexico State University - Center for Public Utilities. My panel topic concerned the electric industry and was titled, "Impact of a Competitive Structure on the Financial Markets". In May 1995, I was a guest speaker at the 87th Annual Meeting of the Pennsylvania Gas Association in Hershey, PA. My topic was "The Pennsylvania Economy and Utility Regulation: Impact on Industry, Consumers and Investors." In May 1996, I was on a panel at the 28th Financial Forum of the Society of Utility and Regulatory Financial Analysts. The panel's topic was "Revisiting the Risk Premium Approach" and was held in Richmond, Virginia. Since May 1996, I have participated as an instructor in 2-3 seminars per year on the "Basics of Regulation" (and the ratemaking process in a changing environment) and also in a program called "A Step Beyond the Basics", all sponsored by New Mexico State University's Center for Public Utilities and NARUC.