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FEB 03 2006

PUBLIC SERVICE COMMISSION

Via Overnight Mail

January 26, 2006

Beth A. O'Donnell, Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602

Re: Case No. 2005-00341

Dear Ms. O'Donnell:

It was brought to our attention that some of the attachments to the data responses of the Kentucky Industrial Utility Customers, Inc. to the Commission Staff and the Kentucky Power Company were inadvertently omitted. In that regard, please find enclosed the CD referenced in response to Staff Data Request No. 1 and the original and five copies of the attachments referenced in response to Staff Data Requests Nos. 20 and 23. I also enclose the original and five copies of the attachments to Kentucky Power Company Data Requests No. 1, 27, 29, 30, 33, 34, 36, 37, 38 and 42. Due to the voluminous nature of the responses, copies of the attachments will be made available upon request to all other parties of record.

By copy of this letter, all parties listed on the Certificate of Service have been served. Please place this document of file.

Very Truly Yours,

David F. Boehm, Esq.
Michael L. Kurtz, Esq.
BOEHM, KURTZ & LOWRY

MLKkew
Attachment
cc: Certificate of Service

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing was served by mailing a true and correct copy, by first-class postage prepaid mail, and electronic mail, (when available) to all parties on the 31st day of January, 2006.

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COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:	
GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY	CASE NO. 2005-00341

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 1

Kentucky Power Company
Summary - KIUC Depreciation Expense Adjustments
For the Test Year Ended 6/30/05

	Total
1 - Remove $32,000,000 million demolition costs from computation of net salvage costs.	(1,409,132)
2 - Correct Account #312 Interim Retirements by removing additional retirements in 2007 and 2009.	(272,735)
3 - Use full history of additions and retirements to determine interim retirement rate for Big Sandy Assets instead of last 30 years.	(909,118)
4 - Use of Net Salvage percentages on overall functional account basis instead of judgement percentages based on retirements.	(1,352,141)
5 - Use full history for all Net Salvage percentages instead of just the 15 year period of 1990-2004.	(2,694,468)
6 - Delay retirement of Big Sandy Unit I five years from 2015 until 2020.	(90,912)
Total Adjustments	(6,728,507)

KENTUCKY POWER COMPANY REVENUE REQUIREMENT
SUMMARY OF KIUC RECOMMENDATIONS
REVENUE REQUIREMENT EFFECTS
($ 000's)

Capitalization Issues	
Reduction to Reflect 13 Month Avg M&S Inventory	(73)
Remove KPCO Reliability Capital Adjustment	(597)
Recognize Additional Pension Funding in 2005	(660)
Remove Prior Deferral of RTO Formation Costs	(129)
Operating Income Issues	
Correct Error in Off-System Sales Margin Roll-In	(2,035)
Increase Off-System Sales Margins to 2006 Projection	(5,102)
Increase Off-System Sales Margins for New East/West Reallocation	(3,620)
Remove Amortization of Deferred RTO Formation Costs	(160)
Remove KPCO Reliability O&M Expense Adjustment	(6,103)
Reduce Pension Expense to 2006 Amount	(288)
Reduce OPEB Expense to 2006 Amount	(96)
Revise Depreciation Expense for Changes in Proposed Depreciation Rates	(6,760)
Reduce KPCO Storm Damage Adjustment Based on 10 Year Average	(386)
Increase PJM Transmission Revenue Credits	(399)
Reduce PJM Net Congestion Costs	(2,121)
Remove KPCO Big Sandy Plant Maintenance Expense Adjustment	(1,305)
Remove KPCO §199 Deduction Tax Savings Included in Filing	414
Correct Error in Tax Expense Due to Interest Synchronization	(74)
Remove OH and WV Taxes from Gross Revenue Conversion Factor	(135)
Revise Kentucky State Income Tax Rate to 6.0%	(675)
Include Corrected §199 Deduction Tax Savings	(548)
Rate of Return Issues	
Reflect Return on Equity of 9.350%	(11,639)
Total KIUC Adjustments to KPCO Request	(42,492)

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

ORIGINAL

In the Matter of:

GENERAL ADJUSTMENT OF ELECTRIC RATES	)	CASE NO.
OF KENTUCKY POWER COMPANY	)	2005-00341

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.

RESPONSE TO

FIRST DATA REQUEST OF COMMISSION STAFF

ATTACHMENT TO

COMMISSION STAFF'S

DATA REQUEST NO. 20

The Journal of FINANCE

VOL. XXXIII MARCH 1978 No. 1

THE SUPERIORITY OF ANALYST FORECASTS AS MEASURES OF EXPECTATIONS: EVIDENCE FROM EARNINGS

LAWRENCE D. BROWN AND MICHAEL S. ROZEFF*

ACCURATE MEASUREMENT OF EARNINGS expectations is essential for studies of firm valuation, cost of capital and the relationship between unanticipated earnings and stock price changes. Under the rational expectations hypothesis [23], market earnings expectations should be measured by the best available earnings forecasts. Univariate time series forecasts are often used for this purpose ([1], [3], [4], [5], [12], [13], [14], [16], [18], [20]) instead of direct measures of earnings expectations such as security analysts' forecasts. Univariate time series forecasts neglect potentially useful information in other time series and therefore do not generally provide the most accurate possible forecasts [24]. Since security analysts process substantially more data than the time series of past earnings, their earnings forecasts *should* be superior to time series forecasts and provide better measures of market earnings expectations.

However, the mere existence of analysts as an employed factor in long run equilibrium means that analysts *must* make forecasts superior to those of time series models. To reach this conclusion, one need only assume that participants in the market for forecasts act in their own best interests and that both forecast producers and consumers demand forecasts solely on the basis of their predictive ability.[1] Since analysts' forecasts cost more than time series forecasts, the continued employment of analysts by profit-maximizing firms implies that analysts' forecasts must be superior to those of the lower cost factor, time series models.

Past comparisons of analysts' forecasts to sophisticated time series models conclude that analysts' forecasts are not more accurate than time series forecasts (Cragg and Malkiel (CM) [9]; Elton and Gruber (EG) [11]). This evidence plainly conflicts with basic economic theory. Hence, the predictive accuracy of analysts' forecasts is re-examined in this paper. In contrast with other studies, the results overwhelmingly favor the superiority of analysts over time series models.

Part I considers statistical tests and experimental design. Part II contains the empirical results. Summary and implications appear in Part III.

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1. We assume that forecast purchasers do not derive nonmonetary benefits from forecasts.

I. Experimental Design

A. *Statistical Evaluation of Forecast Methods*

Without direct information on the costs of imperfect forecasts to forecast users, comparative forecast accuracy is usually evaluated by comparing the error distributions of different forecast methods statistically. However, statistical comparisons in past studies ([9], [11]) utilize test statistics improperly, particularly Theil's U [25] and Student's t. In this section, after discussing the defects of these statistics for evaluating two or more forecast methods, the alternative statistical methods used in this study are introduced.[2]

Theil's U-statistic (applied to earnings) is the square root of

$$U_{ij}^2 = \frac{\sum_{t=1}^{T} (\dot{P}_{ijt} - \dot{A}_{it})^2}{\sum_{t=1}^{T} \dot{A}_{it}^2},$$

where $\dot{A}_{it}$ = change in actual earnings per share of firm i from $t-1$ to t,
$\dot{P}_{ijt}$ = predicted change in earnings per share of firm i from $t-1$ to t by forecast method j, and
T = total number of time series observations.

For its computation, it requires *time series* data on a firm's earnings *changes*.[3] Given forecast method j and earnings time series data on firm i, Theil's U compares the forecast accuracy of method j to that of a naive, no change, earnings forecast model.[4,5] Since analysts' earnings forecasts are currently available only in short time series, use of Theil's U for comparative forecast evaluation necessarily relies on small samples.[6] Larger sample sizes are possible by testing forecast methods on a cross-section of firms. Finally, no procedure is available with tests of significance which uses Theil's U to compare two forecast methods when neither is a no-change method. Direct hypothesis tests are preferable to inferences drawn from ranking the U statistics of different forecast methods.

For hypothesis tests of two forecast methods, an appropriate design is a one-sample or matched pairs case with self-pairing by firm. The members of each pair

2. Past studies also contain experimental biases: CM compare analysts' five-year forecasts with realizations over three and four-year horizons; EG compare analysts' forecasts with the "best" of nine time series models selected from the same time period in which comparisons with analysts' forecasts are made. This procedure introduces *ex post* selection bias.

3. EG computed "Theil's U" using earnings *levels* rather than *changes*. This statistic has unknown sampling properties.

4. $\dot{P}_{ijt} = \dot{A}_{it}$ and $U_{ij} = 0$ if prediction is perfect in every period. If no change is predicted in each period (i.e., $\dot{P}_{ijt} = 0$), $U_{ij} = 1$; $0 < U_{ij} < 1$ if prediction is less than perfect but better than the no-change prediction and $U_{ij} > 1$ if forecast method j is less accurate than the no-change prediction.

5. CM used *cross-sectional* rather than temporal data. This "Theil's U" statistic has unknown sampling properties because each error is drawn from a different error distribution, one for each firm.

6. EG's sample size in computing Theil's U varied between two and six.

are the errors from the two methods; the matched pair is reduced to a single observation by taking the difference in the errors. The usual parametric test of the mean difference is the paired t-test [17]. An alternative non-parametric test of the median difference is the Wilcoxon Signed Ranks test [8].

The parametric paired t-test is inappropriate for testing mean error differences of forecast methods applied to cross-section earnings data. If applied to error measures stated in level form (e.g., $|P_{ijt} - A_{it}|$, where P_{ijt} = firm i's forecasted earnings per share for period t by method j and A_{it} = firm i's actual earnings per share in period t), the test's assumption that paired differences are drawn from the same population is violated since each error difference depends upon each firm's earnings per share level. If applied to error measures stated in ratio form (e.g., $|P_{ijt} - A_{it}|/|A_{it}|$), the distributional assumptions of the paired t-test are also unlikely to be fulfilled since ratio measures applied to earnings per share data are dominated by outliers because actual earnings per share are often close to zero.[7]

Meaningful pairwise comparisons require test statistics which are insensitive to error definition and outliers. We adopt the Wilcoxon Signed Ranks test which meets these requirements and has power comparable to the parametric paired t-test [8, p. 213].

For tests of several forecast methods, the generalization of the paired t-test, two-way analysis of variance, is inapplicable.[8] The Friedman test [8], which is based on two-way analysis of variance by ranks and is independent of error definition, is used instead.

For an error measure, we choose relative error ignoring sign, $|P_{ijt} - A_{it}|/|A_{it}|$, a metric which is likely to be of interest to forecast purchasers.[9] In any event, the Wilcoxon test statistic is insensitive to error definition (see fn. 16).

B. *Forecast Horizon*

Because economic theory provides no guidance concerning the association of analyst superiority with a particular forecast horizon, several horizons should be investigated.[10] Our choice of horizons reflects the following considerations: (i) micro-level information obtained by analysts often concerns earnings of the following several quarters or fiscal year; (ii) current fiscal and monetary policies affect earnings of the subsequent one to five quarters; (iii) published forecasts are available mainly for short horizons. We thus investigate point estimates of quarterly earnings per share for forecast horizons of one to five quarters. We also examine annual earnings forecasts. The basic time series data are quarterly primary

7. EG's cross-section parametric t-test is inappropriate. Their use of an error measure stated in terms of levels squared (mean square error) appears to compound the inherent difficulty in applying the paired t-test to cross-section earnings data (see fn. 16).

8. Preliminary tests indicated serious violation of the homogeneity of variances and additivity assumptions, basically because of error outliers. Violation of the ANOVA assumptions also prevents application below of a factorial design with sample year and forecast horizon as factors, forecast method as treatment and firm as replication.

9. For a discussion of the deficiencies of using $|P_{ijt}|$ or $|P_{ijt} + A_{it}|/2$ in the denominator see [25].

10. The forecast horizons studied in the past have been five years (CM) and one year (EG).

earnings per share before extraordinary items, adjusted for stock splits, stock dividends and other capitalization changes for the years 1951–1975.

Ex ante conditional predictions of all forecast methods are determined as follows for a sample of 50 firms for each of the four years 1972–1975. Starting with third quarter 1971 earnings (III/1971), conditional earnings per share predictions for the ith firm by the jth method are obtained for the individual quarters of 1972. The forecasts of 1972 quarterly earnings, conditional on III/1971, are denoted $P_{ij}(\mathrm{I}/1972 \mid \mathrm{III}/1971)$, $P_{ij}(\mathrm{II}/1972 \mid \mathrm{III}/1971)$, $P_{ij}(\mathrm{III}/1972 \mid \mathrm{III}/1971)$ and $P_{ij}(\mathrm{IV}/1972 \mid \mathrm{III}/1971)$. Moving ahead one quarter, predictions are again obtained for each of the four quarters of 1972 made conditional upon IV/1971 earnings data. Again moving ahead one quarter, predictions are obtained for the last three quarters of 1972 conditional upon knowledge of I/1972 earnings, etc. Table I shows the set of 1972 predictions so obtained. With these conditional predictions, relative forecast errors ignoring sign are computed for each forecast method j over five distinct quarterly forecast horizons for use in the quarterly error comparisons. Annual earnings forecasts for 1972 are the sum of the forecasts $P_{ij}(\mathrm{I}/1972 \mid \mathrm{IV}/1971)$, $P_{ij}(\mathrm{II}/1972 \mid \mathrm{IV}/1971)$, $P_{ij}(\mathrm{III}/1972 \mid \mathrm{IV}/1971)$, and $P_{ij}(\mathrm{IV}/1972 \mid \mathrm{IV}/1971)$, that is, the one to four period ahead point forecasts made conditional upon knowledge of the prior year's fiscal earnings.[11] After obtaining analogous forecasts for the years 1973, 1974 and 1975, quarterly and annual comparisons are repeated for these years.

TABLE I

SUMMARY OF PREDICTIONS BY FORECAST HORIZON FOR 1972[a,b]

1 Quarter Ahead	2 Quarters Ahead	3 Quarters Ahead	4 Quarters Ahead	5 Quarters Ahead[c]
$P_{ij}(\mathrm{I}/1972 \mid \mathrm{IV}/1971)$	$P_{ij}(\mathrm{I}/1972 \mid \mathrm{III}/1971)$			
$P_{ij}(\mathrm{II}/1972 \mid \mathrm{I}/1972)$	$P_{ij}(\mathrm{II}/1972 \mid \mathrm{IV}/1971)$	$P_{ij}(\mathrm{II}/1972 \mid \mathrm{III}/1971)$		
$P_{ij}(\mathrm{III}/1972 \mid \mathrm{II}/1972)$	$P_{ij}(\mathrm{III}/1972 \mid \mathrm{I}/1972)$	$P_{ij}(\mathrm{III}/1972 \mid \mathrm{IV}/1971)$	$P_{ij}(\mathrm{III}/1972 \mid \mathrm{III}/1971)$	
$P_{ij}(\mathrm{IV}/1972 \mid \mathrm{III}/1972)$	$P_{ij}(\mathrm{IV}/1972 \mid \mathrm{II}/1972)$	$P_{ij}(\mathrm{IV}/1972 \mid \mathrm{I}/1972)$	$P_{ij}(\mathrm{IV}/1972 \mid \mathrm{IV}/1971)$	$P_{ij}(\mathrm{IV}/1972 \mid \mathrm{III}/1971)$

[a] Predictions missing from the table (e.g., $P_{ij}(\mathrm{I}/1972 \mid \mathrm{II}/1971)$, $P_{ij}(\mathrm{II}/1972 \mid \mathrm{II}/1971)$) are absent because our source of analyst data does not contain these forecasts.

[b] i and j refer to firm i and method j, respectively.

[c] Five quarter ahead are available for BJ and V only.

C. *Time Series Models and Analysts' Forecasts*

Within the class of univariate time series models, Box and Jenkins (BJ) [6] models are highly regarded for their ability to make the most efficient use of the time series data. The BJ modelling technique enables one to select the most appropriate time series model consistent with the process generating each firm's time series of quarterly earnings per share data. BJ models, by not making *a priori* assumptions about the processes generating the data, subsume autoregressive,

11. Beaver [1] concludes that a quarterly approach to predicting annual earnings is at least as good as an annual approach to predicting annual earnings. Also see [7], [19] and [22] for other aspects of the usefulness of quarterly earnings per share data.

moving average and mixed models as special cases.[12] Forecasts of individually fitted BJ models should, therefore, perform better than forecasts of a particular class of time series models applied to all firms' time series data. We adopt the BJ modelling technique in this paper. Two other time series models are also included, a "seasonal martingale" (denoted M) and a "seasonal submartingale" (S). These models have been used as standards of comparison in the earnings forecast literature and are available for forecast producers and users at minimal cost.

As a source of analysts' forecasts we choose the Value Line Investment Survey since it contains one to five quarter ahead earnings forecasts which can be accurately dated and measured. Value Line makes earnings forecasts for 1,600 firms in contrast with institutional research firms which provide fewer, more expensive forecasts. Our hypothesis test thus compares a relatively sophisticated time series model with an "average" source of analysts' forecasts.

BJ conditional forecasts are obtained by standard methods after identifying and estimating each firm's appropriate model [6].[13] Value Line's conditional forecasts are taken directly from individual issues of the Value Line Investment Survey. The Survey, published weekly, makes quarterly earnings predictions four times a year for each firm included.

To define conditional forecasts of the naive models for each firm i, let A_{it} denote the tth actual quarterly earnings per share for firm i, where $t=1,\ldots,96$ (I/1951–IV/1974).

Seasonal submartingale (S) conditional one to four quarter ahead forecasts at time t are

one quarter ahead	$A_{it-3}+(A_{it}-A_{it-4})$
two quarters ahead	$A_{it-2}+(A_{it}-A_{it-4})$
three quarters ahead	$A_{it-1}+(A_{it}-A_{it-4})$
four quarters ahead	$A_{it}\quad+(A_{it}-A_{it-4})$.

Seasonal martingale (M) conditional one to four quarter ahead forecasts made in period t are A_{it-3}, A_{it-2}, A_{it-1}, and A_{it}. M's forecasts for a given quarter do not change as actual earnings per share data become available. S modifies M's forecasts with the change of the latest period's quarter over that of the previous year.

Actual quarterly earnings data are announced for most firms approximately five to six weeks into the subsequent quarter. Time series forecasts then become

12. The *ad hoc* time series models used in previous studies at a time when BJ techniques were unavailable are special cases of BJ models.

13. Recent research by Froeschle [15] and diagnostic tests of Dent and Swanson [10] were helpful in identifying the BJ models in addition to the standard diagnostic tests. As an aid to identifying the BJ models, most of which had multiplicative seasonal components, theoretical autocorrelation and partial autocorrelation functions for many quarterly multiplicative seasonal models were obtained. The coefficients of the BJ models, estimated with data through IV/1974, were not re-estimated with less data for earlier periods or more data for later periods. Foster [13] has shown that coefficient re-estimation of BJ quarterly earnings models is unnecessary due to its negligible effect on forecast errors. In any event, our procedure (no re-estimation) favors BJ in nearly all comparisons with Value Line.

possible and Value Line forecasts are published, on average, forty to fifty days later.[14]

The pattern of forecasts for all models is summarized in Table 1. Note that models M and S are not used to generate five quarter ahead forecasts.

II. Empirical Results

A. *Sample Selection*

Fifty firms were randomly selected from Moody's Handbook of Common Stocks. Each firm has complete quarterly earnings data available from 1951, is included in the Value Line Investment Survey since 1971 and has a December fiscal year. The resulting sample (Appendix A) is representative of the New York Stock Exchange firms included in Moody's and Value Line. Utilities were excluded due to insufficient quarterly earnings data. Sample sizes are reduced in those rare instances when the Value Line conditional forecasts are unavailable.

B. *Annual Comparisons*

The error distributions of relative annual forecast errors are shown in Table 2 for each of the years 1972–75 using the four forecast methods, seasonal martingale (M), seasonal submartingale (S), Box-Jenkins (BJ) and Value Line (V). Table 2 also contains Friedman test statistics (Chi-square with 3 degrees of freedom) and Wilcoxon test statistics (Student's t with $N-1$ degrees of freedom where N is sample size). The Friedman test statistic examines the null hypothesis that *all four* error distributions are identically distributed; the Wilcoxon statistic tests the null hypothesis that the median error difference of *two* methods being compared exceeds zero.

Using the Friedman test, the null hypothesis is rejected at the 1% level in 1972, 1973 and 1975. In the 12 pairwise hypothesis tests of V's errors against those of M, S, and BJ, the sign of the Wilcoxon test statistic favors Value Line in every instance. Statistical significance occurs 8 times; 6 times at the 1% level and twice at the 5% level. Thus, V generally produces smaller annual errors than the three time series models suggesting that Value Line annual earnings forecasts are superior to those of time series models.

As argued earlier, BJ forecasts should be superior to forecasts of *ad hoc* time series models. The annual comparisons show that the BJ models generally yield smaller forecast errors than the other time series models studied. In 8 comparisons with M and S, the Wilcoxon test favors BJ 7 times with statistical significance 3 times. These findings suggest that BJ's forecasts are superior to those of *ad hoc* naive time series models.

While the annual results provide strong support for the hypothesis of analyst superiority, they use only a fraction of the data. More powerful tests are achieved using the larger sample sizes of the quarterly data and many more comparative tests can be performed with these data. We turn next to quarterly comparisons.

14. The time interval from announcement to forecast varies from approximately 7 to 70 days for our sample firms. The fact that the Investment Survey, published in 13 installments, makes forecasts for different firms each week accounts for the variation.

TABLE 2

WILCOXON AND FRIEDMAN TEST STATISTICS AND ERROR DISTRIBUTIONS, ANNUAL COMPARISONS OF VALUE LINE AND TIME SERIES MODEL PREDICTION ERRORS, 1972–1975[c]

1972

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	3	7	14	17	4	3	2
S	11	6	12	10	3	1	7
BJ	10	6	12	12	4	1	5
V	13	7	17	12	0	0	1

SAMPLE SIZE = 50
Friedman Statistic = 27.10[a]
Wilcoxon Statistics[e]

	S	BJ	*V*
M	−.55	.24	4.46[a]
S		.46	3.50[a]
BJ			3.45[a]

1973

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	2	6	16	18	6	0	2
S	11	8	14	9	4	1	3
BJ	8	6	15	16	3	0	2
V	10	9	13	16	0	0	2

SAMPLE SIZE = 50
Friedman Statistic = 33.19[a]
Wilcoxon Statistics[e]

	S	BJ	*V*
M	3.15[a]	2.51[a]	4.61[a]
S		−1.89[b]	0.34
BJ			2.17[b]

1974

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	8	6	12	15	4	1	4
S	12	3	11	12	6	2	4
BJ	5	8	16	13	4	0	4
V	6	7	15	13	5	0	4

SAMPLE SIZE = 50
Friedman Statistic = 4.68
Wilcoxon Statistics[e]

	S	BJ	*V*
M	−.21	2.37[a]	2.23[b]
S		1.24	1.44
BJ			0.61

TABLE 2 (*continued*)

	1975 Error Distribution[d]						
	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	4	7	13	10	2	3	11
S	3	5	12	7	9	4	10
BJ	7	3	13	12	2	3	10
V	7	5	18	5	3	3	9

SAMPLE SIZE = 50

Friedman Statistics = 12.84[a]

Wilcoxon Statistics[e]

	S	BJ	*V*
M	− 1.77[b]	0.86	3.29[a]
S		2.99[a]	3.11[a]
BJ			1.28

[a] Significant at the 1% level, one-tailed test.

[b] Significant at the 5% level, one-tailed test.

[c] *V* = Value Line, *M* = Seasonal Martingale, *S* = Seasonal Submartingale, BJ = Box-Jenkins.

[d] Each entry below designates the number of observations for a given model whose relative error ignoring sign is within the stated fractiles.

[e] Each Wilcoxon test statistic below results from comparing the method at the top with the method on the side. Thus, positive Wilcoxon statistics indicate superiority of model on top.

C. *Quarterly Comparisons*

In each year, 1972 to 1975, quarterly forecasts are obtained for the forecast methods in the manner shown in Table 1. Relative forecast errors of all four methods are compared over 1–4 quarter forecast horizons; BJ and *V* are also compared over 5 quarter horizons. In each of the four years, sample sizes are approximately 200 for the 1 and 2 quarter ahead comparisons, 150 for the 3 quarter ahead comparisons, and 100 for the 4 quarter ahead comparisons. Test results over all horizons appear in Table 3 and are summarized in Table 4.

With minor exceptions (3 and 4 quarter horizons in 1974), the Friedman statistics are highly significant when the four methods are tested as a group; the null hypothesis of identically distributed distributions is rejected in 14 of the 16 Friedman tests. Using Wilcoxon test statistics, *V*'s errors are tested pairwise against *M*'s and *S*'s errors 16 times each and against BJ's errors 20 times. The resulting 52 hypothesis tests of *V* against *M*, *S* and BJ are summarized in Table 4A. In the 34 instances of significant Wilcoxon test statistics, *V* is statistically superior 33 times. In the remaining 18 tests, the sign of the *t*-statistic favors *V* 12 times. In total, *V* is favored 45 times out of 52, revealing an overwhelming dominance of *V* over the time series models.

The data are also summarized in Table 4 by the mean Wilcoxon *t*-value ($\bar{t}$), the estimated standard deviation of the mean *t*-value ($s(\bar{t})$) and the ratio $\bar{t}/s(\bar{t})$. The latter ratio is itself a *t*-statistic only if each *t*-value being averaged is drawn from the same distribution. Since the distribution of *t*-values is likely to depend upon the horizon, model and/or year that the experiment is conducted, we refrain from

TABLE 3

WILCOXON AND FRIEDMAN TEST STATISTICS, QUARTERLY COMPARISONS OF VALUE LINE AND TIME SERIES MODEL PREDICTION ERRORS, 1972–1975[c,d]

		Forecast Horizon												
		One Quarter			Two Quarter			Three Quarter			Four Quarter			Five Quarter
		S	BJ	V	S	BJ	V	S	BJ	V	S	BJ	V	V
	M	2.14[b]	6.87[a]	8.15[a]	0.79	5.41[a]	6.87[a]	−1.09	2.50[a]	5.77[a]	−3.09[a]	1.41	5.22[a]	—
1972	S	—	4.62[a]	5.25[a]	—	4.62[a]	5.57[a]	—	3.03[a]	5.42[a]	—	3.38[a]	5.30[a]	—
	BJ	—	—	1.75[b]	—	—	2.51[a]	—	—	4.09[a]	—	—	3.93[a]	3.11[a]
		Sample Size = 200			Sample Size = 200			Sample Size = 150			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 73.45[a]			Friedman Stat. = 60.54[a]			Friedman Stat. = 41.14[a]			Friedman Stat. = 43.43[a]			
		S	BJ	V	S	BJ	V	S	BJ	V	S	BJ	V	V
	M	8.02[a]	8.98[a]	10.66[a]	5.81[a]	6.41[a]	8.70[a]	4.81[a]	3.52[a]	6.31[a]	2.55[a]	1.69[b]	4.63[a]	—
1973	S	—	−0.60	1.62	—	−1.83[b]	1.04	—	−3.57[a]	−0.02	—	−1.59	1.04	—
	BJ	—	—	2.48[a]	—	—	3.47[a]	—	—	3.34[a]	—	—	2.79[a]	1.66
		Sample Size = 199			Sample Size = 200			Sample Size = 150			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 173.51[a]			Friedman Stat. = 119.91[a]			Friedman Stat. = 75.22[a]			Friedman Stat. = 29.12[a]			
		S	BJ	V	S	BJ	V	S	BJ	V	S	BJ	V	V
	M	3.35[a]	6.29[a]	6.19[a]	0.84	4.88[a]	3.78[a]	−0.25	2.59[a]	1.29	−2.69[a]	1.41	0.29	—
1974	S	—	2.34[a]	2.95[a]	—	2.31[b]	1.50	—	1.53	0.97	—	2.67[a]	2.80[a]	—
	BJ	—	—	1.16	—	—	−1.45	—	—	−1.04	—	—	−0.92	−2.20[b]
		Sample Size = 199			Sample Size = 199			Sample Size = 149			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 47.57[a]			Friedman Stat. = 22.63[a]			Friedman Stat. = 5.40			Friedman Stat. = 2.92			
		S	BJ	V	S	BJ	V	S	BJ	V	S	BJ	V	V
	M	2.07[b]	5.76[a]	8.22[a]	−2.64[a]	3.63[a]	5.29[a]	−4.49[a]	2.93[a]	2.95[a]	4.89[a]	−0.78	−0.05	—
1975	S	—	4.70[a]	6.36[a]	—	6.02[a]	6.14[a]	—	6.13[a]	5.14[a]	—	3.62[a]	3.28[a]	—
	BJ	—	—	3.51[a]	—	—	1.62	—	—	−0.22	—	—	0.08	0.45
		Sample Size = 199			Sample Size = 199			Sample Size = 149			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 80.32[a]			Friedman Stat. = 44.49[a]			Friedman Stat. = 33.25[a]			Friedman Stat. = 15.66[b]			

[a] Significant at the 1% level, one-tailed test.

[b] Significant at the 5% level, one-tailed test.

[c] V = Value Line, M = Seasonal Martingale, S = Seasonal Submartingale, BJ = Box-Jenkins.

[d] Each Wilcoxon test statistic entered in the table results from comparing method at the top with method on the side. Thus, positive Wilcoxon statistics indicate superiority of model on top.

TABLE 4

SUMMARY OF WILCOXON TEST COMPARISONS

A: Value Line vs. Time Series Models[a]

		Forecast Horizon					Forecast Model			Year			
	Total	1Q	2Q	3Q	4Q	5Q	M	S	BJ	1972	1973	1974	1975
Number of Comparisons	52	12	12	12	12	4	16	16	20	13	13	13	13
Comparisons Favorable to V[b]	45	12	11	9	10	3	15	15	15	13	12	9	11
Comparisons Statistically Favorable to V[c]	33	10	8	7	7	1	13	10	10	13	8	4	8
Comparisons Statistically Unfavorable to V	1	0	0	0	0	1	0	0	1	0	0	1	0
Mean Wilcoxon Test Statistic ($\bar{t}$)	3.25	4.86	3.75	2.83	2.37	.76	5.27	3.40	1.51	4.84	3.67	1.18	3.29
$\bar{t}/s(\bar{t})$[d]	8.27	5.45	4.51	3.81	3.72	.67	5.65	6.24	3.48	9.98	4.18	1.81	4.24

B: BJ vs. Naive Time Series Models

		Forecast Horizon				Forecast Model		Year			
	Total	1Q	2Q	3Q	4Q	M	S	1972	1973	1974	1975
Number of Comparisons	32	8	8	8	8	16	16	8	8	8	8
Comparisons Favorable to BJ[b]	27	7	7	7	6	15	12	8	4	8	7
Comparisons Statistically Favorable to BJ[c]	24	7	7	6	4	13	11	7	4	6	7
Comparisons Statistically Unfavorable to BJ	2	0	1	1	0	0	2	0	2	0	0
Mean Wilcoxon Test Statistic ($\bar{t}$)	3.15	4.87	3.93	2.33	1.48	3.97	2.34	3.98	1.63	3.00	4.00
$\bar{t}/s(\bar{t})$[d]	6.37	4.70	4.16	2.41	2.25	6.23	3.25	6.46	1.05	4.99	4.96

[a] V = Value Line, M = Seasonal Martingale, S = Seasonal Submartingale, BJ = Box-Jenkins.

[b] Comparisons are favorable if Wilcoxon statistic in Table 3 is positive.

[c] Comparisons are statistically favorable if Wilcoxon statistic in Table 3 is positive and significant at the 5% level or better.

[d] Both $\bar{t}$ and $s(\bar{t})$ are computed using the number of comparisons in each column of the Table.

hypothesis tests on $\bar{t}$ and present $\bar{t}$ and $\bar{t}/s(\bar{t})$ without formal tests of significance. For the 52 comparisons involving V, the mean Wilcoxon test statistic is 3.25 and $\bar{t}/s(\bar{t})$ is 8.27.

Table 4A also decomposes the 52 comparisons of V with the time series models by forecast horizon, model and year.[15] The data show that Value Line's forecast superiority holds over all horizons studied with a tendency for its superiority to decline as horizon lengthens. V's predominance model-by-model is, as hypothesized, quite evident with somewhat less superiority over BJ than over M and S. Turning our attention to the 20 comparisons between V and BJ, V is superior in 10 of 11 cases in which the test statistic is significant. In 5 of the remaining 9 comparisons, the sign of the Wilcoxon test statistic favors V. For completeness, Table 4A summarizes Wilcoxon tests by year. Again we expect V to be superior, on average, but have no hypothesis concerning particular years. Comparisons unfavorable to V tend to be confined to 1974, but even in this year, 4 of the 5 statistically significant comparisons favor Value Line.

In summary, the evidence strongly supports the hypothesis that Value Line consistently makes significantly better predictions than time series models. The statistically significant experiments overwhelmingly favor Value Line. In the remaining experiments the majority of the Wilcoxon tests also favor Value Line, providing additional support for the hypothesis of analyst superiority.

Table 4B summarizes the 32 comparisons of BJ with the naive time series models. The mean Wilcoxon test statistic is 3.15 and $\bar{t}/s(\bar{t})$ equals 6.37. In 26 cases, there are significant differences with BJ statistically superior 24 times. BJ is superior to M and S in 3 of the remaining 6 comparisons. Hence, BJ is favored in 27 of 32 comparisons, providing strong support for the hypothesis that BJ predicts earnings better than *ad hoc* time series models.

Table 4B also summarizes comparisons involving BJ by horizon, model and year. BJ's superiority over the naive models is clearly evident over each forecast horizon with a tendency for its superiority to decline as horizon lengthens. In comparison to individual models, BJ outperforms both M and S with somewhat less dominance over S. Turning to comparisons by year, the superiority of BJ is consistent over time, with most of the comparisons unfavorable to BJ occurring in 1973. Even in this year, the mean Wilcoxon test statistic is 1.63 and 4 of the 6 significant comparisons favor BJ.[16]

In conclusion, the quarterly and the annual comparisons provide convincing evidence both of Value Line's superiority over each of the three time series models and BJ's superiority over the naive models. The quarterly results also show that V's superiority over the time series models and BJ's superiority over the naive models

15. The decomposition is an alternative to analysis of variance which is inapplicable to the error distribution (see fn. 8).

16. As noted earlier, the Wilcoxon tests should be insensitive to error definition. Wilcoxon test statistics were recomputed on annual and selected quarterly comparisons using three additional error measures, mean square error, root mean square error and relative error squared. The small changes in the test statistics left the results virtually unchanged. Parametric t-tests were also applied to the four error measures. Both the sign and magnitude of these test statistics were highly sensitive to error definition. The hypothesis tests using the parametric t-test most often gave results in disagreement with the Wilcoxon test when mean square error was chosen as the error definition. This may account for EG's results differing from ours.

are not confined to particular models, horizons, or years. The very general character of Value Line's superiority in predicting earnings, evidenced over all models, horizons, and years in 64 separate hypothesis tests involving sample sizes averaging 125, lends extraordinary support to the hypothesis of analyst superiority.

D. *Further Analysis*

The superiority of Value Line over time series models follows from the rational behavior of forecast producers and consumers and should be generalizable to other sources of analyst forecasts and other time periods. As a preliminary test of the sensitivity of our results to choice of analyst, we obtained predictions of 1975 annual earnings per share made by the Standard and Poor's Earnings Forecaster (SP) for each firm included in the 1975 annual earnings sample.[17] Wilcoxon tests of SP against M, S, and BJ favored SP, yielding t-statistics of 3.18, 2.85 and 1.45 respectively. These results are remarkably similar to those using Value Line.[18] This evidence suggests that Value Line's forecast superiority over time series models is not unique.

To ascertain whether the sample period posed unusual difficulties for time series earnings forecasting, a BJ model was fitted to the Quarterly Earnings Index of the Dow Jones Industrial Average over the 1951–1975 time period.[19] Average quarterly percentage errors ignoring sign produced by the BJ model for 1972–1975 were 7.31%, 6.61%, 9.99%, and 15.47% respectively. Since the mean and standard deviation of average percentage forecast errors over the 1951–1975 period were 10.14% and 4.38%, it appears that the 1972–1975 period was not a particularly difficult one in which to predict earnings. Indeed, from this standpoint, the 1972–1975 period is comparable to the "stable" years of the sixties, 1962–1967, studied by CM and EG.[20]

These results indicate that if appropriate hypothesis tests are applied to other analysts and time periods, the results are likely to parallel those using Value Line and the 1972–1975 time period.

E. *A Brief Investigation of Value Line Superiority*

To produce forecasts superior to time series models, Value Line must utilize information not contained in the time series of quarterly earnings. During the period between the most recent quarterly earnings announcement and the subsequent Value Line prediction, Value Line acquires incremental information which, if an important part of its total information set, may explain Value Line's

17. SP, published weekly, contains annual predictions made by Standard and Poor's and other investment firms. The SP prediction for each firm is that made by Standard and Poor's on the date closest to the Value Line prediction date.

18. V's t-statistics versus M, S, and BJ were 3.29, 3.11, and 1.28 respectively (See Table 2). A direct Wilcoxon test between V and SP favored V ($t = .77$).

19. The sample period, 1972–1975, may appear "unusual" since it includes peacetime wage and price controls, high inflation and inventory profits, large changes in employment and new accounting requirements. If events arising during the sample period caused the earnings generating process to change, the forecast ability of the BJ modelling technique may be hampered, unintentionally favoring the analyst.

20. The average percentage errors were 12.67%, 10.71%, 7.03%, 4.93%, 6.08% and 5.26%, respectively for 1962–1967.

superiority. Information arising during this interval is likely to be most important for predicting next quarter's earnings. Assuming that the generation of this incremental information is positively related to the passage of time, earnings should be relatively easier to predict the further Value Line's prediction date is from the most recent earnings announcement date, and one quarter horizon forecast errors should be negatively related to the corresponding intervals.

To test this hypothesis, we obtained for the firms in the 1975 one quarter horizon sample their Value Line errors and the time intervals (7–70 days) since their most recent earnings announcements. A rank correlation was applied to these variables. The insignificantly negative Spearman rho which was obtained suggests that information obtained by Value Line during this interval has a negligible effect on its ability to predict next quarter's earnings.[21] This evidence is consistent with the hypothesis that Value Line's superiority can be attributed to its use of the information set available to it on the quarterly earnings announcement date, and not to the acquisition of information arising after the quarterly earnings announcement date.

III. Summary and Implications

Basic economic theory and the equilibrium employment of analysts, a higher cost factor than time series models, imply that analysts must produce better forecasts than time series models. Past studies ([9], [11]) of comparative earnings forecast accuracy have concluded otherwise but use inappropriate parametric tests and contain experimental biases. Using nonparametric statistics which provide proper yet powerful tests, we find that (1) BJ models consistently produce significantly better earnings forecasts than martingale and submartingale models; (2) Value Line Investment Survey consistently makes significantly better earnings forecasts than the BJ and naive time series models. The findings are in accord with rationality in the market for forecasts and the long-run equilibrium employment of analysts.

If market earnings expectations are rational [23], it follows that the best available earnings forecasts should be used to measure market earnings expectations. Given rational market expectations, our evidence of analyst superiority over time series models means that analysts' forecasts should be used in studies of firm valuation, cost of capital and the relationship between unanticipated earnings and stock price changes until forecasts superior to those of analysts are found.[22] Past findings ([2], [21]) that share price levels are significantly better explained by analysts' earnings

21. The lack of a significant negative correlation between prediction error and time since last announcement date may occur if the interval is intentionally lengthened by Value Line in order to acquire more information about the firms whose earnings are more difficult to predict. To test this possibility, we measured each firm's prediction "difficulty" by its average one quarter horizon percentage error ignoring sign yielded by its BJ model. No significant correlation was found between this variable and the time interval between the most recent quarterly earnings announcement and the Value Line prediction date.

22. In examining the relationship between unanticipated earnings and stock price changes, for example, the sign of the forecast error from a time series is often used ([7], [12], [13]) as a device for classifying unanticipated earnings into "favorable" or "unfavorable" categories. With this methodology, BJ and *V* classify earnings differently 213 times out of the 797 one quarter ahead forecasts in our sample.

forecasts than by those of time series models are consistent with our evidence and with market rationality.

The hypothesis of analyst superiority versus univariate time series models is derived from basic economic theory and is not limited to the case of earnings. It is therefore applicable to all types of forecasts subject to the market test. There is no presumption that other, non-market forecasts such as those made by corporate executives or government agencies should be better (or worse) than those generated by univariate time series models.

Appendix A

Sample Firms

Abbott Laboratories
Allegheny Ludlum Industries, Inc.
American Airlines, Inc.
Anaconda Company
Boeing Company
Borg-Warner Corporation
Braniff International Corporation
Caterpillar Tractor Company
Champion International Corporation
Chrysler Corporation
Clark Equipment Company
Colgate-Palmolive Company
Continental Can Company, Inc.
Curtiss-Wright Corporation
Cutler-Hammer, Inc.
Eastern Airlines, Incorporated
Eastman Kodak Company
Flintkote Company
Freeport Minerals Company
Fruehauf Corporation
GATX Corporation
General Electric Company
Goodrich (B. F.) Company
Gulf Oil Corporation
Homestake Mining Company
International Business Machines Corporation
International Paper Co.
Kennecott Copper Corporation
Leheigh Portland Cement Co.
Ligget Group Inc.
Lowenstein (M.) & Sons, Inc.
Nabisco, Inc.
National Distillers & Chemical Corporation
National Steel Corporation

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Pan American World Airways, Inc.
Pepsico, Inc.
Phelps Dodge Corporation
Phillips Petroleum Co.
Pullman, Incorporated
Raybestos-Manhattan, Inc.
Republic Steel Corporation
Standard Brands, Inc.
Standard Oil Company of Indiana
Sterling Drug, Incorporated
St. Regis Paper Company
Timken Company
United States Gypsum Company
United States Steel Corporation
United Technologies Corp.
Wrigley (W. M.) Jr. Company

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INVESTOR GROWTH EXPECTATIONS AND STOCK PRICES

James Vander Weide and Willard Carleton

INTRODUCTION

Although it is widely recognized that growth expectations play an important role in share price determination, there is still considerable disagreement about how investors' growth expectations are measured. Earlier studies by Cragg and Malkiel ([3] and [4]) suggest that the consensus financial analysts' growth expectations are more highly correlated with stock prices than are growth expectations based on simple historical growth extrapolations. However, the Cragg and Malkiel work was based on a limited database of analysts' growth forecasts covering the period 1961 to 1968. Furthermore, compared to the more recent period of high inflation and interest rate volatility, the 1961-1968 period studied by Cragg and Malkiel was characterized by an unusual degree of stability.

Our study is an update for year-end 1981, 1982, and 1983 of the Cragg and Malkiel work. It relies on an extensive database of analysts' 5-year earnings growth rate forecasts available through the IBES ("Institutional Brokers Estimate System") service of Lynch, Jones & Ryan, a New York securities firm.[1] The results of our study confirm Cragg and Malkiel's basic findings

1 The forecasts, collected on a monthly basis, are by more than 2,000 analysts from over 100 New York and regional securities firms. Over 3,000 companies are included. Most large institutional investors subscribe to the IBES service. Although systematic coverage of earnings growth rate forecasts has been included in Lynch, Jones and Ryan's surveys only since January, 1982, the firm has been collecting analysts' forecasts of companies' earnings per share (one and two years ahead) for many years. These data themselves have been employed in several studies, e.g., Elton and Gruber [5] and Peterson and Peterson[10].

with respect to the role of consensus growth rate forecasts. They also reveal more ambiguities with respect to the measurement of risk, for which we provide both statistical and economic interpretation.

The significance of our study derives from the fact that the measurement of growth expectations plays a critical role in one of the commonly used techniques of cost of equity capital estimation.[2] All valuation, or cost of equity capital, models require for practical implementation market expectational variables which cannot be directly observed (company earnings, growth rate, return or excess return on the market portfolio, etc.). The Gordon model and its variants, in particular, have been criticized among other reasons for requiring such input. The evidence from this study suggests strongly that consensus growth forecasts are at the very least good surrogates for the unobserved market growth expectations.

THE STOCK PRICE MODEL

To study the effect of growth expectations on share prices, we need an explicit model of how share prices are determined. An appealing stock price model has recently been described in an interesting book by Cragg and Malkiel

2 Indeed, our initial research was conducted in response to the Federal Communications Commission's Notice of Proposed Rulemaking [6] which sought comments on methods for estimating the cost of capital for companies providing interexchange telecommunications services.

entitled Expectations and the Structure of Share Prices [4]. Cragg and Malkiel begin with the assumptions that (1) utility maximizing investors choose to hold diversified portfolios and (2) there are certain common elements of risk (i.e., common risk factors) that cannot be diversified away. Under these assumptions, they show that the equilibrium price on any security must be given (at least approximately) by the equation

$$p_j = \mu_j a_o + \sum_{k=1}^{K} \gamma_{jk} a_k \tag{1}$$

where p_j = security j's stock price,

μ_j = expected return on security j,

γ_{jk} = coefficient representing security j's sensitivity to the kth common factor,

a_k = coefficient representing the expected utility (in equilibrium) from a marginal increase in common factor k.

Now if investors expect that future security prices will also be determined by (1) and the a_k's still remain unchanged, then the expected return on security j at time t is given by

$$\mu_{jt} = E(d_{j,\ t+1}) + E(\mu_{j,t+1}\ a_o + \sum_{k=1}^{K} \gamma_{jk,t+1} a_k) \tag{2}$$

where $d_{j,t+1}$ is the dividend received in the next period and E is the expectation operator. Repeated substitution of (2) into (1), along with the assumption that dividends are expected to grow indefinitely at the constant rate g produces an appropriate stock price equation for period zero that is remarkably similar to the textbook version of the Discounted Cash Flow Model:

$$P_{jo} = d_{jo}(1 + g_j)/(\bar{\rho} - g_j) + \sum_{k=1}^{K} a_k \gamma_{jk} (1 + \bar{\rho})/\bar{\rho} \qquad (3)$$

where $\bar{\rho}$ is the risk-free rate.

Dividing both sides of equation (3) by the firm's current earnings, we see that the Cragg-Malkiel model implies the existence of a functional relationship between the security's price/earnings ratio and K + 3 other variables: the firm's dividend payout ratio, investors' growth expectation, the risk-free rate of interest, and K common risk factors. This is the functional relationship that we shall explore in the remainder of this study.

DESCRIPTION OF DATA

Our data sets include both historically-based measures of future growth and the consensus analysts' forecasts of 5-year earnings growth supplied by the Institutional Brokers Estimate System of Lynch, Jones & Ryan. They also include the firm's dividend-payout ratio and various measures of the firm's risk. The latter data items are included in the regression, along with earnings growth, to account for other variables that may affect the firm's stock price.

A more detailed description of our data set follows:

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 pre-tax 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 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. The contributing brokers have been selected by IBES "because of the superior quality of their research, professional reputation, and client demand." (IBES Monthly Summary book. [7])

5. Risk Variables Although there are a great many risk factors that could potentially affect the firm's stock price, most of these are highly correlated with one another. We have decided to restrict our attention to four risk measures that have intuitive appeal and are followed by many financial analysts. These include: a) B, the firm's "beta" as published by Value Line; b) Cov, the firm's pre-tax interest coverage ratio

price/earnings ratio (P/E) is calculated as the closing stock price for the year (i.e., year-end 1981, 1982 and 1983) divided by the consensus analyst earnings expectation for the forthcoming fiscal year, (i.e., 1982, 1983 and 1984).

3. Dividends Dividends per share represent the common dividends declared per share during the calendar year (it includes an 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 earnings per share for the forthcoming calendar year (D/E). Although this definition has the deficiency that it is obviously biased downwards (because 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 3).

4. Growth In comparing historically-based and consensus analysts' forecasts, we calculated 41 different historical growth measures. These included the following: a) the past growth rate in EPS as determined by a log-linear least squares regression for the latest year,[4] two years, three years ... and ten years, b) the past growth rate in DPS for the latest year, two

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

1. Earnings Per Share Since our goal is to determine which earnings variable is embodied in the firm's market price, we need to define this variable with great 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.

In this study, we defined "earnings" as the consensus analyst estimate (as reported by IBES) of the firm's earnings for the forthcoming year.[3] This definition approximates the normalized earnings that investors most likely have in mind when making stock purchase and sell decisions. It implicitly incorporates the analyst's adjustments for differences in accounting treatment among firms and the effects of the business cycle on each firm's results of operations. Although we at first thought that this earnings estimate might be highly correlated with the analyst 5-year earnings growth forecasts, this was not the case. Thus, a potential spurious correlation problem was avoided.

2. Price/Earnings Ratio Corresponding to our definition of "earnings", the

3 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. Since our results were insensitive to reasonable alternative definitions of "earnings", we only report the results for one definition in this paper.

(obtained from Standard & Poor's Compustat); c) Rsq, the stability of the firm's five-year historical EPS (measured by the R^2 from a log-linear least squares regression); and d) 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 more meaningful results could be obtained by imposing several restrictions on the companies included in our study. These restrictions are listed below:

A. 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 13-year period 1971-1983. Only companies with at least a 13-year operating history were included in our study. .

B. Since 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 which experienced negative EPS during any of the years 1971-1983.

C. For similar reasons, we also eliminated companies which did not pay a dividend during any one of the years 1971-1983.

D. To insure comparability of time periods covered by each consensus earnings figure in the P/E ratios, we eliminated all companies which did not have a December 31 fiscal year-end.

E. To eliminate distortions caused by highly unusual events that impact current earnings; but not expected future earnings, and thus the firm's price/earnings ratio, we eliminated any firm having a price/earnings ratio greater than 50.

F. Since the evaluation of analysts' forecasts is a major part of this study, we eliminated all firms that were not followed by IBES.

Our final sample consisted of approximately 135 industrial and 65 utility firms.[5]

Linear Approximation

As noted earlier, our study is designed to test which estimate of expected dividend growth is embodied in current market prices. For this purpose, we shall employ a linear approximation to the stock price model (3) that takes the form:

$$(P/E)_j = a_o + a_1(D/E)_j + a_2g_j + a_3B_j + a_4Cov_j + a_5Rsq_j + a_6Sa_j + e_j \qquad (4)$$

where $(P/E)_j$ is firm j's price/earnings ratio, $(D/E)_j$ is firm j's dividend payout ratio, g_j is an estimate of firm j's future growth, B_j is firm j's Value Line beta, Cov_j is firm j's pre-tax interest coverage ratio, Rsq_j is a measure of the stability of firm j's five-year historical EPS, Sa_j is the

5 We use the word "approximately" because the set of available firms varied each year. However, in each case it was only from 0-3 firms on either side of the figures cited here.

standard deviation of the consensus analysts' five-year EPS growth forecast for firm j, and e_j is an error term that is assumed to obey the standard ordinary least squares (OLS) assumptions:

$$E(e_i) = 0 \qquad \text{for all } i = 1, 2, \ldots, n$$

$$E(e_i e_j) = \begin{cases} 0 & \text{for } i \neq j;\ i,j = 1, 2, \ldots, n \\ \sigma_e^2 & \text{for } i = j;\ i,j = 1, 2, \ldots, n \end{cases} \qquad (5)$$

$$E(e_i X_{ik}) = 0 \qquad \text{for all } i = 1, 2, \ldots, n;\ k = 1, 2, \ldots, m$$

where n is the number of firms and m is the number of independent variables.

Although the use of the linear approximation to the price/earnings equation (3) is convenient for estimation purposes, there is a legitimate concern that it may seriously interfere with our ability to draw correct inferences from our study results. If the linear approximation to the price/earnings equation is not very accurate, then there is a high likelihood that the OLS assumptions (5) do not hold, and thus there exists the possibility of reaching incorrect conclusions.

RESULTS

To keep the number of calculations in our study at a reasonable level, we performed the study in two stages. In stage 1, all 41 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. Because we felt the results of our study might vary over time and across groups of firms, we performed our regressions on two groups of firms in each of three recent time periods. The two candidate groups of firms were (1) the S & P 400 Industrials and (2) the 178 utilities tracked by IBES, to the extent that these companies met our criteria for inclusion.

First-Stage Correlation Study

Table 1 (Parts A and B) contains 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 various time periods (one-year, two-year, three-year, etc.) 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 current year and its return on book equity for that year. In all, we calculated 41 historically-oriented growth rates for each group of firms in each study period.

The goal of the first-stage correlation analysis is to determine which historically-oriented growth rate is most highly correlated with each group's year-end P/E ratio. Ten-year BVPS has the highest correlation with the year-end P/E ratio in each year of the study period for the industrial group of firms (see Table 1A). For the utility group, 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 (see Table 1B). In all cases, the "plowback" estimate of future growth performed very poorly, indicating that it is not a factor in investors' expectations of future growth.

Table 1 (Part A)

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

Industrial Group

	Current Year	Historical Growth Rate Period in Years									
		1	2	3	4	5	6	7	8	9	10
1981											
EPS		-.04	-.06	-.14	-.10	-.09	-.06	-.00	-.00	-.01	-.02
DPS		-.03	-.04	.02	.08	.08	.09	.08	.08	.10	.09
BVPS		.14	.12	.12	.16	.19	.21	.24	.25	.25	.26
CFPS		-.06	-.00	.21	.03	.06	.08	.14	.14	.14	.16
Plowback	.23										
1982											
EPS		.01	-.06	-.13	-.17	-.07	-.07	-.02	-.00	-.03	-.03
DPS		-.14	-.13	-.13	-.03	.02	.00	.02	.00	.01	.04
BVPS		.06	.10	.10	.11	.14	.16	.17	.17	.18	.18
CFPS		-.03	-.07	-.07	-.08	-.03	.01	.06	.08	.07	.06
Plowback	.04										
1983											
EPS		-.05	-.22	-.25	-.21	-.21	-.16	-.16	-.14	-.14	-.12
DPS		-.05	-.10	-.10	-.11	-.09	-.08	-.06	-.05	-.04	.00
BVPS		-.07	-.01	-.04	-.04	-.02	-.01	-.01	.00	.00	.02
CFPS		.01	-.20	-.20	-.13	-.12	-.10	-.11	-.10	-.12	-.11
Plowback	-.21										

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Second-Stage Regression Study

In the second stage of our regression study, we ran regression 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 are shown in Table 2.

These results support at least four general conclusions regarding the pricing of equity securities. First, there is 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. Furthermore, the regression coefficients in the equation containing the consensus analysts' forecast 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. They are also consistent with the hypothesis that investors use analysts' forecasts, rather than historically-oriented growth calculations, in making stock buy and sell decisions.

Second, there is some evidence that investors tend to view risk in fairly traditional terms: the interest coverage variable is statistically significant in all but one of our samples and the stability of the operating income

Table 1 (Part B)

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

Utility Group

	Current Year	Historical Growth Rate Period in Years: 1	2	3	4	5	6	7	8	9	10
1981											
EPS		-.02	.07	.03	.01	.03	.12	.08	.09	.09	.09
DPS		.05	.18	.14	.15	.14	.15	.19	.23	.23	.23
BVPS		.01	.11	.13	.13	.16	.18	.15	.15	.15	.15
CFPS		-.05	.04	.13	.22	.28	.31	.30	.31	-.57	-.54
Plowback	.19										
1982											
EPS		-.10	-.13	-.06	-.02	-.02	-.01	-.03	-.03	.00	.00
DPS		-.19	-.10	.03	.05	.07	.08	.09	.11	.13	.13
BVPS		.07	.08	.11	.11	.09	.10	.11	.11	.09	.09
CFPS		-.02	-.08	.00	.10	.16	.19	.23	.25	.24	.07
Plowback	.04										
1983											
EPS		-.06	-.25	-.25	-.24	-.16	-.11	-.05	.00	.02	.02
DPS		.03	-.10	-.03	.08	.15	.21	.21	.21	.22	.24
BVPS		.03	.10	.04	.09	.15	.16	.19	.21	.22	.21
CFPS		-.08	.01	.02	.08	.20	.29	.35	.38	.40	.42
Plowback	-.08										

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variable is statistically significant in six of the twelve samples we studied, while the beta is never statistically significant and the standard deviation of the analysts' 5-year growth forecasts is statistically significant in only two of our twelve samples. However, this evidence is far from conclusive since, as we demonstrate later, there is a significant degree of cross-correlation among our four risk variables. This cross-correlation makes any general conclusions about risk extremely hazardous.

Finally, the study results suggest that our price/earnings model "works" significantly better for utilities than it does for industrials, as evidenced by the significantly higher R^2 values for the utility regressions. We shall explore the possibility that this result is explained by the fact that the linear approximation to our theoretical price/earnings equation is more exact for the utilities than for the industrials in the next section.

Table 2 (Part A)

Regression Results - Industrials
Model I - with P/E as Dependent Variable

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	-9.15*	16.29*	20.54*	4.27	0.06*	4.27*	36.94*	0.45	18.82
	(2.61)	(8.01)	(3.30)	(1.63)	(2.69)	(3.19)	(4.93)		
1982	-6.52	18.19*	19.17*	-1.31	0.11*	7.63*	142.46	0.51	24.33
	(1.48)	(10.22)	(2.05)	(0.33)	(3.17)	(4.42)	(4.45)		
1983	-5.23	19.84*	18.08*	4.74	0.04*	2.27	30.19	0.41	16.12
	(1.45)	(9.18)	(2.22)	(1.55)	(1.65)	(1.64)	(1.44)		

Part B: Analysts

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

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	-15.30*	17.73*	101.45*	-0.19	0.06*	3.82*	-7.31	0.67	43.00
	(5.23)	(11.15)	(8.85)	(0.08)	(3.36)	(3.62)	(0.91)		
1982	-16.77*	18.98*	146.20*	-3.46	0.12*	3.09*	89.03	0.66	43.93
	(4.19)	(12.79)	(7.82)	(0.98)	(4.14)	(1.99)	(2.02)		
1983	-14.92*	19.83*	112.83*	4.85	0.04	-0.92	13.14	0.59	32.59
	(4.49)	(11.56)	(7.76)	(1.86)	(1.64)	(0.73)	(0.72)		

Notes:

* = Coefficient is significant at the 5% level (using a 1-tailed test) and has the correct sign.

The t-statistic is indicated in parentheses.

Table 2 (Part B)

Regression Results - Utilities
Model I - with P/E as Dependent Variable

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: Analysts

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

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 1-tailed test) and has the correct sign.

The t-statistic is indicated in parentheses.

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STATISTICAL ISSUES

Although the results of our study provide convincing evidence in support of our conclusions, we feel it is important to investigate whether, and to what extent, our conclusions may have been affected by the nature of our statistical assumptions. In this section, we investigate (1) the amount of independent variation in the explanatory variables, (2) the accuracy of the linear approximation to the theoretical price-earnings relationship and (3) the effect of a possible misspecification of the risk variables.

Independent Variation in the Explanatory Variables

In an effort to understand why we were unable to find a strong and consistent relationship between firms' price-earnings ratios and their risk measures, we performed a principal-axis factor analysis (with a varimax rotation) of our six explanatory variables. The results are summarized in Tables 3 and 4.

Table 3 shows the cumulative percentage of the total variation in the six explanatory variables in each sample that is accounted for by the four principal components with the highest eigenvalues. In all cases, roughly 75% of the total variation in the six explanatory variables is accounted for by the first three principal components. This means that there are really at most three independent dimensions of variation in our explanatory variables and there may very well be less. In fact, the subsequent factor analysis demonstrates that there are really only two statistically significant independent dimensions of variation in all cases but one, where there are three (See Table 4). Thus, we should not be surprised to get less than a full set of significant coefficients in our regressions.

Table 4 displays the factor loadings of the six explanatory variables on the (two or three) statistically significant principal factors obtained from the factor analysis. We see that the six original variables tend to fall into two 3-member subgroups, whose members load on the same factor. In the utility sample, for instance, the three variables g_a, B and s_a always load heavily on one of the two factors, while the three variables D/E, Cov, and Rsq load heavily on the other. This means that the variables within each group are so highly correlated that it is virtually impossible to distinguish between them statistically.

Table 3

Cumulative Percentage of Total Variance Accounted for by Four Principal Components with Highest Eigenvalues in Descending Order

Principal Component	Study Group* 1-81	2-81	1-82	2-82	1-83	2-83
1	31%	40%	31%	34%	30%	35%
2	54%	64%	59%	62%	53%	62%
3	74%	78%	73%	75%	69%	74%
4	86%	88%	85%	85%	82%	86%

* The study groups are labeled to reflect both the year (1981, 1982, 1983) and whether the sample consisted of industrial firms (1) or utility firms (2).

Table 4 (Part A)

Rotated Factor Loadings of Industrial and Utility Firm Samples in 1981

Original Variable	Industrial Firms Factor 1	Factor 2	Factor 3	Utility Firms Factor 1	Factor 2
D/E	-0.056	0.822	-0.188	-0.677	-0.077
g_a	0.859	-0.290	0.143	0.372	0.861
B	0.132	-0.756	-0.183	0.370	0.565
Cov	0.036	0.371	0.736	0.668	0.357
Rsq	-0.103	-0.318	0.774	0.812	-0.001
Sa	0.898	0.062	-0.195	-0.473	0.793

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Table 4 (Part B)

Rotated Factor Loadings of Industrial and Utility Firm Samples in 1982

Original Variable	Industrial Firms Factor 1	Industrial Firms Factor 2	Utility Firms Factor 1	Utility Firms Factor 2
D/E	-0.717	0.030	-0.170	-0.649
g_a	0.732	0.303	0.817	0.371
B	0.222	0.801	0.827	0.032
Cov	0.343	-0.369	-0.119	0.771
Rsq	0.774	-0.371	-0.011	0.750
Sa	-0.094	0.815	0.733	-0.251

Table 4 (Part C)

Rotated Factor Loadings of Industrial and Utility Firm Samples in 1983

Original Variable	Industrial Firms Factor 1	Industrial Firms Factor 2	Utility Firms Factor 1	Utility Firms Factor 2
D/E	-0.638	0.073	0.004	-0.750
g_a	0.740	0.345	0.882	0.181
B	0.039	0.716	0.775	-0.008
Cov	0.402	-0.483	0.255	0.670
Rsq	0.764	-0.237	-0.226	0.633
Sa	-0.029	0.756	0.712	-0.497

Accuracy of Linear Approximation

Since nonlinearity can be a serious problem in statistical inference, we need to test carefully how closely the linear equation (4) approximates the true price/earnings relationship (3). A straightforward approach is to run an OLS regression, assuming that (4) is reasonable (and hence (5) applies), and then to examine the appropriate test statistics to see whether the linear approximation "works". (see Theil [11])

On the other hand, there are at least two drawbacks to the straightforward approach to testing for nonlinearity. Since the straightforward approach makes no assumption about the form of the nonlinear relationship we are testing for, it is necessarily an indirect, and hence not very powerful, test. Furthermore, the test itself is biased by the fact that the covariance matrix of the least squares residuals is generally nonscalar (i.e, $Var(e) \neq \sigma^2 I$), even when the covariance matrix of the true residuals is scalar. Thus, uncorrelated disturbances do not guarantee that the OLS residuals are uncorrelated.

Given the above uncertainties with the straightforward approach to testing for nonlinearity and the importance of the linear assumption to the interpretation of our results, we conducted a second test of the reasonableness of the linear approximation to the price/earnings equation (3), using the multi-variable version of Taylor's Theorem. For the purposes of this test, we ignored the risk variables appearing in (3), since they clearly appear in a strictly linear form.

From Taylor's Theorem[6], we know that any continuous function $f(p)$ of two variables with continuous derivatives up to third order in a neighborhood of the point $p_o = (x_o, y_o)$ can be expressed as

$$f(p) = f(p_o) + \frac{(x-x_o)}{1} \left.\frac{\partial f}{\partial x}\right|_{p_o} + \frac{(y-y_o)}{1} \left.\frac{\partial f}{\partial y}\right|_{p_o} \tag{6}$$
$$+ \frac{(x-x_o)^2}{2!} \left.\frac{\partial^2 f}{\partial x^2}\right|_{p^*} + \frac{(x-x_o)(y-y_o)}{1!\quad 1!} \left.\frac{\partial^2 f}{\partial x \partial y}\right|_{p^*} + \frac{(y-y_o)^2}{2!} \left.\frac{\partial^2 f}{\partial y^2}\right|_{p^*}$$

where $p = (x,y)$ and p^* is a point on the line segment joining p_o and p. Applying this knowledge to the nonlinear term in equation (3), we have

$$p_{jo}(D,g) = \frac{(1+\bar{g})\bar{D}}{\bar{\rho} - \bar{g}} + \frac{(1+g)}{\bar{\rho} - g}(D-\bar{D}) + \frac{(\bar{\rho}+1)}{(\bar{\rho}-g)^2}(g-\bar{g}) + R_n(D,g) \tag{7}$$

where a bar over a variable indicates the mean value of that variable and R_n is the sum of second order terms evaluated at (D^*, g^*).

Let us denote the first order Taylor approximation to $p_{jo}(D,g)$ by p_L. Then we can investigate the relative accuracy of the linear approximation to equation (3) by calculating

$$\frac{p_{jo} - p_L}{p_{jo}}$$

for various values of D and g. Table 5 (Parts A and B) shows the resulting calculations for 20 D and g values taken from both the industrial and utility samples. The only criterion used in selecting these values was that the firm's

6 Buck, R. Creighton and E. F. Buck, Advanced Calculus, McGraw-Hill Book Company, New York, 1965, pp. 260-261.

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TABLE 5 (PART A)

Analysis of Accuracy of Linear Approximation for 20 D/E and

g Values Taken from Industrial Sample

D/E	g	P	P_L	$\frac{P-P_L}{P}$
0.518	0.104	35.742	35.113	0.176
0.539	0.109	54.341	82.273	-0.514
0.863	0.092	33.657	32.096	0.046
0.499	0.099	26.114	21.852	0.163
0.390	0.095	17.082	13.974	0.182
0.794	0.107	67.612	77.936	-0.153
0.286	0.093	11.578	9.470	0.182
0.382	0.103	24.785	22.534	0.091
0.534	0.113	84.906	238.466	-1.809
0.516	0.101	29.901	25.993	0.131
0.419	0.103	27.186	24.935	0.083
0.365	0.109	36.799	64.730	-0.759
0.541	0.108	49.952	67.492	-0.351
0.564	0.111	69.623	135.132	-0.941
0.801	0.109	80.755	108.687	-0.346
0.317	0.101	18.369	14.461	0.213
0.408	0.109	41.134	69.065	-0.679
0.627	0.111	77.400	142.909	-0.846
0.469	0.082	13.354	17.446	-0.306
0.863	0.092	33.657	32.096	0.046

Note: $\overline{D/E}$ = 0.71

$\bar{g}$ = 0.061

$\bar{\rho}$ = .12

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TABLE 5 (PART B)

Analysis of Accuracy of Linear Approximation for D/E and

g Values Taken from Utility Sample

D/E	g	P	P_L	$\frac{P-P_L}{P}$
0.603	0.063	11.234	11.985	-0.066
0.633	0.054	10.109	9.910	0.020
0.545	0.064	10.355	11.277	-0.089
0.927	0.043	12.592	12.237	0.028
0.659	0.087	21.707	41.089	-0.893
0.646	0.030	7.393	7.443	-0.007
0.550	0.081	15.245	25.152	-0.650
0.755	0.036	9.312	9.131	0.019
0.631	0.067	12.703	14.309	-0.126
0.637	0.069	13.352	15.550	-0.165
0.567	0.065	10.979	12.105	-0.103
0.668	0.052	10.334	10.050	0.028
0.630	0.085	19.530	35.035	-0.794
0.880	0.047	12.621	12.247	0.030
0.923	0.050	13.845	13.506	0.025
0.946	0.038	11.975	11.732	0.020
0.729	0.046	10.305	9.929	0.036
0.695	0.055	11.280	11.138	0.013
0.849	0.053	13.343	13.098	0.018
0.713	0.055	11.573	11.430	0.012

Note: $\overline{D/E} = 0.61$

$\bar{g} = 0.061$

$\bar{\rho} = .12$

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growth estimate had to be less than the risk-free rate $\tilde{\rho}$, which we chose to be 12% since this was indicative of rates on long-term U. S. government securities in the 1981-83 period. The use of this criterion meant that we excluded certain industrial firms with extremely high growth expectations; it had no effect on our choice of utility company values. We included observations from all three years of our study.

On the basis of this investigation and our further statistical tests, we believe that at least three conclusions regarding the accuracy of the linear approximation are justified:

1. The linear approximation is reasonably accurate for sample values of the independent variables centered around the mean observations.
2. The linear approximation is considerably more reasonable for the utility sample than it is for the industrial sample (which helps to explain why the R^2s in the utility regressions are higher).
3. The accuracy of the linear approximation can be improved by eliminating extreme observations.

Possible Misspecification of Risk

Since the stock valuation theory says nothing about which risk variables are most important to investors, we need to consider the possibility that the risk variables of our study are actually only proxies for the "true" risk variables used by investors. It is well known that 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.[7]

[7] See Maddala, G.S., Econometrics, McGraw-Hill Book Company, New York, 1977, pp. 158-162.

Table 6 (Part A)

Regression Results -- Industrials
Model II - with P/E as Dependent Variable

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	-0.59 (.39)	15.40 (7.48)*	31.33 (4.93)*	.30	30.30
1982	-0.31 (0.15)	17.97 (9.03)*	40.75 (4.30)*	.36	40.79
1983	2.09 (1.14)	19.03 (8.89)*	22.17 (2.81)*	.37	41.80

Part B: Analysts

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

Year	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	R^2	F Ratio
1981	-10.99 (6.34)*	16.88 (10.46)*	95.31 (10.31)*	.57	88.79
1982	-17.60 (6.52)*	18.30 (12.16)*	172.41 (9.68)*	.59	98.58
1983	-9.95 (4.85)*	19.28 (11.86)*	111.00 (8.40)*	.58	92.79

Notes:
* = Coefficient is significant at the 5% level (using a 1-tailed test) and has the correct sign.

The t-statistic is indicated in parentheses.

Table 6 (Part B)

Regression Results - Utilities
Model II - with P/E as Dependent Variable

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 (1.61)	9.59 (12.13)*	21.20 (7.05)*	.73	82.95
1982	0.54 (1.38)	8.92 (17.73)*	12.18 (6.95)*	.83	167.97
1983	-0.75 (1.13)	8.92 (12.38)*	12.18 (7.94)*	.77	107.82

Part B: Analysts

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

Year	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	R^2	F Ratio
1981	3.96 (8.31)*	10.07 (20.91)*	60.53 (15.79)*	.90	274.16
1982	-1.75 (4.00)*	9.19 (21.35)*	44.92 (11.06)*	.88	246.36
1983	-4.97 (6.93)*	10.95 (15.93)*	82.02 (11.02)*	.83	168.28

Notes:
* = Coefficient is significant at the 5% level (using a 1-tailed test) and has the correct sign.

The t-statistic is indicated in parentheses.

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 regression equation (4) with the risk variables excluded. The results of these regressions are shown in Table 6 (Parts A and B). 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 database 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 database, we have conducted extensive studies that 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 those valuation models whose input includes expected growth rates.

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THE ACCURACY OF LONG-TERM EARNINGS FORECASTS IN THE ELECTRIC UTILITY INDUSTRY

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This paper examines the accuracy of various methods of forecasting long-term earnings growth for firms in the electric utility industry. In addition to a number of extrapolative techniques, *Value Line* analyst forecasts are also evaluated. *Value Line* analyst forecasts for a five-year time horizon are found to be superior to many of the extrapolative models. Among the extrapolative models examined, implied growth and historical book value per share growth rate models performed best. These results provide strong support for using *Value Line* growth forecasts in cost of capital estimates for electric utilities in the context of utility rate cases. *Value Line* forecast errors could be explained by changes in dividend payout ratios, the firm's regulatory environment and bond rating changes.

Keywords: Earnings forecasting, Utility forecasting, Analysts' forecasts, Electric utilities.

1. Introduction

A central issue in most public utility rate cases is the determination of the cost of equity capital for the utility. In the regulatory process the return required by investors is considered a legitimate cost of doing business that is appropriately charged to customers. Other things being equal, the lower the rate of return which a utility is permitted to earn from its customers, the higher the level of customer welfare. However, if the utility does not have the opportunity to earn investor-required rates of return on capital, investment in plant and equipment will lag and the demand for service at the established price will be greater than the utility can supply. Accordingly, it is important to permit a utility to earn a fair return on its invested capital in order to assure that adequate levels of service will be provided.

Two landmark judicial decisions have provided the general framework within which this analysis must be done. The Supreme Court concluded in the Bluefield Water Works case [Bluefield Water Works (1923)] that the 'return must be reasonably sufficient to ... support its credit and enable it to raise the money necessary for the proper discharge of its public duties.' Recognition must be given to the returns currently earned 'on investments in other business undertakings which are attended by

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corresponding risks and uncertainties ...'. In the Hope Natural Gas case [Federal Power Commission (1944)] the Supreme Court stated that the return must also enable a firm to 'maintain its credit and attract capital'.

These judicial guidelines provide a general framework for implementing the determination of the cost of equity capital in utility rate cases. Neither the Hope nor the Bluefield decisions provides guidance about what specific method(s) should be used to establish the cost of equity. In the Hope case, the Court stated that 'under the statutory standard of 'just and reasonable' it is the result reached not the method employed which is controlling' [Federal Power Commission (1944, p. 603)].

In contrast, the rich academic literature in this area has emphasized the appropriateness of various methods employed to determine the cost of equity capital [Brigham and Gordon (1968), Elton and Gruber (1971), Gordon (1974), Gordon and Gould (1978), Litzenberger, Ramaswamy and Sosin (1980), Myers (1972) and Robichek, Higgins and Kinsman (1973)]. In practice, three models have dominated recent utility rate cases. These are the capital asset pricing model, the comparable earnings model, and the constant-growth form of the dividend valuation model (often called the DCF or discounted cash flow methodology).

This paper focuses on the DCF model as it is commonly applied in utility rate cases. Specifically, we examine the long-term accuracy of a number of forecasting techniques which are used to estimate the growth rate component in the DCF cost of equity model. [1] Based on a rational expectations view of the formation of investor expectations, [2] we find support for the use of *Value Line* analyst forecasts, [3] implied growth techniques, and historical book value growth rate models. However, *Value Line* forecast accuracy deteriorates significantly if the forecast is evaluated over a three or four year time horizon rather than the maximum five year horizon reported by *Value Line*.

Section 2 of the paper develops the DCF model as it is normally applied in rate cases. Section 3 describes the data used, and Section 4 discusses the various forecasting techniques tested. In Section 5 the statistical tests used in the analysis are discussed; Section 6 presents the results of the tests. Section 7 reports the results of tests conducted to explain the errors in *Value Line* analyst forecasts. Section 8 offers conclusions and implications.

2. The DCF model

The DCF model of valuation is based on the proposition that the value of a share of stock is equal to the present value of all expected future dividends, discounted at the shareholders' required rate of return. Expert witnesses in utility rate cases commonly rely on a constant growth form of the basic dividend valuation model, such as $k_e = D_1/P_0 + g$, as the basis for their cost of equity recommendations. [4] Expert witnesses do so because it is thought that many utility firms meet or nearly meet the requirements necessary to use the constant growth DCF model. Whether the constant growth DCF

[1] There is an extensive literature, including Brown and Rozeff (1978), Cragg and Malkiel (1968), Elton and Gruber (1972), Johnson and Schmitt (1974) and Ruland (1980) that considers the accuracy of short-term forecasting models. With the exception of a recent paper by Rozeff (1983), there has been very little analysis of the accuracy of long-term earnings forecasts.

[2] We use the term 'rational expectations' in the same sense as Sargent (1972, p. 74), and Brown and Rozeff (1978, p. 1). We use the term, basically, to mean that rational investors' expectations are the same as the best availabe forecasts.

[3] *Value Line* is a well-known, widely available, investment advisory service which is published quarterly and includes, among other things, five year earnings forecasts for the over 1700 firms followed by the service.

[4] Twenty-four witnesses who were authorities on the cost of capital testified before the Federal Energy Regulatory Commission in eleven separate rate cases between 1980 and 1982. An analysis of their testimony showed that all used $k_e = D_1/P_0 + g$ as the basis of their DCF analysis, where k_e is the cost of equity capital, D_1 is dividends expected over the next period, P_0 is the current market price of the firm's stock and g is the long-term perpetual growth rate in dividends.

model or the non-constant growth model is employed, long-term (three to five year) earnings and dividend growth forecasts are essential inputs.

The application of this model invariably results in considerable controversy among expert witnesses regarding the appropriate method by which to estimate the growth (g) component. Theoretically, this growth component is the growth rate expected by investors at the margin. Since expectations cannot be directly observed, experts focus on a wide range of alternative techniques as a proxy for g. According to the rational expectations hypothesis [Sargent (1972)], the best forecasting method should be used to estimate g. In practice, proxies for g have included historical earnings and dividend growth rates, historical book value growth rates, implied growth rates (the product of the retention ratio times the return on book equity), and analysts' forecasts such as *Value Line*.

This paper examines the long-term accuracy of different methods of forecasting earnings growth of electric utility corporations and compares the results with *Value Line* forecasts of future earnings growth. On an ex-post basis the different methods are evaluated to determine the most accurate, long-range (three to five year) forecast. [5]

3. The data

The sample consists of the ninety-eight electric utilities that *Value Line* followed between 1971 and 1976 and the ninety-three electric utilities followed by *Value Line* between 1977 and 1982. Per share data have been adjusted for stock splits and dividends. Generally, *Value Line* reports on each firm four times a year. The *Value Line* data come from its second quarterly report of each year since this is the first *Value Line* report which generally includes actual data for the previous year. For example, *Value Line* earnings forecasts for 1976 are those reported in its second quarterly report in 1972.

All data, both actual earnings and forecasts of earnings, have been converted to compound annual growth rates. Hence, all comparisons of forecast accuracy are based on annual growth rates. Two five-year forecast horizons are used in the analysis: 1971–1976 and 1977–1982. *Value Line* makes its earnings per share forecasts for a three-year range, e.g., the forecast made in 1972 (which is conditional on actual 1971 data) is for the 1974–1976 time period. Thus, forecasted *Value Line* growth rates can be computed assuming a three, four, or five-year horizon. We considered each possible *Value Line* horizon in the paper, i.e., earnings forecasting accuracy is evaluated for the 1971–1974, 1971–1975 and the 1971–1976 time periods, as well as the 1977–1980, 1977–1981, and the 1977–1982 time periods.

These time periods are especially important for the electric utility industry because of the unsettled conditions prevailing in that industry through the 1970s. These conditions include the effects of rapidly escalating fuel costs, the need to convert large amounts of capacity from natural gas and oil to coal and nuclear power, and the impact of high inflation and rapidly rising capital costs.

4. Forecasting methods

The forecasting methods tested have been selected for analysis because of their use in prior studies and because of the extent to which they are commonly used in utility rate cases. These methods are:

X2. *Value Line* 3, 4, and 5-year earnings forecast.

X3. The 5-year historical compound dividend per share growth rate; for example, the 1971–1976 forecast horizon uses the actual annual compound growth rate from 1966–1971.

[5] The three to five year horizon was chosen since this is the longest forecast horizon available from *Value Line* analysis.

X4. The 5-year historical compound earnings per share growth rate.
X5. The 5-year historical compound book value per share growth rate.
X6. The 10-year historical compound dividend per share growth rate.
X7. The 10-year historical compound earnings per share growth rate.
X8. The 10-year historical compound book value per share growth rate.
X9. The 5-year average implied earnings growth rate, i.e., the 5-year historical average return on equity times the 5-year historical average retention rate.
X10. The 10-year average implied earnings growth rate.
X11. The current implied earnings growth rate (e.g., the implied growth rate for the 1971–1976 forecasting horizon is equal to the return on equity in 1971 times the 1971 retention rate).
X12. Brigham–Shome method of smoothing to compute the implied earnings growth rate [Brigham and Shome (1981)]; for example, the implied growth rate for the 1971–1976 forecasting horizon is equal to smoothed ROE times smoothed retention rate and the smoothed ROE is computed as

$$0.1 ROE_{t-4} + 0.2 ROE_{t-3} + 0.3 ROE_{t-2} + 0.4 ROE_{t-1} = ROE \text{ forecast.}$$

A similar computation is done for the retention rate forecast.

X13. The growth rate computed from the following trend line in book value per share (BPS) over a five year period

$$\ln BPS = a + bt.$$

X14. Same as X13 except for the use of 10 years of historical data.
X15. The growth rate computed from a trend line in dividends per share over a 5-year period.
X16. Same as X15 except for the use of 10 years of historical data.
X17. The growth rate computed from a trend line in earnings per share over a 5-year period.
X18. Same as X17 except for the use of 10 years of historical data.

X1 is defined as the actual 3, 4 or 5-year compound annual growth rate in earnings per share, e.g., the growth rate for the 1971 to 1976 time horizon is the actual compound annual growth computed using 1971 earnings per share as the start point and 1976 earnings per share as the end point. Similar computations are made for each horizon.

5. Statistical tests

First we examined the directional relationship between individual forecasts and actual earnings per share (EPS) growth rates. Kendall rank order correlations were calculated between the forecasted growth rates for each of the forecasting methods and the actual earnings growth rates. Next, similar to Rozeff (1983), the average deviation (average forecast growth minus average actual growth), mean absolute error ($MABE$) and root mean square error ($RMSE$) were calculated for each forecasting method. The $MABE$ is the sample average of the absolute value of the forecast error calculated for each forecast method on the entire sample of firms. The $RMSE$ is the square root of the sample average of the squared forecast error. As such, $RMSE$ gives more weight to large forecast errors than does $MABE$.

A method similar to that used by Brown and Rozeff (1978) was employed to test for significant differences in the accuracy of each forecasting model and of *Value Line*. The measure of forecast accuracy used was the absolute value of the difference between forecasted growth in EPS for each of n forecast methods (for each time horizon) over t firms (g_{tn}) and actual growth in EPS over the same horizon (a_t), or $|g_{tn} - a_t|$. The forecast errors were then compared across firms.

We used the Friedman test [Friedman (1937)] to test for the relative accuracy of all forecasting methods. The test criterion was the magnitude of forecast error. In practice the distribution of the Friedman test statistic is usually approximated by the chi-square distribution as in Brown and Rozeff (1978), but recent studies by Iman and Davenport (1980) show that the F-distribution approximation is superior to the chi-square approximation. Hence, the F-distribution approximation to the Friedman test is employed to test the null hypothesis that all seventeen forecasts are equally accurate. If the null hypothesis is rejected, we may conclude that at least one forecasting method is superior to at least one other.

The next step in evaluating the relative accuracy of the forecasting methods was to compare forecast accuracy across firms using pairwise comparisons between forecasts. These comparisons test the accuracy of a method's forecasts against each of the other methods' forecasts using a least significant difference test statistic developed by Conover (1980, p. 300). The Wilcoxian signed ranks test can also be used for these pairwise comparisons as in Brown and Rozeff (1978), but this least significant difference test is more powerful [Conover (1980)]. The null hypothesis tested is that one method's forecasts are as accurate as another method's forecasts.

6. Empirical results

Exhibit 1 reports the Kendall rank order correlations between each of the forecasting methods and the actual earnings per share growth for the two five-year forecast horizons. In both five-year periods,

Exhibit 1
Kendall rank order correlations between actual 5-year annual earnings growth rates and earnings forecasts

Method	Period 1 (1971–1976)	Period 2 (1977–1982)
X2	0.214 [a]	0.269 [a]
X3	−0.153 [b]	−0.118 [c]
X4	−0.093	−0.058
X5	0.013	0.151 [b]
X6	0.021	0.105
X7	−0.020	0.084
X8	0.013	0.033
X9	−0.137 [b]	0.078
X10	−0.091	0.042
X11	−0.209 [c]	−0.164 [b]
X12	−0.149 [b]	0.024
X13	−0.010	0.112
X14	0.006	0.077
X15	0.020	0.193 [c]
X16	0.007	0.109
X17	−0.112 [c]	−0.108
X18	−0.085	0.065

[a] Significant at 1% or better.
[b] Significant at 5%.
[c] Significant at 10%.

Exhibit 2
Summary of error statistics 1971–1976.

Method	Average deviation (forecast–actual)	*MABE*	*RMSE*
X2	0.021	0.036	0.044
X3	−0.013	0.047	0.066
X4	0.013	0.042	0.053
X5	0.006	0.038	0.051
X6	0.016	0.039	0.048
X7	0.003	0.037	0.046
X8	0.013	0.039	0.050
X9	−0.002	0.036	0.046
X10	0.000	0.035	0.045
X11	−0.007	0.040	0.056
X12	−0.004	0.037	0.049
X13	0.007	0.038	0.046
X14	0.009	0.036	0.045
X15	0.000	0.038	0.050
X16	0.015	0.039	0.047
X17	−0.017	0.050	0.070
X18	0.007	0.040	0.050

Value Line forecasts (X2) are positively and significantly correlated with actual earnings growth.

In period 1, no other forecasting method is both significant and positively correlated with actual earnings growth. In period 2, methods X5 (five-year compound book value per share growth) and X15 (five-year trend line growth in dividends per share) also have statistically significant positive correlations.

Exhibit 1 provides strong cross-sectional evidence of the superiority of *Value Line* forecasts in capturing movement in the *direction* of earnings growth rates. Thus, *Value Line* forecasts higher growth for firms which later show higher growth, and lower growth for firms which later show lower growth. During the highly unstable periods included in the forecast horizons, only *Value Line* forecasts consistently reflected the direction of movement in actual earnings growth rates for the electric utility industry.

Exhibit 1 does not, however, show any indication of the accuracy of *Value Line* relative to alternative forecasting techniques. From a cost of capital perspective, accuracy in forecasting is of greatest importance. Exhibits 2 and 3 report the average deviation, mean absolute error and root mean square error for the two five-year forecast horizons.

The *Value Line* average deviation is the largest in period 1 at 2.1%, but the lowest in period 2 at 1%. In both periods it is positive, indicating that *Value Line* forecasts tend to be on the high side. Hence, it appears that in the long-term (five years) *Value Line* is relatively successful in forecasting the *direction* of future earnings movements, but there is a tendency to overestimate the size of this earnings growth. In order to verify this initial conclusion we next look at two other measures of overall forecasting accuracy – the *MABE* and *RMSE*.

Value Line has a relatively low *MABE* in period 1. Only X10 (ten-year average implied growth of *EPS*) is lower; X9 (five-year average implied growth) and X14 (ten-year trend line growth in book value) are equivalent. In period 2 *Value Line* has the lowest *MABE*. *Value Line* appears even better when accuracy is evaluated using *RMSE*. In both periods *Value Line* has the lowest *RMSE*.

Thus, in addition to forecasting successfully the direction of movement, *Value Line* is relatively accurate as a predictor of the future growth rate itself. Its forecasts tend to be on the high side but when compared to the sixteen mechanical forecasting methods, it is among the most accurate.

Exhibit 3
Summary of error statistics 1977–1982.

Method	Average deviation (forecast–actual)	*MABE*	*RMSE*
X2	0.010	0.039	0.059
X3	−0.030	0.067	0.094
X4	−0.019	0.053	0.075
X5	−0.013	0.044	0.063
X6	−0.013	0.044	0.063
X7	−0.024	0.051	0.070
X8	−0.011	0.045	0.065
X9	−0.016	0.046	0.067
X10	−0.013	0.045	0.065
X11	−0.015	0.052	0.074
X12	−0.017	0.048	0.070
X13	−0.027	0.052	0.070
X14	−0.014	0.045	0.065
X15	−0.012	0.045	0.068
X16	−0.016	0.046	0.065
X17	−0.015	0.065	0.093
X18	−0.020	0.049	0.071

Finally, we consider two statistical tests of relative accuracy – the Friedman test and the least significant difference test. Exhibits 4 and 5 report the results from these two tests for periods 1 and 2 respectively. The Friedman test rejects the null hypothesis at the 1% level for both periods. Thus, the alternative hypothesis that at least one forecasting method is more accurate than at least one other forecasting method may be accepted.

The least significant difference test of the multiple pairwise comparisons is performed at a 5% significance level. The results indicate that *Value Line* is dominated only by X10 (ten-year average implied growth) in period 1 and is not dominated by any forecasting method in period 2.

Several of the forecasting methods performed exceedingly well in the multiple pairwise comparisons. X5, X8 (five and ten-year compound book value per share growth), X9, X10 (five and ten-year average implied growth), X14 (ten-year trend line growth in book value), and X15 (five-year trend line growth in dividends) are not dominated by any other forecasting method in either period.

In summary, *Value Line* performs very well relative to the 16 extrapolative forecasting methods in the five-year forecast horizons. It is relatively successful at forecasting the direction of future earnings growth. Also, the *MABE*, *RMSE*, and multiple pairwise comparisons indicate that *Value Line* is relatively accurate in predicting the actual future growth rate.

Value Line forecasts are made for a three to five-year forecast horizon. The preceding results have focused on the five-year horizon. Identical statistical tests were performed for two three-year horizons (1971–1974 and 1977–1980) and two four-year horizons (1971–1975 and 1977–1981). Because *Value Line* forecasts per share earnings for a three to five-year horizon, the calculated growth rate will be greater the shorter the horizon. Since the *Value Line* forecasts tended to overestimate the actual growth rate for five-year horizons, one would expect the same dollar earnings forecast for a three or four-year horizon to perform less well.

The correlation results for three and four-year horizons are similar to those for five years. *Value Line* forecasts are positively and significantly correlated with actual earnings growth in both periods for both the three and four-year horizons. In addition to *Value Line*, only X5 and X10 are significant

Exhibit 4
Multiple pairwise comparisons period 1 (1971-1976) [a]

	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	Times superior	Times inferior
X2			+						–									1	1
X3								–	–		–		–	–				0	5
X4	–			–		–	–	–	–	–	–		–	–				0	10
X5			+													+		2	0
X6								–	–									0	2
X7			+													+		2	0
X8			+													+		2	0
X9		+	+		+							+			+	+	+	7	0
X10	+	+	+		+							+			+	+	+	8	0
X11			+													+		2	0
X12		+	+													+		3	0
X13								–	–									0	2
X14		+	+													+		3	0
X15		+	+													+		3	0
X16								–	–									0	2
X17				–		–	–	–	–	–	–		–	–				0	9
X18								–	–									0	2

[a] Friedman test. F-value is 2.63, significant at 1% level. A plus sign (negative sign) in the table indicates the forecast method represented by the row is superior (inferior) to the forecast method represented by the column at a significance level of 5%.

Exhibit 5
Multiple pairwise comparisons period 2 (1977-1982). [a]

	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	Times superior	Times inferior
X2		+	+			+				+		+				+		6	0
X3	–			–	–	–	–	–	–	–	–	–	–	–	–		–	0	14
X4	–			–	–		–	–	–		–		–	–	–		–	0	11
X5		+	+			+				+		+				+	+	7	0
X6		+	+			+				+		+				+	+	7	0
X7	–	+		–	–		–	–	–		–		–	–	–			1	10
X8		+	+			+				+		+				+		6	0
X9		+	+			+				+		+				+		6	0
X10		+	+			+				+		+				+		6	0
X11	–	+		–	–		–	–	–				–	–	–			1	9
X12		+	+			+						+		–		+		5	1
X13	–	+		–	–		–	–	–		–		–	–	–			1	10
X14		+	+			+				+		+				+		6	0
X15		+	+			+				+	+	+				+	+	8	0
X16		+	+			+				+		+				+		6	0
X17	–			–	–		–	–	–		–		–	–	–		–	0	11
X18		+	+	–	–									–		+		3	3

[a] Friedman test. F-value is 8.24, significant at 1% level. A plus sign (negative sign) in the table indicates the forecast method represented by the row is superior (inferior) to the forecast method represented by the column at a significance level of 5%.

and positively correlated. Moreover, this phenomenon persists only in period 2 for three and four-year horizons.

The average deviation, *MABE*, and *RMSE* show *Value Line*'s forecast to decline appreciably in relative accuracy. With the exception of the *RMSE* in period 2 of the three and four-year horizons, *Value Line* is outperformed in these measures of relative accuracy by all or most of the sixteen forecasting methods.

The multiple pairwise comparisons for the four-year horizon still show *Value Line* to be relatively accurate. It is less accurate than only one method in both periods. However, for the three-year horizon, it is less accurate than all the other methods in period 1 and less accurate than 14 of 16 methods in period 2. [6]

These results indicate that, whether it is intentional or not, *Value Line* tends to forecast most accurately to the five-year end of their three to five-year forecast horizon. In forecasting earnings for a five-year horizon, *Value Line* is very successful relative to the sixteen extrapolative forecasting methods examined in this study.

7. Error analysis of value line forecasts

The results reported in section 6 indicate that *Value Line* earnings growth rate forecasts for a five-year horizon are significantly, positively correlated with actual earnings growth rates. In addition, *Value Line* forecasts have mean absolute errors and root mean square errors which are among the lowest when compared with the sixteen extrapolative models. The multiple pairwise comparison tests reported in exhibits 4 and 5 indicate that *Value Line* forecasts are less accurate than only one other forecast method in the 1971-1976 period, and are not less accurate than any other method during the 1977-1982 period.

In this section we perform a micro-analysis of errors in order to discover causes for over and under-estimates of forecasted earnings growth rates made by *Value Line*. This analysis can help users of *Value Line* earnings forecasts to identify instances where *Value Line* forecasts are likely to be least reliable.

We have examined a number of firm-specific/regulatory environment variables which might be expected to influence the accuracy of *Value Line* forecasts. These variables are

(1) *Regulatory environment. Value Line* rates the regulatory environment faced by each firm as either above average, average, or below average. It is possible that regulatory environments that are perceived to be more (less) favorable cause the analysts to over-(under-)estimate actual earnings growth potential for the firm. Two dummy variables are used to represent regulatory environment at the end of each forecast horizon ($D_1 = 1$ if above average, 0 otherwise; $D_2 = 1$ if average, 0 otherwise; below average is the excluded class).

(2) *Percent of electric revenues from residential customers* (measured at the end of each forecast horizon). Residential electric revenue is less subject to cyclical fluctuations than commercial and industrial electric revenue. Hence, firms with a high proportion of residential demand might be expected to have more stable and easily forecasted earnings.

(3) *Percent of revenues from electric sales* (measured at the end of each forecast horizon). Some firms in the sample had a significant portion of total revenues attributable to natural gas distribution services and/or other diversified business efforts. During the 1971-1982 time period, natural gas demand was highly volatile because of shortages and large price increases. Hence, firms that

[6] Complete statistical results for the three and four-year horizons are available on request from the authors.

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concentrated on providing electric service might also be expected to have more stable and easily forecasted earnings.

(4) *Percent of generation from oil and gas capacity* (measured at the end of each forecast horizon). Oil and gas prices increased dramatically during the time periods examined, and not all firms had the benefit of perfectly effective fuel adjustment clauses. Hence, it is hypothesized that those firms with a greater proportion of oil and gas generating capacity were faced with more volatile and less easily forecasted earnings during this period.

(5) *Nuclear construction.* Firms with a significant nuclear construction program [defined with a dummy variable (D_3) as a firm having a greater than 10% ownership interest in a nuclear plant under construction at the end of each forecast horizon] were expected to have more volatile and less easily forecasted earnings than non-nuclear firms. This is particularly true during the 1977–1982 period when, following the accident at Three Mile Island, the Nuclear Regulatory Agency ordered plant shutdowns. At that time, also, cancelled projects began to affect adversely the earnings of electric utilities.

(6) *Percentage change in dividend payout ratio* (defined as the 1976 payout ratio minus the 1971 payout ratio for the first period and the 1982 payout ratio minus the 1977 payout ratio for the second period). An increase in the payout ratio reduces funds for reinvestment in the firm and is hypothesized to be directly related to overestimates of earnings made by *Value Line*.

(7) *Percentage change in net plant* (measured as the percentage increase (decrease) in net plant over the period). The hypothesized direction of the effect of this variable is indeterminant since a rapid growth in net plant might be associated with growth in demand and future earnings. Alternatively, firms with large construction programs during the 1970s and 1980s have been under heavy financing and regulatory pressures that have negatively influenced earnings.

(8) *Change in bond ratings* (measured from the beginning to the end of each period by two dummy variables: $D_4 = 1$ if downgraded by Moody's, 0 otherwise; $D_5 = 1$ if upgraded by Moody's, 0 otherwise; firms with no rating change are the excluded set). When a firm is upgraded (downgraded), this indicates an improvement (decline) in its financial profile. Hence, upgradings (downgradings) might be associated with underestimates (overestimates) of future earnings.

(9) *Coefficient of variation of earnings per share* (measured over the ten years prior to the start of each forecast horizon). Highly volatile earnings are expected to be positively related to *Value Line* earnings forecasting errors.

For each forecasting horizon (1971–1976 and 1977–1982), two regressions were run using the above independent variables and (1) positive forecasting errors (*Value Line* minus actual) and (2) negative forecasting errors as the dependent variables.

During the 1971–1976 period, the factors identified above explained 24% (adjusted) of the variation in the positive *Value Line* errors and 13% (adjusted) of the variation in negative *Value Line* errors. The only factor significant at the 5% or better level was the percentage change in the payout ratio. Increases in a firm's payout ratio were significantly associated with overestimates of earnings (positive errors) made by *Value Line* analysts. This result is consistent with the support found for the use of implied growth techniques for forecasting future earnings. No factors were found to be statistically significant in explaining negative *Value Line* forecast errors during the 1971–1976 period.

During the 1977–1982 horizon, the percentage change in the payout ratio again was associated significantly with positive *Value Line* errors. In addition, there was a significant, positive relationship between bond downgradings and positive *Value Line* errors. Negative *Value Line* errors were significantly associated with bond upgradings. There was also evidence that *Value Line* significantly underestimated future earnings growth for firms with a high coefficient of variation of earnings.

In sum, this evidence suggests the *Value Line* earnings forecasts adequately consider each of the

factors identified above except the impact of changes in a firm's dividend payout ratio, the effects of bond rating changes, and, to a lesser extent, the volatility of past earnings. Consequently, users of *Value Line* data should be aware of potential biases in *Value Line* earnings forecasts for firms likely to change significantly their dividend payout policy, for firms likely to have a bond downgrading or upgrading over the forrecast horizon, and for firms with historically volatile earnings. Unfortunately, forecasting changes in dividend payout ratios and bond ratings is itself a difficult matter. It can be noted, however, that although the explanatory variables examined were not generally significantly correlated with each other, there were significantly positive (+0.287 and +0.317) correlations between downgradings and nuclear construction during the 1971–1976 and 1977–1982 period respectively) and significantly negative correlations (−0.212 and −0.170) between upgradings and nuclear construction. This suggests that *Value Line* earnings forecasts were less reliable for firms with significant nuclear construction programs. Additional support for this fact can be inferred by observing that during the 1977–1982 time period, 62% (32 of 52) of the firms whose earnings were overestimated by *Value Line*, were involved with nuclear construction while only 37% (14 of 38) of the firms where *Value Line* underestimated earnings were involved with nuclear construction.

8. Summary

Value Line performed very well in forecasting earnings per share in the 1971–1976 and 1977–1982 time horizons relative to extrapolative forecasting methods. It was clearly superior in forecasting the direction of future earnings growth and provided forecasts that were among the best when evaluated using various tests of accuracy. Among the extrapolative models, implied growth and historical book value growth rate models performed best.

The results are from two specific past time periods, but *Value Line* performed consistently well in both periods. The evidence supports the use of five-year *Value Line* earnings forecasts as an estimate of future growth rates in future cost of capital rate cases. *Value Line* forecasts based on three and four-year time horizons appear to have a significant upward bias.

The results of the micro-analysis of *Value Line* forecast errors might assist users to detect biases in the *Value Line* forecasts. In this study *Value Line* forecasts overestimated future earnings when firms increased their payout ratios or if a firm's bonds were downgraded. They underestimated when a firm's bonds were upgraded or if a firm had very volatile earnings prior to the beginning of the forecast horizon. As is true with all empirical studies, the results may pertain only to the industry and time-periods studied. Additional work is needed to ascertain whether the findings will prove applicable to other industries, time-periods, and analyses.

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Predicting Long-term Earnings Growth: Comparisons of Expected Return Models, Submartingales and Value Line Analysts

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ABSTRACT

This paper derives four-five year predictions of growth rates of accounting earnings per share implicit in four expected return models commonly used in financial research. A comparison of such growth rates with those produced and reported by Value Line analysts and those generated by a submartingale model revealed the following: two expected return models—the Sharpe-Lintner-Mossin model and the Black model—were significantly more accurate than the submartingale model, though not significantly more accurate than the other return models. However, the growth rate forecasts provided by Value Line significantly outperformed all the other models tested—none of which relied on the direct input of a security analyst.

KEY WORDS Forecasting Earnings growth Comparisons Empirical study Analysts Value Line

An extensive body of literature evaluates the short-run (less than 15 months) earnings forecasts of security analysts and time-series models.[1] The importance of this subject to accounting and finance is that a variety of applications such as firm valuation, cost of capital, and event studies require the measurement of earnings expectations. However, except for a recent paper by Moyer *et al.* (1983), little work has been done to this point in studying long-run earnings forecasts. Moreover, a potential source of earnings forecasts—expected return models—has been overlooked.

This paper evaluates the accuracy of long-term forecasts of growth rates of annual earnings per share. Six sources of forecasts are used: a submartingale model, the *Value Line Investment Survey*, and four expected return models. Each expected return model is combined with the Gordon Shapiro constant growth model. Further, certain expected return models use the beta coefficient and, as such, lend insight into the usefulness of beta in a forecasting context.

The paper comprises three sections. Section 1 describes the six forecasting sources and states the

[1] See Cragg and Malkiel (1968), Elton and Gruber (1972), Barefield and Comiskey (1975), Brown and Rozeff (1978), Abdel-khalik and Thompson (1977-78), Crichfield *et al.* (1978), Givoly and Lakonishok (1979), Collins and Hopwood (1980), Jaggi (1980), Elton *et al.* (1981), Hopwood *et al.* (1981), Fried and Givoly (1982) and Imhoff and Pare (1982) for studies of analyst forecasts and time-series models. See Ball and Watts (1972), Brooks and Buckmaster (1976), Albrecht *et al.* (1977), Watts and Leftwich (1977), Foster (1977), Griffin (1977), Brown and Rozeff (1979), Lorek (1979), Hopwood and McKeown (1981), Hopwood *et al.* (1981) and Manegold (1981) for studies of the time-series properties of earnings.

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hypotheses. Tests of the hypotheses are presented in Section 2. Section 3 offers tentative conclusions.

1. FORECASTING SOURCES AND HYPOTHESES

This section (1) describes how six sets of growth rate forecasts of earnings per share are derived and (2) discusses the formal hypotheses to be tested.

Submartingale model

Evidence that measured annual accounting income is a submartingale or some similar process can be found in Ball and Watts (1972), Albrecht *et al.* (1977), and Watts and Leftwich (1977).[2] Although measured (reported) annual earnings per share may not be precisely a submartingale, a submartingale process is included because of its appearance in numerous studies as a benchmark forecasting technique. Another reason for including the submartingale model is to compare its forecasts to those reported in the *Value Line Investment Survey*. Such comparisons have been done for forecasts of three to fifteen months (Brown and Rozeff, 1978) but not forecasts of four to five years.

The submartingale model (SUB), as used here, estimates the expected annual growth rate of accounting earnings per share as the average compound annual rate of growth of earnings per share of the ten-year period preceding the test period. These historical growth data are obtained from various issues of the *Value Line Investment Survey*.

Value Line forecasts

The *Value Line Investment Survey* (VL) contains forecasts of earnings per share made by the Value Line security analysts for time periods four to five years into the future. After adjustment for capital changes, these forecasts, in conjunction with actual earnings per share in the base period, are converted to VL forecasts of a compound annual growth rate for each firm in the sample.

The importance of testing analyst forecasts is explained by Brown and Rozeff (1978). They argue that since analyst forecasts are purchased in a free market they are likely to be informed forecasts with a marginal value exceeding that of less costly forecast alternatives. According to this reasoning, the VL forecasts should be more accurate than the SUB forecasts and those derived from the expected return models (stated next).

Expected return model forecasts

A technique that has not previously been exploited to obtain earnings forecasts is to use expected stock rate of return models in conjunction with the Gordon–Shapiro (1956) constant growth model. This subsection shows how to extract earnings per share growth rate forecasts from these models. First, the four expected stock rate of return models are explained. Secondly, the paper proceeds to show how growth rate forecasts are obtained.

Four expected return models

The four models of how the market sets expected rates of return on securities are:

(1) the comparison returns (CMR) model (Masulis, 1980; Brown and Warner, 1980).
(2) the market adjusted returns (MAR) model (Latane and Jones, 1979; Brown and Warner, 1980).
(3) the Sharpe–Lintner–Mossin (SLM) model (Sharpe, 1964; Lintner, 1965; Mossin, 1966).
(4) the Black (BLK) model (Black, 1972).

[2] For example, Ball and Watts (1972, p 680) conclude: 'Consequently, our conclusion . . . is that income can be characterized on average as a submartingale or some similar process.'

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The CMR model assumes that the expected return on stock i at time T ($E(R_{iT})$) is an expectation that is specific to each security. However, a risk parameter such as the beta coefficient is not explicitly included in the expected return calculation. Instead, the expected stock return at time T is measured as the arithmetic mean of the realized returns of the stock in a prior period. To the extent that individual means of stock return distributions differ as a reflection of risk differences, the CMR model allows for individual differences in risk. This model (see Masulis, 1980) has been tested by Brown and Warner (1980) who found that it compared favourably with alternative expected return models in detecting abnormal performance.

The MAR model states that the expected return on stock i at time T equals the expected return on the market (denoted $E(R_{MT})$), which is the same for all stocks. As for the CMR model, no beta coefficient is used in calculating expected returns. However, unlike the CMR model, the MAR model does not allow for individual risk differences among stocks, since all stocks are assumed to have the same expected return, namely, the expected market return. To estimate expected market returns, an arithmetic average of past returns on the equally-weighted (Center for Research in Securities Prices) CRSP index is used.

The SLM model is infrequently referred to as the capital asset pricing model or CAPM. It is used in its *ex ante* form:

$$E(R_{iT}) = R_{fT} + [E(R_{MT}) - R_{fT}]\beta_i \tag{1}$$

where

R_{fT} = interest rate on a U.S. Treasury security over the forecast horizon,
β_i = beta coefficient of stock i expected to prevail over the forecast horizon.

This study examines two annual growth rate forecasts over two non-overlapping horizons of five years and four years. The five year forecast period is 1968–1972 and its base year is 1967. The four year forecast period is 1973–1976 and its base year is 1972. In estimating expected returns using the SLM model, R_{fT} for the forecast period 1968–1972 is taken as the yield-to-maturity on a five year U.S. Government security as of December 1967. Similarly, for the forecast period 1973–1976, R_{fT} is the yield-to-maturity on a four year U.S. Government security as of December 1972.[3]

$E(R_{MT})$ is estimated precisely in the same manner as in the CMR model, namely, as an average over past realized market returns.

The beta coefficients of individual stocks were estimated in two ways. First, the expected beta was measured as the historical beta coefficient of the stock over the 84 months up to and including month T. This beta was simply the covariance of the stock's returns with the market divided by the variance of the market's returns over the sample period. Secondly, in an attempt to obtain a more accurate estimate of the future expected beta, the tendency of betas to regress towards the value 1.0 noted by Blume (1971) was taken into account. The method for doing this is Blume's method.[4]

The last expected return model is the BLK model. This can be stated in *ex ante* form (Black, 1972) as:

$$E(R_{iT}) = E(R_{ZT}) + [E(R_{MT}) - E(R_{ZT})]\beta_i \tag{2}$$

where $E(R_{ZT})$ is the expected return on the minimum variance portfolio whose return is

[3] Schaefer (1977) points out the pitfalls of using yield-to-maturity as a surrogate for the interest rate on a no-coupon bond. Livingston and Jain (1982) estimate the biases involved. Since for bonds of maturity four to five years, the coupon bias is confortably small (of the order of ten basis points), the effect is neglected in this paper.

[4] For example, to adjust the betas computed over the 1961–1967 time period, the betas of all stocks on the CRSP file from the 1954–1960 period were regressed on the betas of the same stocks from the 1947–1953 period. The resulting regression coefficients were then used to adjust linearly the 1961–1967 betas.

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uncorrelated with the return on the market portfolio. Unlike R_{fT} in the SLM model, $E(R_{ZT})$ is not observable at time T. Historical returns are frequently used to estimate this model (Black *et al.*, 1972). When this is done, the BLK model can be written

$$E(R_{iT}) = \bar{\gamma}_0 + \bar{\gamma}_1 \beta_i \tag{3}$$

$\bar{\gamma}_0$ and $\bar{\gamma}_1$ are arithmetic averages of monthly estimates of $E(R_{ZT})$ and $E(R_{MT}) - E(R_{ZT})$. The estimation method of Fama and Macbeth (1973) was used to obtain the gamma estimates.[5]

The forecasting model can now be formulated by obtaining $\bar{\gamma}_0$ and $\bar{\gamma}_1$ as of time T and using these as estimates of future gammas. The procedure is legitimate since Fama and Macbeth have shown that the gamma variables are stationary and have autocorrelations that are essentially nil.

Obtaining growth rate forecasts

Suppressing the time subscript T for simplicity, the expected return of security i according to model j is denoted $E(R_{ij})$. Given the expected rate of return of security i from model j, each model's expected growth rate of earnings per share will be extracted by assuming that each firm possesses investment opportunities which are expected to provide a constant rate of growth of earnings in perpetuity. In other words, the 'constant growth' model is assumed to hold for each stock (Gordon and Shapiro, 1956, Miller and Modigliani, 1961).

Let g_{ip} be firm i's rate of price increase, g_{id} be its rate of growth of dividends per share, and g_{ie} be its rate of growth of earnings per share. In the constant growth model, the expected rate of return of security i is given by:

$$E(R_i) = \frac{\tilde{P}_{i1} + \tilde{D}_{i1} - P_{i0}}{P_{i0}} = \frac{\tilde{D}_{i1}}{P_{i0}} + \frac{\tilde{P}_{i1} - P_{i0}}{P_{i0}} \tag{4}$$

where

$\tilde{P}_{i1}$ = random end-of-period price per share
$\tilde{D}_{i1}$ = random end-of-period dividend per share
P_{i0} = current price per share
D_{i0} = current dividend per share.

Hence:

$$\frac{\tilde{D}_{i1}}{P_{i0}} + \frac{\tilde{P}_{i1} - P_{i0}}{P_{i0}} = \frac{D_{i0}(1 + g_{id})}{P_{i0}} + g_{ip} \tag{5}$$

Assuming $g_{id} = g_{ip} = g_i$

$$E(R_i) = \frac{D_{i0}(1 + g_i)}{P_{i0}} + g_i \tag{6}$$

A key assumption to obtain the constant growth is that the firm's payout ratio of dividends from earnings is constant. This ensures the equality of the growth rates of dividends, earnings, and price per share. Violation of the constant payout ratio assumption occurs for a variety of reasons such as a change in the firm's investment opportunities or a change in its financing mix. To the extent that the constant growth model fails to describe the firm's expected rate of return, the derived estimates of g_i will contain measurement error which will bias the tests against the expected return models.

[5] I am grateful to Gary Schlarbaum for supplying these estimates.

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Since each expected return model estimates $E(R_i)$ by $E(R_{ij})$, equation (6) can be solved to obtain model j's implicit forecast of g_i, denoted g_{ij} or:

$$g_{ij} = \frac{E(R_{ij}) - D_{i0}/P_{i0}}{1 + D_{i0}/P_{i0}} \tag{7}$$

Hence, by estimating $E(R_{ij})$ and observing the current dividend yield, a forecast by model j of the firm i's growth rate of earning per share, g_{ij}, is extracted.

Statement of hypotheses

The empirical results in this paper will be interpreted with reference to several hypotheses, which are presented and discussed below:

> *Hypothesis* 1. Expected return models that use *ex ante* information on stock beta coefficients contain implicit earnings per share growth rate forecasts that are not more accurate than the implicit earnings per share growth rate forecasts of expected return models that do not use information on beta coefficients.

The SLM and BLK models include beta information whereas the CMR and MAR models do not. Rejection of Hypothesis 1 means that the beta-based expected return models can be employed to obtain forecasts of earnings per share which are superior to those obtained from the non-beta stock return models. Assuming that earnings growth rates observed for a future period reflect the prices and the expected returns established at the start of the period, rejection of Hypothesis 1 provides an indication that the market, in setting expected returns, uses betas or their informational equivalent as opposed to neglecting betas as the CMR and MAR do.

The forecasts of the expected return models can also be compared with the SUB model forecasts. These comparisons provide a natural check on whether the expected return models combined with the constant growth model are producing forecasts that are reasonably competitive with the process which, at least approximately, generates annual earnings.

> *Hypothesis* 2. Expected return models contain implicit earnings per share growth rate forecasts that are not more accurate than the forecasts of the growth rate of earnings per share derived using the submartingale model of earnings.

A third test compares the forecasting ability of the VL model with the expected return models. If the procedure used in this paper to extract forecasts from the expected return models was efficient enough to extract forecasts that reflected all information available to the market, then the VL model forecasts would not be more accurate than the expected return model forecasts. Since the procedure used is clearly crude compared to the information processing of analysts, it is anticipated that Hypothesis 3 will be rejected in favour of VL.

> *Hypothesis* 3. The VL forecasts of the growth rate of earnings per share are no more accurate than the earnings forecasts of the expected return models.

Finally, since the lengthy literature comparing analyst forecasts with those of time series models is confined to short forecast horizons (see footnote 1), it is of interest to compare the VL forecasts with the SUB forecasts over the long forecast horizons used in this paper.

> *Hypothesis* 4. The VL forecasts of the growth rate of earnings per share are no more accurate than the forecasts of the SUB model.

Rejection of Hypothesis 4 in favour of VL superiority would provide further evidence of analyst forecast superiority relative to time-series models.

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2. TESTS OF HYPOTHESES

Samples

Two replications of the experiment were conducted. In the first, time T was year-end 1967 and forecasted earnings were for 1972. The first 253 firms (in alphabetical order) were selected from the CRSP tape which met the criteria: (1) return data available during 1961–1967; (2) covered by the *Value Line Investment Survey* as of December 1967; (3) December fiscal year; and (4) positive earnings per share in 1967 and 1972. The second replication set T at December 1972. The sample size was 348. The criteria were similar with the corresponding changes in dates, namely, return data available during 1966–1972 and positive earnings per share in the base year 1972 and test year 1976.

The reasons for these criteria follow. The requirement that a sample firm have return data on the CRSP tape in the base period allowed computation of the firm's beta coefficient using this data source. The firm had to be covered by the *Value Line Investment Survey* to allow forecast comparisons to be made. Use of the December fiscal year-end ensured that all six model forecasts were based on comparable amounts of data relative to the fiscal year. Furthermore, the VL model forecasts had to be conditional only on annual earnings of the base year. The requirements of positive earnings per share in the base and test years allowed for positive growth rates. (The positive earnings criterion, as it turned out, was not binding in the first test period. In the second period, ten firms were eliminated because of this criterion.)

Although it is unlikely that the sample selection procedures materially affected the outcomes of the experiments, they did result in noticeably less risky sample firms than the market as a whole. The average beta for both samples was 0.85. As such, the test results may not generalize to the entire population of firms.

Test procedures

Because January 1935 was the starting date for calculating the BLK model estimates, that date was the starting point for most of the other return calculations. Thus, in estimating the CMR model, a stock's mean monthly stock return was found by averaging its returns over the history of the stock available since January 1935. In estimating mean market returns, the average of monthly returns was found over the time period beginning in January 1935. The market index was the equally-weighted return index of all stocks on the CRSP tape. Finally, in estimating the gammas for the BLK model, the monthly averages were also taken over the period starting in 1935.[6]

The SLM model requires risk-free returns and, for this purpose, yields-to-maturity on U.S. Government Bonds of the relevant maturity were employed. The data source was *Moody's Municipal and Government Manual*.

Let a_i = growth rate of actual earnings per share for firm i and g_{ij} = growth rate of forecasted earnings per share for firm i by method j. In each test period, a vector of errors $|a_i - g_{ij}| = e_{ij}$ may be calculated for each method j, where e_{ij} is the absolute value of the difference between the forecasted and realized growth rates. For hypothesis tests of two models, an appropriate design is a one-sample or matched-pairs case with self-pairing by firm. The members of each pair are errors, e_{ij}, from the two models, which are reduced to a single observation by taking the difference in the errors. The t-test is the usual parametric test of the mean difference and the Wilcoxon signed ranks test is an alternative non-parametric test of the median difference. Both tests were conducted. But since the results were similar, only the paired t-test results are reported.

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[6] All tests were also conducted using mean returns calculated over the most recent 84 months. The results were essentially the same as those reported in the paper. If anything, the longer estimation period benefited the CMR model.

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Results

Table 1 contains summary statistics of the error distributions generated by the models when regression-adjusted betas were employed.

The average of deviations, $a_i - g_{ij}$, was computed for all sample firms. Such deviations measure the average bias of the forecast models. It appears that, in period 1, all the models tended to overforecast earnings growth. In period 2, the average deviation of the return models was slight, whereas VL tended to overforecast on average. However, the fraction of firms overestimated by VL (58.0 per cent) was quite close to the fractions for the other models. This suggests that the sample average deviation for VL was heavily influenced by a few firms.

Table 1. Summary statistics of error distributions*†

	Error measure	SUB	MAR	CMR	SLM	BLK	VL
	Average deviation	−0.001	−0.062	−0.051	−0.049	−0.051	−0.046
	MABE	0.115	0.112	0.117	0.105	0.106	0.088
Period 1,	MSE	0.046	0.032	0.034	0.031	0.031	0.018
1967–1972	RMSE	0.213	0.178	0.184	0.176	0.177	0.135
	% Forecasts overestimated	56.1	81.8	72.7	72.3	73.5	64.0
	Average deviation	0.040	−0.002	0.012	0.011	0.008	−0.030
	MABE	0.146	0.140	0.147	0.137	0.137	0.118
Period 2,	MSE	0.071	0.067	0.070	0.066	0.066	0.031
1972–1976	RMSE	0.266	0.258	0.265	0.256	0.256	0.175
	% Forecasts overestimated	47.2	58.9	53.4	52.9	53.7	58.0

* MAR = Market adjusted return; SUB = Submartingale; CMR = Comparison return; SLM = Sharpe-Lintner-Mossin; BLK = Black; VL = Value Line.
† Based on adjusted betas for the SLM and BLK models.

The mean absolute error (MABE), defined as the sample average of $|a_i - g_{ij}|$, better reflects the overall forecasting performance of the models since it takes into account the average error size. In period 1, VL's MABE was lowest at 0.088, followed by SLM and BLK at 0.105 and 0.106, while the other three models had MABE's between 0.112 and 0.117. Two other summary error measures, which give greater weight to large deviations, are mean square error or MSE (the sample average of $(a_i - g_{ij})^2$) and root mean squared error or RSME (the square root of MSE). Using these measures of forecast accuracy, VL was most accurate followed by the four expected return models all of which were more accurate than SUB.

In time period 2, VL had the most accurate forecasts. Using MABE, it again appears that SLM and BLK had smaller errors than the CMR, MAR, and SUB models. Using MSE, all models other than VL appear to have approximately equal forecast accuracy.

Table 2 contains the t-statistics for all paired comparisons over both sample periods and using both the historical beta and the regression-adjusted beta. In reading this table, a positive t-statistic means that the model at the top has lower errors than the model at the side. Since the results are very similar for both beta estimation methods, the discussion concentrates on the regression-adjusted beta case.

In both sample periods, both the SLM and BLK models produced smaller errors at high levels of confidence than the two non-beta expected return models – MAR and CMR. Hypothesis 1 is thus rejected. If one were attempting to gauge the market's expectation of future earnings growth via

005203

Table 2. Parametric t-statistics, comparisons of six model's earnings prediction errors for two time periods*†

		Historical beta							Regression-adjusted beta					
		SUB	MAR	CMR	SLM	BLK	VL		SUB	MAR	CMR	SLM	BLK	VL
Period 1, 1967–1972	SUB	—	0.59	−0.50	1.32	1.17	2.69‡	SUB	—	0.59	−0.50	1.76¶	1.58‡	2.69‡
	MAR	—	—	−1.70¶	1.74¶	1.37	3.72‡	MAR	—	—	−1.70¶	4.93‡	4.29‡	3.72‡
	CMR	—	—	—	3.32‡	3.00‡	4.50‡	CMR	—	—	—	4.35‡	3.96‡	4.50‡
	SLM	—	—	—	—	−7.12‡	3.06‡	SLM	—	—	—	—	−8.22‡	2.72‡
	BLK	—	—	—	—	—	3.21	BLK	—	—	—	—	—	2.88‡
Period 2, 1972–1976	SUB	—	1.58	−0.40	2.88‡	2.84‡	2.90‡	SUB	—	1.58	−0.40	2.78‡	2.68‡	2.90‡
	MAR	—	—	−2.25§	2.38§	2.48§	2.35§	MAR	—	—	−2.25§	3.06‡	3.13‡	2.35§
	CMR	—	—	—	3.77‡	3.76‡	2.92‡	CMR	—	—	—	3.83‡	3.72‡	2.92‡
	SLM	—	—	—	—	−0.59	1.86¶	SLM	—	—	—	—	−1.60	1.93¶
	BLK	—	—	—	—	—	1.88¶	BLK	—	—	—	—	—	1.96§

* MAR = Market adjusted return; SUB = Submartingale; CMR = Comparison return; SLM = Sharpe–Lintner–Mossin; BLK = Black; VL = Value Line.

† A positive test statistic indicates superiority (lower forecast error) of model on top as compared with model on side; a negative test statistic indicates superiority of model on side. Forecast error is mean absolute error (MABE).

‡ Significant at the 1 per cent level, two-tailed test.

§ Significant at the 5 per cent level, two-tailed test.

¶ Significant at the 10 per cent level, two-tailed test.

the market's expected rate of return and the revealed dividend yield, then one would be better off employing either of the two models that use beta. The consistency of the results over the two test periods strengthens the conclusion that use of the beta coefficient enhances the predictability of expected rate of return and hence earnings growth.

To check on the efficacy of the procedure by which the expected return model forecasts were extracted, those models were compared with the SUB model. For the non-beta models, the t-statistics were less than ordinary conventional levels in both of the test periods. A comparison of MAR against SUB produced t-statistics of -0.50 and -0.40. These results indicate that Hypothesis 2 cannot be rejected for the non-beta models, although the MAR model provided slight indication of outperforming the SUB model.

For the SLM and BLK models, the t-statistics were positive and significant in both time periods. A comparison of SLM against SUB yielded t-statistics of 1.76 and 2.78, whereas in similar comparisons, BLK yielded 1.58 and 2.68. This is reasonable evidence for rejecting Hypothesis 2 in favour of the alternative hypothesis that SLM and BLK produce smaller errors than SUB. From another point of view, this result is impressive: a relatively simple manipulation of the expected return models, involving extrapolation of the expected market return and the stock's beta coefficient and subtraction of the stock's dividend yield, produced earnings forecasts that were more accurate than a well known time-series model of annual earnings. This interpretation indicates that the SLM and BLK expected return models appear to capture an important aspect of the market's return generating mechanism, and that the forecast extraction procedure has reasonable power.

The next hypothesis tests involve the VL forecasts. It is clear that Hypothesis 3 can be rejected at high levels of significance. By wide margins, VL produced lower forecast errors than all the expected return models, including the more accurate SLM and BLK models.

The last comparison, Hypothesis 4, evaluates VL against the TS model. In both samples, the forecasts of earnings per share growth were statistically superior to those of the TS model. This provides additional evidence that security analysts produce more accurate forecasts than time-series models.

The results of the tests were quite uniform in the two time periods. The average analyst error in forecasting the future annual growth rate for the following four to five year period tended to be about 1.7 per cent below the errors of the SLM and BLK expected return models, whereas the errors of the latter two models were about 0.7–1.2 per cent below the errors of the remaining models, including the SUB model.

3. CONCLUSIONS

This paper has shown that expected return models commonly used in the finance literature contain implicit forecasts of the growth rate of accounting earnings per share. For the comparison returns model (CMR) and the market-adjusted returns model (MAR), the resulting forecasts were no less accurate than a submartingale model. On the other hand, for the Sharpe-Lintner-Mossin (SLM) and Black (BLK) models, the forecasts were significantly more accurate than those generated by the submartingale model.

Evidence that security analysts forecasts are more accurate than those of less costly alternatives is also provided. The forecasts of four to five year growth rates of earnings per share produced and reported in the *Value Line Investment Survey* were shown to be more accurate than *all* of the other models tested—none of which required the direct input of a security analyst.

the market's expected rate of return and the revealed dividend yield, then one would be better off employing either of the two models that use beta. The consistency of the results over the two test periods strengthens the conclusion that use of the beta coefficient enhances the predictability of expected rate of return and hence earnings growth.

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The next hypothesis tests involve the VL forecasts. It is clear that Hypothesis 3 can be rejected at high levels of significance. By wide margins, VL produced lower forecast errors than all the expected return models, including the more accurate SLM and BLK models.

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The results of the tests were quite uniform in the two time periods. The average analyst error in forecasting the future annual growth rate for the following four to five year period tended to be about 1.7 per cent below the errors of the SLM and BLK expected return models, whereas the errors of the latter two models were about 0.7–1.2 per cent below the errors of the remaining models, including the SUB model.

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ACKNOWLEDGEMENTS

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COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of: GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY	CASE NO. 2005-00341

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 27

Avista Corp. (AVA)

At 1:31PM ET: **17.71**

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	17.85	18.84	17.47	17.71	234,895	17.71
28-Nov-05			$ 0.14 Cash Dividend			
Nov-05	17.53	17.96	16.76	17.65	262,585	17.65
Oct-05	19.40	19.55	17.01	17.52	325,928	17.38
Sep-05	19.44	20.20	18.11	19.40	190,552	19.25
23-Aug-05			$ 0.135 Cash Dividend			
Aug-05	18.10	19.61	17.90	19.44	188,830	19.29
Jul-05	18.63	19.36	18.10	19.04	166,915	18.75

* Close price adjusted for dividends and splits.

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Cleco Corp. (CNL)

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	22.10	22.29	19.00	20.85	468,314	20.85
Nov-05	21.07	22.98	20.64	22.08	310,257	22.08
27-Oct-05	$ 0.225 Cash Dividend					
Oct-05	23.58	24.36	20.56	21.20	211,938	21.20
Sep-05	22.99	23.96	22.10	23.58	175,314	23.33
Aug-05	22.49	23.52	21.65	23.00	180,856	22.76
28-Jul-05	$ 0.225 Cash Dividend					
Jul-05	21.60	22.58	21.00	22.48	141,740	22.24

* Close price adjusted for dividends and splits.

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DPL Inc. (DPL)

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	25.76	26.40	25.10	26.01	868,366	26.01
10-Nov-05	$ 0.24 Cash Dividend					
Nov-05	25.70	26.85	25.29	25.55	775,428	25.55
Oct-05	27.81	28.19	24.33	25.77	630,166	25.54
Sep-05	27.05	27.95	26.73	27.80	576,109	27.55
11-Aug-05	$ 0.24 Cash Dividend					
Aug-05	27.50	28.34	26.43	26.99	695,873	26.75
Jul-05	27.50	27.97	26.85	27.60	747,675	27.11

* Close price adjusted for dividends and splits.

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Duquesne Light Holdings Inc. (DQE)

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
7-Dec-05			$ 0.25 Cash Dividend			
Dec-05	16.99	17.34	16.21	16.32	475,257	16.32
Nov-05	16.64	17.35	16.10	16.95	456,609	16.70
Oct-05	17.25	17.59	16.08	16.69	455,671	16.45
7-Sep-05			$ 0.25 Cash Dividend			
Sep-05	18.13	18.42	17.06	17.21	430,390	16.96
Aug-05	19.35	19.52	17.57	18.15	363,447	17.64
Jul-05	18.80	19.41	18.47	19.40	390,950	18.86

* Close price adjusted for dividends and splits.

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Empire District Electric Co. (EDE)

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	20.44	21.25	20.32	20.33	158,080	20.33
29-Nov-05			$ 0.32 Cash Dividend			
Nov-05	20.40	21.07	20.01	20.31	103,133	20.31
Oct-05	22.95	23.27	19.25	20.20	127,504	19.89
Sep-05	23.70	24.16	22.49	22.87	69,428	22.52
30-Aug-05			$ 0.32 Cash Dividend			
Aug-05	24.20	24.41	22.30	23.75	87,465	23.39
Jul-05	24.05	25.01	23.57	24.18	67,380	23.49

* Close price adjusted for dividends and splits.

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	23.68	23.88	22.60	22.80	731,652	22.80
Nov-05	23.80	24.20	22.50	23.45	512,023	23.45
14-Oct-05			$ 0.29 Cash Dividend			
Oct-05	25.34	25.95	22.80	23.85	655,476	23.85
Sep-05	26.12	26.69	24.82	25.19	542,323	24.88
Aug-05	27.90	27.92	25.65	26.22	826,478	25.90
14-Jul-05			$ 0.275 Cash Dividend			
Jul-05	28.99	29.35	27.20	27.87	684,300	27.52

* Close price adjusted for dividends and splits.

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Firstenergy Corp. (FE)

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	47.17	50.07	46.73	48.99	1,087,504	48.99
3-Nov-05			$ 0.43 Cash Dividend			
Nov-05	47.50	47.67	45.78	46.96	1,571,028	46.96
Oct-05	52.13	53.36	45.94	47.50	1,813,542	47.06
Sep-05	51.16	53.00	50.35	52.12	1,240,533	51.64
3-Aug-05			$ 0.413 Cash Dividend			
Aug-05	49.90	51.11	48.41	51.03	1,017,995	50.56
Jul-05	48.36	50.45	47.46	49.78	1,057,090	48.91

* Close price adjusted for dividends and splits.

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Tuesday, January 3, 2006, 2:01PM ET - U.S. Markets close in 1 hour and 59 minutes. Dow **+0.07%** Nasdaq **+0.16**

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Green Mountain Power Corp. (GMP)

At 10:02AM ET: **28.89**

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
15-Dec-05			$ 0.25 Cash Dividend			
Dec-05	29.54	30.90	26.62	28.77	10,642	28.77
Nov-05	32.44	32.65	28.74	29.54	12,161	29.29
Oct-05	32.68	33.09	31.90	32.70	6,890	32.42
13-Sep-05			$ 0.25 Cash Dividend			
Sep-05	30.55	33.03	30.50	32.93	6,504	32.65
Aug-05	29.37	30.75	28.75	30.35	5,808	29.85
Jul-05	29.44	30.00	29.10	29.40	3,680	28.92

* Close price adjusted for dividends and splits.

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Tuesday, January 3, 2006, 2:02PM ET - U.S. Markets close in 1 hour and 58 minutes. Dow **+0.14%** Nasdaq **+0.23**

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Hawaiian Electric Industries Inc. (HE)

At 1:42PM ET: **25.96**

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	26.50	26.72	25.65	25.90	220,333	25.90
17-Nov-05			$ 0.31 Cash Dividend			
Nov-05	26.30	26.90	25.50	26.44	264,261	26.44
Oct-05	27.89	28.50	25.50	26.35	265,290	26.04
Sep-05	26.53	28.76	26.38	27.88	318,214	27.55
8-Aug-05			$ 0.31 Cash Dividend			
Aug-05	27.00	27.81	26.21	26.51	265,878	26.20
Jul-05	26.81	27.77	26.51	26.93	222,780	26.31

* Close price adjusted for dividends and splits.

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Northeast Utilities (NU)

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	18.67	20.25	18.42	19.69	1,737,876	19.69
29-Nov-05	$ 0.175 Cash Dividend					
Nov-05	18.17	19.03	17.30	18.58	907,238	18.58
Oct-05	19.99	20.20	17.62	18.19	590,742	18.02
Sep-05	19.90	20.48	19.35	19.95	528,214	19.77
30-Aug-05	$ 0.175 Cash Dividend					
Aug-05	21.58	21.95	19.52	19.92	501,956	19.74
Jul-05	20.90	21.74	20.41	21.58	633,840	21.19

* Close price adjusted for dividends and splits.

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Pinnacle West Capital Corp. (PNW)

At 1:53PM ET: **41.93** ↑

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	41.64	43.33	41.05	41.35	475,019	41.35
Nov-05	41.72	42.19	39.91	41.49	536,438	41.49
28-Oct-05	$ 0.50 Cash Dividend					
Oct-05	44.08	44.97	39.81	41.76	691,914	41.76
Sep-05	44.98	46.06	43.13	44.08	463,076	43.54
Aug-05	45.99	46.68	43.22	44.93	421,091	44.38
28-Jul-05	$ 0.475 Cash Dividend					
Jul-05	44.55	46.16	43.76	45.80	482,740	45.23

* Close price adjusted for dividends and splits.

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PNM Resources Inc. (PNM)

At 1:44PM ET: **24.53** ↑

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	26.07	26.19	24.15	24.49	349,328	24.49
Nov-05	25.28	26.26	24.03	25.97	402,490	25.97
28-Oct-05	$ 0.20 Cash Dividend					
Oct-05	28.72	29.22	24.07	25.35	585,171	25.35
Sep-05	29.58	29.98	27.62	28.67	313,590	28.44
Aug-05	29.60	30.45	27.90	29.58	428,317	29.34
28-Jul-05	$ 0.20 Cash Dividend					
Jul-05	28.94	29.85	28.24	29.39	598,780	29.15

* Close price adjusted for dividends and splits.

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PPL Corp. (PPL)

At 1:46PM ET: **29.76**

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
7-Dec-05			$ 0.25 Cash Dividend			
Dec-05	29.54	30.90	28.59	29.40	1,322,304	29.40
Nov-05	30.05	31.14	28.25	29.40	1,454,476	29.15
Oct-05	32.67	33.68	29.01	31.34	1,352,571	31.07
7-Sep-05			$ 0.50 Cash Dividend			
Sep-05	31.95	33.51	31.55	32.33	1,485,819	32.05
25-Aug-05			2 : 1 Stock Split			
Aug-05	61.65	65.12	30.81	31.96	1,800,608	31.21
Jul-05	59.55	62.14	59.50	61.58	1,664,390	30.07

* Close price adjusted for dividends and splits.

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Progress Energy Inc. (PGN)

At 1:47PM ET: **43.98**

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	44.86	45.20	43.39	43.92	774,523	43.92
Nov-05	43.59	45.50	42.62	44.78	941,857	44.78
6-Oct-05			$ 0.59 Cash Dividend			
Oct-05	44.75	45.14	40.77	43.59	997,666	43.59
Sep-05	43.45	45.00	43.03	44.75	752,242	44.14
Aug-05	44.86	45.00	41.90	43.59	726,169	42.99
7-Jul-05			$ 0.59 Cash Dividend			
Jul-05	45.54	46.00	43.80	44.61	887,395	44.00

* Close price adjusted for dividends and splits.

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Puget Energy Inc. (PSD)

At 1:47PM ET: **20.43**

Historical Prices

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
Dec-05	20.87	20.90	20.21	20.42	499,080	20.42
Nov-05	21.33	21.33	20.26	20.78	381,185	20.78
14-Oct-05	$ 0.25 Cash Dividend					
Oct-05	23.46	23.70	20.50	21.44	494,285	21.44
Sep-05	22.80	23.82	22.40	23.48	295,542	23.20
Aug-05	23.35	23.54	22.05	22.77	257,682	22.50
20-Jul-05	$ 0.25 Cash Dividend					
Jul-05	23.43	24.36	23.26	23.38	324,180	23.11

* Close price adjusted for dividends and splits.

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Unisource Energy Corp. (UNS)

At 1:46PM ET: **31.07**

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PRICES

Date	Open	High	Low	Close	Avg Vol	Adj Close*
9-Dec-05			$ 0.19 Cash Dividend			
Dec-05	32.35	32.86	30.80	31.20	218,747	31.20
Nov-05	31.85	32.78	30.39	32.36	218,838	32.17
Oct-05	33.15	33.86	29.86	31.97	278,200	31.78
16-Sep-05			$ 0.19 Cash Dividend			
Sep-05	33.31	33.92	31.80	33.24	220,614	33.04
Aug-05	32.25	33.60	31.19	33.29	278,195	32.91
Jul-05	30.75	32.70	30.50	32.25	269,330	31.88

* Close price adjusted for dividends and splits.

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COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of: **GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY**	**CASE NO. 2005-00341**

**KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO**

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 29

The Journal of FINANCE

VOL. XXXIII MARCH 1978 No. 1

THE SUPERIORITY OF ANALYST FORECASTS AS MEASURES OF EXPECTATIONS: EVIDENCE FROM EARNINGS

LAWRENCE D. BROWN AND MICHAEL S. ROZEFF*

ACCURATE MEASUREMENT OF EARNINGS expectations is essential for studies of firm valuation, cost of capital and the relationship between unanticipated earnings and stock price changes. Under the rational expectations hypothesis [23], market earnings expectations should be measured by the best available earnings forecasts. Univariate time series forecasts are often used for this purpose ([1], [3], [4], [5], [12], [13], [14], [16], [18], [20]) instead of direct measures of earnings expectations such as security analysts' forecasts. Univariate time series forecasts neglect potentially useful information in other time series and therefore do not generally provide the most accurate possible forecasts [24]. Since security analysts process substantially more data than the time series of past earnings, their earnings forecasts *should* be superior to time series forecasts and provide better measures of market earnings expectations.

However, the mere existence of analysts as an employed factor in long run equilibrium means that analysts *must* make forecasts superior to those of time series models. To reach this conclusion, one need only assume that participants in the market for forecasts act in their own best interests and that both forecast producers and consumers demand forecasts solely on the basis of their predictive ability.[1] Since analysts' forecasts cost more than time series forecasts, the continued employment of analysts by profit-maximizing firms implies that analysts' forecasts must be superior to those of the lower cost factor, time series models.

Past comparisons of analysts' forecasts to sophisticated time series models conclude that analysts' forecasts are not more accurate than time series forecasts (Cragg and Malkiel (CM) [9]; Elton and Gruber (EG) [11]). This evidence plainly conflicts with basic economic theory. Hence, the predictive accuracy of analysts' forecasts is re-examined in this paper. In contrast with other studies, the results overwhelmingly favor the superiority of analysts over time series models.

Part I considers statistical tests and experimental design. Part II contains the empirical results. Summary and implications appear in Part III.

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1. We assume that forecast purchasers do not derive nonmonetary benefits from forecasts.

I. Experimental Design

A. *Statistical Evaluation of Forecast Methods*

Without direct information on the costs of imperfect forecasts to forecast users, comparative forecast accuracy is usually evaluated by comparing the error distributions of different forecast methods statistically. However, statistical comparisons in past studies ([9], [11]) utilize test statistics improperly, particularly Theil's U [25] and Student's t. In this section, after discussing the defects of these statistics for evaluating two or more forecast methods, the alternative statistical methods used in this study are introduced.[2]

Theil's U-statistic (applied to earnings) is the square root of

$$U_{ij}^2 = \frac{\sum_{t=1}^{T} (\dot{P}_{ijt} - \dot{A}_{it})^2}{\sum_{t=1}^{T} \dot{A}_{it}^2},$$

where $\dot{A}_{it}$ = change in actual earnings per share of firm i from $t-1$ to t,
$\dot{P}_{ijt}$ = predicted change in earnings per share of firm i from $t-1$ to t by forecast method j, and
T = total number of time series observations.

For its computation, it requires *time series* data on a firm's earnings *changes*.[3] Given forecast method j and earnings time series data on firm i, Theil's U compares the forecast accuracy of method j to that of a naive, no change, earnings forecast model.[4,5] Since analysts' earnings forecasts are currently available only in short time series, use of Theil's U for comparative forecast evaluation necessarily relies on small samples.[6] Larger sample sizes are possible by testing forecast methods on a cross-section of firms. Finally, no procedure is available with tests of significance which uses Theil's U to compare two forecast methods when neither is a no-change method. Direct hypothesis tests are preferable to inferences drawn from ranking the U statistics of different forecast methods.

For hypothesis tests of two forecast methods, an appropriate design is a one-sample or matched pairs case with self-pairing by firm. The members of each pair

2. Past studies also contain experimental biases: CM compare analysts' five-year forecasts with realizations over three and four-year horizons; EG compare analysts' forecasts with the "best" of nine time series models selected from the same time period in which comparisons with analysts' forecasts are made. This procedure introduces *ex post* selection bias.

3. EG computed "Theil's U" using earnings *levels* rather than *changes*. This statistic has unknown sampling properties.

4. $\dot{P}_{ijt} = \dot{A}_{it}$ and $U_{ij} = 0$ if prediction is perfect in every period. If no change is predicted in each period (i.e., $\dot{P}_{ijt} = 0$), $U_{ij} = 1$; $0 < U_{ij} < 1$ if prediction is less than perfect but better than the no-change prediction and $U_{ij} > 1$ if forecast method j is less accurate than the no-change prediction.

5. CM used *cross-sectional* rather than temporal data. This "Theil's U" statistic has unknown sampling properties because each error is drawn from a different error distribution, one for each firm.

6. EG's sample size in computing Theil's U varied between two and six.

are the errors from the two methods; the matched pair is reduced to a single observation by taking the difference in the errors. The usual parametric test of the mean difference is the paired t-test [17]. An alternative non-parametric test of the median difference is the Wilcoxon Signed Ranks test [8].

The parametric paired t-test is inappropriate for testing mean error differences of forecast methods applied to cross-section earnings data. If applied to error measures stated in level form (e.g., $|P_{ijt} - A_{it}|$, where P_{ijt} = firm i's forecasted earnings per share for period t by method j and A_{it} = firm i's actual earnings per share in period t), the test's assumption that paired differences are drawn from the same population is violated since each error difference depends upon each firm's earnings per share level. If applied to error measures stated in ratio form (e.g., $|P_{ijt} - A_{it}|/|A_{it}|$), the distributional assumptions of the paired t-test are also unlikely to be fulfilled since ratio measures applied to earnings per share data are dominated by outliers because actual earnings per share are often close to zero.[7]

Meaningful pairwise comparisons require test statistics which are insensitive to error definition and outliers. We adopt the Wilcoxon Signed Ranks test which meets these requirements and has power comparable to the parametric paired t-test [8, p. 213].

For tests of several forecast methods, the generalization of the paired t-test, two-way analysis of variance, is inapplicable.[8] The Friedman test [8], which is based on two-way analysis of variance by ranks and is independent of error definition, is used instead.

For an error measure, we choose relative error ignoring sign, $|P_{ijt} - A_{it}|/|A_{it}|$, a metric which is likely to be of interest to forecast purchasers.[9] In any event, the Wilcoxon test statistic is insensitive to error definition (see fn. 16).

B. *Forecast Horizon*

Because economic theory provides no guidance concerning the association of analyst superiority with a particular forecast horizon, several horizons should be investigated.[10] Our choice of horizons reflects the following considerations: (i) micro-level information obtained by analysts often concerns earnings of the following several quarters or fiscal year; (ii) current fiscal and monetary policies affect earnings of the subsequent one to five quarters; (iii) published forecasts are available mainly for short horizons. We thus investigate point estimates of quarterly earnings per share for forecast horizons of one to five quarters. We also examine annual earnings forecasts. The basic time series data are quarterly primary

7. EG's cross-section parametric t-test is inappropriate. Their use of an error measure stated in terms of levels squared (mean square error) appears to compound the inherent difficulty in applying the paired t-test to cross-section earnings data (see fn. 16).

8. Preliminary tests indicated serious violation of the homogeneity of variances and additivity assumptions, basically because of error outliers. Violation of the ANOVA assumptions also prevents application below of a factorial design with sample year and forecast horizon as factors, forecast method as treatment and firm as replication.

9. For a discussion of the deficiencies of using $|P_{ijt}|$ or $|P_{ijt} + A_{it}|/2$ in the denominator see [25].

10. The forecast horizons studied in the past have been five years (CM) and one year (EG).

earnings per share before extraordinary items, adjusted for stock splits, stock dividends and other capitalization changes for the years 1951–1975.

Ex ante conditional predictions of all forecast methods are determined as follows for a sample of 50 firms for each of the four years 1972–1975. Starting with third quarter 1971 earnings (III/1971), conditional earnings per share predictions for the ith firm by the jth method are obtained for the individual quarters of 1972. The forecasts of 1972 quarterly earnings, conditional on III/1971, are denoted $P_{ij}(\mathrm{I}/1972\,|\,\mathrm{III}/1971)$, $P_{ij}(\mathrm{II}/1972\,|\,\mathrm{III}/1971)$, $P_{ij}(\mathrm{III}/1972\,|\,\mathrm{III}/1971)$ and $P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{III}/1971)$. Moving ahead one quarter, predictions are again obtained for each of the four quarters of 1972 made conditional upon IV/1971 earnings data. Again moving ahead one quarter, predictions are obtained for the last three quarters of 1972 conditional upon knowledge of I/1972 earnings, etc. Table I shows the set of 1972 predictions so obtained. With these conditional predictions, relative forecast errors ignoring sign are computed for each forecast method j over five distinct quarterly forecast horizons for use in the quarterly error comparisons. Annual earnings forecasts for 1972 are the sum of the forecasts $P_{ij}(\mathrm{I}/1972\,|\,\mathrm{IV}/1971)$, $P_{ij}(\mathrm{II}/1972\,|\,\mathrm{IV}/1971)$, $P_{ij}(\mathrm{III}/1972\,|\,\mathrm{IV}/1971)$, and $P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{IV}/1971)$, that is, the one to four period ahead point forecasts made conditional upon knowledge of the prior year's fiscal earnings.[11] After obtaining analogous forecasts for the years 1973, 1974 and 1975, quarterly and annual comparisons are repeated for these years.

TABLE I

SUMMARY OF PREDICTIONS BY FORECAST HORIZON FOR 1972[a,b]

1 Quarter Ahead	2 Quarters Ahead	3 Quarters Ahead	4 Quarters Ahead	5 Quarters Ahead[c]
$P_{ij}(\mathrm{I}/1972\,|\,\mathrm{IV}/1971)$	$P_{ij}(\mathrm{I}/1972\,|\,\mathrm{III}/1971)$			
$P_{ij}(\mathrm{II}/1972\,|\,\mathrm{I}/1972)$	$P_{ij}(\mathrm{II}/1972\,|\,\mathrm{IV}/1971)$	$P_{ij}(\mathrm{II}/1972\,|\,\mathrm{III}/1971)$		
$P_{ij}(\mathrm{III}/1972\,|\,\mathrm{II}/1972)$	$P_{ij}(\mathrm{III}/1972\,|\,\mathrm{I}/1972)$	$P_{ij}(\mathrm{III}/1972\,|\,\mathrm{IV}/1971)$	$P_{ij}(\mathrm{III}/1972\,|\,\mathrm{III}/1971)$	
$P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{III}/1972)$	$P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{II}/1972)$	$P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{I}/1972)$	$P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{IV}/1971)$	$P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{III}/1971)$

[a] Predictions missing from the table (e.g., $P_{ij}(\mathrm{I}/1972\,|\,\mathrm{II}/1971)$, $P_{ij}(\mathrm{II}/1972\,|\,\mathrm{II}/1971)$ are absent because our source of analyst data does not contain these forecasts.

[b] i and j refer to firm i and method j, respectively.

[c] Five quarter ahead are available for BJ and V only.

C. *Time Series Models and Analysts' Forecasts*

Within the class of univariate time series models, Box and Jenkins (BJ) [6] models are highly regarded for their ability to make the most efficient use of the time series data. The BJ modelling technique enables one to select the most appropriate time series model consistent with the process generating each firm's time series of quarterly earnings per share data. BJ models, by not making *a priori* assumptions about the processes generating the data, subsume autoregressive,

11. Beaver [1] concludes that a quarterly approach to predicting annual earnings is at least as good as an annual approach to predicting annual earnings. Also see [7], [19] and [22] for other aspects of the usefulness of quarterly earnings per share data.

moving average and mixed models as special cases.[12] Forecasts of individually fitted BJ models should, therefore, perform better than forecasts of a particular class of time series models applied to all firms' time series data. We adopt the BJ modelling technique in this paper. Two other time series models are also included, a "seasonal martingale" (denoted M) and a "seasonal submartingale" (S). These models have been used as standards of comparison in the earnings forecast literature and are available for forecast producers and users at minimal cost.

As a source of analysts' forecasts we choose the Value Line Investment Survey since it contains one to five quarter ahead earnings forecasts which can be accurately dated and measured. Value Line makes earnings forecasts for 1,600 firms in contrast with institutional research firms which provide fewer, more expensive forecasts. Our hypothesis test thus compares a relatively sophisticated time series model with an "average" source of analysts' forecasts.

BJ conditional forecasts are obtained by standard methods after identifying and estimating each firm's appropriate model [6].[13] Value Line's conditional forecasts are taken directly from individual issues of the Value Line Investment Survey. The Survey, published weekly, makes quarterly earnings predictions four times a year for each firm included.

To define conditional forecasts of the naive models for each firm i, let A_{it} denote the tth actual quarterly earnings per share for firm i, where $t=1,\ldots,96$ (I/1951–IV/1974).

Seasonal submartingale (S) conditional one to four quarter ahead forecasts at time t are

one quarter ahead	$A_{it-3}+(A_{it}-A_{it-4})$
two quarters ahead	$A_{it-2}+(A_{it}-A_{it-4})$
three quarters ahead	$A_{it-1}+(A_{it}-A_{it-4})$
four quarters ahead	$A_{it}\quad+(A_{it}-A_{it-4})$.

Seasonal martingale (M) conditional one to four quarter ahead forecasts made in period t are A_{it-3}, A_{it-2}, A_{it-1}, and A_{it}. M's forecasts for a given quarter do not change as actual earnings per share data become available. S modifies M's forecasts with the change of the latest period's quarter over that of the previous year.

Actual quarterly earnings data are announced for most firms approximately five to six weeks into the subsequent quarter. Time series forecasts then become

12. The *ad hoc* time series models used in previous studies at a time when BJ techniques were unavailable are special cases of BJ models.

13. Recent research by Froeschle [15] and diagnostic tests of Dent and Swanson [10] were helpful in identifying the BJ models in addition to the standard diagnostic tests. As an aid to identifying the BJ models, most of which had multiplicative seasonal components, theoretical autocorrelation and partial autocorrelation functions for many quarterly multiplicative seasonal models were obtained. The coefficients of the BJ models, estimated with data through IV/1974, were not re-estimated with less data for earlier periods or more data for later periods. Foster [13] has shown that coefficient re-estimation of BJ quarterly earnings models is unnecessary due to its negligible effect on forecast errors. In any event, our procedure (no re-estimation) favors BJ in nearly all comparisons with Value Line.

possible and Value Line forecasts are published, on average, forty to fifty days later.[14]

The pattern of forecasts for all models is summarized in Table 1. Note that models M and S are not used to generate five quarter ahead forecasts.

II. Empirical Results

A. *Sample Selection*

Fifty firms were randomly selected from Moody's Handbook of Common Stocks. Each firm has complete quarterly earnings data available from 1951, is included in the Value Line Investment Survey since 1971 and has a December fiscal year. The resulting sample (Appendix A) is representative of the New York Stock Exchange firms included in Moody's and Value Line. Utilities were excluded due to insufficient quarterly earnings data. Sample sizes are reduced in those rare instances when the Value Line conditional forecasts are unavailable.

B. *Annual Comparisons*

The error distributions of relative annual forecast errors are shown in Table 2 for each of the years 1972–75 using the four forecast methods, seasonal martingale (M), seasonal submartingale (S), Box-Jenkins (BJ) and Value Line (V). Table 2 also contains Friedman test statistics (Chi-square with 3 degrees of freedom) and Wilcoxon test statistics (Student's t with $N-1$ degrees of freedom where N is sample size). The Friedman test statistic examines the null hypothesis that *all four* error distributions are identically distributed; the Wilcoxon statistic tests the null hypothesis that the median error difference of *two* methods being compared exceeds zero.

Using the Friedman test, the null hypothesis is rejected at the 1% level in 1972, 1973 and 1975. In the 12 pairwise hypothesis tests of V's errors against those of M, S, and BJ, the sign of the Wilcoxon test statistic favors Value Line in every instance. Statistical significance occurs 8 times; 6 times at the 1% level and twice at the 5% level. Thus, V generally produces smaller annual errors than the three time series models suggesting that Value Line annual earnings forecasts are superior to those of time series models.

As argued earlier, BJ forecasts should be superior to forecasts of *ad hoc* time series models. The annual comparisons show that the BJ models generally yield smaller forecast errors than the other time series models studied. In 8 comparisons with M and S, the Wilcoxon test favors BJ 7 times with statistical significance 3 times. These findings suggest that BJ's forecasts are superior to those of *ad hoc* naive time series models.

While the annual results provide strong support for the hypothesis of analyst superiority, they use only a fraction of the data. More powerful tests are achieved using the larger sample sizes of the quarterly data and many more comparative tests can be performed with these data. We turn next to quarterly comparisons.

14. The time interval from announcement to forecast varies from approximately 7 to 70 days for our sample firms. The fact that the Investment Survey, published in 13 installments, makes forecasts for different firms each week accounts for the variation.

TABLE 2

WILCOXON AND FRIEDMAN TEST STATISTICS AND ERROR DISTRIBUTIONS, ANNUAL COMPARISONS OF VALUE LINE AND TIME SERIES MODEL PREDICTION ERRORS, 1972–1975[c]

1972

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	3	7	14	17	4	3	2
S	11	6	12	10	3	1	7
BJ	10	6	12	12	4	1	5
V	13	7	17	12	0	0	1

SAMPLE SIZE = 50
Friedman Statistic = 27.10[a]
Wilcoxon Statistics[e]

	S	BJ	*V*
M	−.55	.24	4.46[a]
S		.46	3.50[a]
BJ			3.45[a]

1973

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	2	6	16	18	6	0	2
S	11	8	14	9	4	1	3
BJ	8	6	15	16	3	0	2
V	10	9	13	16	0	0	2

SAMPLE SIZE = 50
Friedman Statistic = 33.19[a]
Wilcoxon Statistics[e]

	S	BJ	*V*
M	3.15[a]	2.51[a]	4.61[a]
S		−1.89[b]	0.34
BJ			2.17[b]

1974

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	8	6	12	15	4	1	4
S	12	3	11	12	6	2	4
BJ	5	8	16	13	4	0	4
V	6	7	15	13	5	0	4

SAMPLE SIZE = 50
Friedman Statistic = 4.68
Wilcoxon Statistics[e]

	S	BJ	*V*
M	−.21	2.37[a]	2.23[b]
S		1.24	1.44
BJ			0.61

TABLE 2 (*continued*)

1975

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	4	7	13	10	2	3	11
S	3	5	12	7	9	4	10
BJ	7	3	13	12	2	3	10
V	7	5	18	5	3	3	9

SAMPLE SIZE = 50

Friedman Statistics = 12.84[a]

Wilcoxon Statistics[e]

	S	BJ	*V*
M	−1.77[b]	0.86	3.29[a]
S		2.99[a]	3.11[a]
BJ			1.28

[a] Significant at the 1% level, one-tailed test.

[b] Significant at the 5% level, one-tailed test.

[c] *V* = Value Line, *M* = Seasonal Martingale, *S* = Seasonal Submartingale, BJ = Box-Jenkins.

[d] Each entry below designates the number of observations for a given model whose relative error ignoring sign is within the stated fractiles.

[e] Each Wilcoxon test statistic below results from comparing the method at the top with the method on the side. Thus, positive Wilcoxon statistics indicate superiority of model on top.

C. *Quarterly Comparisons*

In each year, 1972 to 1975, quarterly forecasts are obtained for the forecast methods in the manner shown in Table 1. Relative forecast errors of all four methods are compared over 1–4 quarter forecast horizons; BJ and *V* are also compared over 5 quarter horizons. In each of the four years, sample sizes are approximately 200 for the 1 and 2 quarter ahead comparisons, 150 for the 3 quarter ahead comparisons, and 100 for the 4 quarter ahead comparisons. Test results over all horizons appear in Table 3 and are summarized in Table 4.

With minor exceptions (3 and 4 quarter horizons in 1974), the Friedman statistics are highly significant when the four methods are tested as a group; the null hypothesis of identically distributed distributions is rejected in 14 of the 16 Friedman tests. Using Wilcoxon test statistics, *V*'s errors are tested pairwise against *M*'s and *S*'s errors 16 times each and against BJ's errors 20 times. The resulting 52 hypothesis tests of *V* against *M*, *S* and BJ are summarized in Table 4A. In the 34 instances of significant Wilcoxon test statistics, *V* is statistically superior 33 times. In the remaining 18 tests, the sign of the *t*-statistic favors *V* 12 times. In total, *V* is favored 45 times out of 52, revealing an overwhelming dominance of *V* over the time series models.

The data are also summarized in Table 4 by the mean Wilcoxon *t*-value ($\bar{t}$), the estimated standard deviation of the mean *t*-value ($s(\bar{t})$) and the ratio $\bar{t}/s(\bar{t})$. The latter ratio is itself a *t*-statistic only if each *t*-value being averaged is drawn from the same distribution. Since the distribution of *t*-values is likely to depend upon the horizon, model and/or year that the experiment is conducted, we refrain from

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TABLE 3

WILCOXON AND FRIEDMAN TEST STATISTICS, QUARTERLY COMPARISONS OF VALUE LINE AND TIME SERIES MODEL PREDICTION ERRORS, 1972–1975[c,d]

		Forecast Horizon												
		One Quarter			Two Quarter			Three Quarter			Four Quarter			Five Quarter
		S	BJ	*V*	*S*	BJ	*V*	*S*	BJ	*V*	*S*	BJ	*V*	*V*
	M	2.14[b]	6.87[a]	8.15[a]	0.79	5.41[a]	6.87[a]	−1.09	2.50[a]	5.77[a]	−3.09[a]	1.41	5.22[a]	—
1972	*S*	—	4.62[a]	5.25[a]	—	4.62[a]	5.57[a]	—	3.03[a]	5.42[a]	—	3.38[a]	5.30[a]	—
	BJ	—	—	1.75[b]	—	—	2.51[a]	—	—	4.09[a]	—	—	3.93[a]	3.11[a]
		Sample Size = 200			Sample Size = 200			Sample Size = 150			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 73.45[a]			Friedman Stat. = 60.54[a]			Friedman Stat. = 41.14[a]			Friedman Stat. = 43.43[a]			
		S	BJ	*V*	*S*	BJ	*V*	*S*	BJ	*V*	*S*	BJ	*V*	*V*
	M	8.02[a]	8.98[a]	10.66[a]	5.81[a]	6.41[a]	8.70[a]	4.81[a]	3.52[a]	6.31[a]	2.55[a]	1.69[b]	4.63[a]	—
1973	*S*	—	−0.60	1.62	—	−1.83[b]	1.04	—	−3.57[a]	−0.02	—	−1.59	1.04	—
	BJ	—	—	2.48[a]	—	—	3.47[a]	—	—	3.34[a]	—	—	2.79[a]	1.66
		Sample Size = 199			Sample Size = 200			Sample Size = 150			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 173.51[a]			Friedman Stat. = 119.91[a]			Friedman Stat. = 75.22[a]			Friedman Stat. = 29.12[a]			
		S	BJ	*V*	*S*	BJ	*V*	*S*	BJ	*V*	*S*	BJ	*V*	*V*
	M	3.35[a]	6.29[a]	6.19[a]	0.84	4.88[a]	3.78[a]	−0.25	2.59[a]	1.29	−2.69[a]	1.41	0.29	—
1974	*S*	—	2.34[a]	2.95[a]	—	2.31[b]	1.50	—	1.53	0.97	—	2.67[a]	2.80[a]	—
	BJ	—	—	1.16	—	—	−1.45	—	—	−1.04	—	—	−0.92	−2.20[b]
		Sample Size = 199			Sample Size = 199			Sample Size = 149			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 47.57[a]			Friedman Stat. = 22.63[a]			Friedman Stat. = 5.40			Friedman Stat. = 2.92			
		S	BJ	*V*	*S*	BJ	*V*	*S*	BJ	*V*	*S*	BJ	*V*	*V*
	M	2.07[b]	5.76[a]	8.22[a]	−2.64[a]	3.63[a]	5.29[a]	−4.49[a]	2.93[a]	2.95[a]	4.89[a]	−0.78	−0.05	—
1975	*S*	—	4.70[a]	6.36[a]	—	6.02[a]	6.14[a]	—	6.13[a]	5.14[a]	—	3.62[a]	3.28[a]	—
	BJ	—	—	3.51[a]	—	—	1.62	—	—	−0.22	—	—	0.08	0.45
		Sample Size = 199			Sample Size = 199			Sample Size = 149			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 80.32[a]			Friedman Stat. = 44.49[a]			Friedman Stat. = 33.25[a]			Friedman Stat. = 15.66[b]			

[a] Significant at the 1% level, one-tailed test.

[b] Significant at the 5% level, one-tailed test.

[c] *V* = Value Line, *M* = Seasonal Martingale, *S* = Seasonal Submartingale, BJ = Box-Jenkins.

[d] Each Wilcoxon test statistic entered in the table results from comparing method at the top with method on the side. Thus, positive Wilcoxon statistics indicate superiority of model on top.

TABLE 4

SUMMARY OF WILCOXON TEST COMPARISONS

A: Value Line vs. Time Series Models[a]

		Forecast Horizon					Forecast Model			Year			
	Total	1Q	2Q	3Q	4Q	5Q	*M*	*S*	BJ	1972	1973	1974	1975
Number of Comparisons	52	12	12	12	12	4	16	16	20	13	13	13	13
Comparisons Favorable to *V*[b]	45	12	11	9	10	3	15	15	15	13	12	9	11
Comparisons Statistically Favorable to *V*[c]	33	10	8	7	7	1	13	10	10	13	8	4	8
Comparisons Statistically Unfavorable to *V*	1	0	0	0	0	1	0	0	1	0	0	1	0
Mean Wilcoxon Test Statistic ($\bar{t}$)	3.25	4.86	3.75	2.83	2.37	.76	5.27	3.40	1.51	4.84	3.67	1.18	3.29
$\bar{t}/s(\bar{t})$[d]	8.27	5.45	4.51	3.81	3.72	.67	5.65	6.24	3.48	9.98	4.18	1.81	4.24

B: BJ vs. Naive Time Series Models

		Forecast Horizon				Forecast Model		Year			
	Total	1Q	2Q	3Q	4Q	*M*	*S*	1972	1973	1974	1975
Number of Comparisons	32	8	8	8	8	16	16	8	8	8	8
Comparisons Favorable to BJ[b]	27	7	7	7	6	15	12	8	4	8	7
Comparisons Statistically Favorable to BJ[c]	24	7	7	6	4	13	11	7	4	6	7
Comparisons Statistically Unfavorable to BJ	2	0	1	1	0	0	2	0	2	0	0
Mean Wilcoxon Test Statistic ($\bar{t}$)	3.15	4.87	3.93	2.33	1.48	3.97	2.34	3.98	1.63	3.00	4.00
$\bar{t}/s(\bar{t})$[d]	6.37	4.70	4.16	2.41	2.25	6.23	3.25	6.46	1.05	4.99	4.96

[a] *V* = Value Line, *M* = Seasonal Martingale, *S* = Seasonal Submartingale, BJ = Box-Jenkins.

[b] Comparisons are favorable if Wilcoxon statistic in Table 3 is positive.

[c] Comparisons are statistically favorable if Wilcoxon statistic in Table 3 is positive and significant at the 5% level or better.

[d] Both $\bar{t}$ and $s(\bar{t})$ are computed using the number of comparisons in each column of the Table.

hypothesis tests on $\bar{i}$ and present $\bar{i}$ and $\bar{i}/s(\bar{i})$ without formal tests of significance. For the 52 comparisons involving V, the mean Wilcoxon test statistic is 3.25 and $\bar{i}/s(\bar{i})$ is 8.27.

Table 4A also decomposes the 52 comparisons of V with the time series models by forecast horizon, model and year.[15] The data show that Value Line's forecast superiority holds over all horizons studied with a tendency for its superiority to decline as horizon lengthens. V's predominance model-by-model is, as hypothesized, quite evident with somewhat less superiority over BJ than over M and S. Turning our attention to the 20 comparisons between V and BJ, V is superior in 10 of 11 cases in which the test statistic is significant. In 5 of the remaining 9 comparisons, the sign of the Wilcoxon test statistic favors V. For completeness, Table 4A summarizes Wilcoxon tests by year. Again we expect V to be superior, on average, but have no hypothesis concerning particular years. Comparisons unfavorable to V tend to be confined to 1974, but even in this year, 4 of the 5 statistically significant comparisons favor Value Line.

In summary, the evidence strongly supports the hypothesis that Value Line consistently makes significantly better predictions than time series models. The statistically significant experiments overwhelmingly favor Value Line. In the remaining experiments the majority of the Wilcoxon tests also favor Value Line, providing additional support for the hypothesis of analyst superiority.

Table 4B summarizes the 32 comparisons of BJ with the naive time series models. The mean Wilcoxon test statistic is 3.15 and $\bar{i}/s(\bar{i})$ equals 6.37. In 26 cases, there are significant differences with BJ statistically superior 24 times. BJ is superior to M and S in 3 of the remaining 6 comparisons. Hence, BJ is favored in 27 of 32 comparisons, providing strong support for the hypothesis that BJ predicts earnings better than *ad hoc* time series models.

Table 4B also summarizes comparisons involving BJ by horizon, model and year. BJ's superiority over the naive models is clearly evident over each forecast horizon with a tendency for its superiority to decline as horizon lengthens. In comparison to individual models, BJ outperforms both M and S with somewhat less dominance over S. Turning to comparisons by year, the superiority of BJ is consistent over time, with most of the comparisons unfavorable to BJ occurring in 1973. Even in this year, the mean Wilcoxon test statistic is 1.63 and 4 of the 6 significant comparisons favor BJ.[16]

In conclusion, the quarterly and the annual comparisons provide convincing evidence both of Value Line's superiority over each of the three time series models and BJ's superiority over the naive models. The quarterly results also show that V's superiority over the time series models and BJ's superiority over the naive models

15. The decomposition is an alternative to analysis of variance which is inapplicable to the error distribution (see fn. 8).

16. As noted earlier, the Wilcoxon tests should be insensitive to error definition. Wilcoxon test statistics were recomputed on annual and selected quarterly comparisons using three additional error measures, mean square error, root mean square error and relative error squared. The small changes in the test statistics left the results virtually unchanged. Parametric t-tests were also applied to the four error measures. Both the sign and magnitude of these test statistics were highly sensitive to error definition. The hypothesis tests using the parametric t-test most often gave results in disagreement with the Wilcoxon test when mean square error was chosen as the error definition. This may account for EG's results differing from ours.

are not confined to particular models, horizons, or years. The very general character of Value Line's superiority in predicting earnings, evidenced over all models, horizons, and years in 64 separate hypothesis tests involving sample sizes averaging 125, lends extraordinary support to the hypothesis of analyst superiority.

D. *Further Analysis*

The superiority of Value Line over time series models follows from the rational behavior of forecast producers and consumers and should be generalizable to other sources of analyst forecasts and other time periods. As a preliminary test of the sensitivity of our results to choice of analyst, we obtained predictions of 1975 annual earnings per share made by the Standard and Poor's Earnings Forecaster (SP) for each firm included in the 1975 annual earnings sample.[17] Wilcoxon tests of SP against M, S, and BJ favored SP, yielding t-statistics of 3.18, 2.85 and 1.45 respectively. These results are remarkably similar to those using Value Line.[18] This evidence suggests that Value Line's forecast superiority over time series models is not unique.

To ascertain whether the sample period posed unusual difficulties for time series earnings forecasting, a BJ model was fitted to the Quarterly Earnings Index of the Dow Jones Industrial Average over the 1951–1975 time period.[19] Average quarterly percentage errors ignoring sign produced by the BJ model for 1972–1975 were 7.31%, 6.61%, 9.99%, and 15.47% respectively. Since the mean and standard deviation of average percentage forecast errors over the 1951–1975 period were 10.14% and 4.38%, it appears that the 1972–1975 period was not a particularly difficult one in which to predict earnings. Indeed, from this standpoint, the 1972–1975 period is comparable to the "stable" years of the sixties, 1962–1967, studied by CM and EG.[20]

These results indicate that if appropriate hypothesis tests are applied to other analysts and time periods, the results are likely to parallel those using Value Line and the 1972–1975 time period.

E. *A Brief Investigation of Value Line Superiority*

To produce forecasts superior to time series models, Value Line must utilize information not contained in the time series of quarterly earnings. During the period between the most recent quarterly earnings announcement and the subsequent Value Line prediction, Value Line acquires incremental information which, if an important part of its total information set, may explain Value Line's

17. SP, published weekly, contains annual predictions made by Standard and Poor's and other investment firms. The SP prediction for each firm is that made by Standard and Poor's on the date closest to the Value Line prediction date.

18. V's t-statistics versus M, S, and BJ were 3.29, 3.11, and 1.28 respectively (See Table 2). A direct Wilcoxon test between V and SP favored $V(t = .77)$.

19. The sample period, 1972–1975, may appear "unusual" since it includes peacetime wage and price controls, high inflation and inventory profits, large changes in employment and new accounting requirements. If events arising during the sample period caused the earnings generating process to change, the forecast ability of the BJ modelling technique may be hampered, unintentionally favoring the analyst.

20. The average percentage errors were 12.67%, 10.71%, 7.03%, 4.93%, 6.08% and 5.26%, respectively for 1962–1967.

superiority. Information arising during this interval is likely to be most important for predicting next quarter's earnings. Assuming that the generation of this incremental information is positively related to the passage of time, earnings should be relatively easier to predict the further Value Line's prediction date is from the most recent earnings announcement date, and one quarter horizon forecast errors should be negatively related to the corresponding intervals.

To test this hypothesis, we obtained for the firms in the 1975 one quarter horizon sample their Value Line errors and the time intervals (7–70 days) since their most recent earnings announcements. A rank correlation was applied to these variables. The insignificantly negative Spearman rho which was obtained suggests that information obtained by Value Line during this interval has a negligible effect on its ability to predict next quarter's earnings.[21] This evidence is consistent with the hypothesis that Value Line's superiority can be attributed to its use of the information set available to it on the quarterly earnings announcement date, and not to the acquisition of information arising after the quarterly earnings announcement date.

III. Summary and Implications

Basic economic theory and the equilibrium employment of analysts, a higher cost factor than time series models, imply that analysts must produce better forecasts than time series models. Past studies ([9], [11]) of comparative earnings forecast accuracy have concluded otherwise but use inappropriate parametric tests and contain experimental biases. Using nonparametric statistics which provide proper yet powerful tests, we find that (1) BJ models consistently produce significantly better earnings forecasts than martingale and submartingale models; (2) Value Line Investment Survey consistently makes significantly better earnings forecasts than the BJ and naive time series models. The findings are in accord with rationality in the market for forecasts and the long-run equilibrium employment of analysts.

If market earnings expectations are rational [23], it follows that the best available earnings forecasts should be used to measure market earnings expectations. Given rational market expectations, our evidence of analyst superiority over time series models means that analysts' forecasts should be used in studies of firm valuation, cost of capital and the relationship between unanticipated earnings and stock price changes until forecasts superior to those of analysts are found.[22] Past findings ([2], [21]) that share price levels are significantly better explained by analysts' earnings

21. The lack of a significant negative correlation between prediction error and time since last announcement date may occur if the interval is intentionally lengthened by Value Line in order to acquire more information about the firms whose earnings are more difficult to predict. To test this possibility, we measured each firm's prediction "difficulty" by its average one quarter horizon percentage error ignoring sign yielded by its BJ model. No significant correlation was found between this variable and the time interval between the most recent quarterly earnings announcement and the Value Line prediction date.

22. In examining the relationship between unanticipated earnings and stock price changes, for example, the sign of the forecast error from a time series is often used ([7], [12], [13]) as a device for classifying unanticipated earnings into "favorable" or "unfavorable" categories. With this methodology, BJ and V classify earnings differently 213 times out of the 797 one quarter ahead forecasts in our sample.

forecasts than by those of time series models are consistent with our evidence and with market rationality.

The hypothesis of analyst superiority versus univariate time series models is derived from basic economic theory and is not limited to the case of earnings. It is therefore applicable to all types of forecasts subject to the market test. There is no presumption that other, non-market forecasts such as those made by corporate executives or government agencies should be better (or worse) than those generated by univariate time series models.

Appendix A

Sample Firms

Abbott Laboratories
Allegheny Ludlum Industries, Inc.
American Airlines, Inc.
Anaconda Company
Boeing Company
Borg-Warner Corporation
Braniff International Corporation
Caterpillar Tractor Company
Champion International Corporation
Chrysler Corporation
Clark Equipment Company
Colgate-Palmolive Company
Continental Can Company, Inc.
Curtiss-Wright Corporation
Cutler-Hammer, Inc.
Eastern Airlines, Incorporated
Eastman Kodak Company
Flintkote Company
Freeport Minerals Company
Fruehauf Corporation
GATX Corporation
General Electric Company
Goodrich (B. F.) Company
Gulf Oil Corporation
Homestake Mining Company
International Business Machines Corporation
International Paper Co.
Kennecott Copper Corporation
Leheigh Portland Cement Co.
Ligget Group Inc.
Lowenstein (M.) & Sons, Inc.
Nabisco, Inc.
National Distillers & Chemical Corporation
National Steel Corporation

Pan American World Airways, Inc.
Pepsico, Inc.
Phelps Dodge Corporation
Phillips Petroleum Co.
Pullman, Incorporated
Raybestos-Manhattan, Inc.
Republic Steel Corporation
Standard Brands, Inc.
Standard Oil Company of Indiana
Sterling Drug, Incorporated
St. Regis Paper Company
Timken Company
United States Gypsum Company
United States Steel Corporation
United Technologies Corp.
Wrigley (W. M.) Jr. Company

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INVESTOR GROWTH EXPECTATIONS AND STOCK PRICES

James Vander Weide and Willard Carleton

INTRODUCTION

Although it is widely recognized that growth expectations play an important role in share price determination, there is still considerable disagreement about how investors' growth expectations are measured. Earlier studies by Cragg and Malkiel ([3] and [4]) suggest that the consensus financial analysts' growth expectations are more highly correlated with stock prices than are growth expectations based on simple historical growth extrapolations. However, the Cragg and Malkiel work was based on a limited database of analysts' growth forecasts covering the period 1961 to 1968. Furthermore, compared to the more recent period of high inflation and interest rate volatility, the 1961-1968 period studied by Cragg and Malkiel was characterized by an unusual degree of stability.

Our study is an update for year-end 1981, 1982, and 1983 of the Cragg and Malkiel work. It relies on an extensive database of analysts' 5-year earnings growth rate forecasts available through the IBES ("Institutional Brokers Estimate System") service of Lynch, Jones & Ryan, a New York securities firm.[1] The results of our study confirm Cragg and Malkiel's basic findings

1 The forecasts, collected on a monthly basis, are by more than 2,000 analysts from over 100 New York and regional securities firms. Over 3,000 companies are included. Most large institutional investors subscribe to the IBES service. Although systematic coverage of earnings growth rate forecasts has been included in Lynch, Jones and Ryan's surveys only since January, 1982, the firm has been collecting analysts' forecasts of companies' earnings per share (one and two years ahead) for many years. These data themselves have been employed in several studies, e.g., Elton and Gruber [5] and Peterson and Peterson[10].

with respect to the role of consensus growth rate forecasts. They also reveal more ambiguities with respect to the measurement of risk, for which we provide both statistical and economic interpretation.

The significance of our study derives from the fact that the measurement of growth expectations plays a critical role in one of the commonly used techniques of cost of equity capital estimation.[2] All valuation, or cost of equity capital, models require for practical implementation market expectational variables which cannot be directly observed (company earnings, growth rate, return or excess return on the market portfolio, etc.). The Gordon model and its variants, in particular, have been criticized among other reasons for requiring such input. The evidence from this study suggests strongly that consensus growth forecasts are at the very least good surrogates for the unobserved market growth expectations.

THE STOCK PRICE MODEL

To study the effect of growth expectations on share prices, we need an explicit model of how share prices are determined. An appealing stock price model has recently been described in an interesting book by Cragg and Malkiel

2 Indeed, our initial research was conducted in response to the Federal Communications Commission's Notice of Proposed Rulemaking [6] which sought comments on methods for estimating the cost of capital for companies providing interexchange telecommunications services.

entitled Expectations and the Structure of Share Prices [4]. Cragg and Malkiel begin with the assumptions that (1) utility maximizing investors choose to hold diversified portfolios and (2) there are certain common elements of risk (i.e., common risk factors) that cannot be diversified away. Under these assumptions, they show that the equilibrium price on any security must be given (at least approximately) by the equation

$$p_j = \mu_j a_o + \sum_{k=1}^{K} \gamma_{jk} a_k \tag{1}$$

where p_j = security j's stock price,

μ_j = expected return on security j,

γ_{jk} = coefficient representing security j's sensitivity to the kth common factor,

a_k = coefficient representing the expected utility (in equilibrium) from a marginal increase in common factor k.

Now if investors expect that future security prices will also be determined by (1) and the a_k's still remain unchanged, then the expected return on security j at time t is given by

$$\mu_{jt} = E(d_{j,t+1}) + E\left(\mu_{j,t+1} a_o + \sum_{k=1}^{K} \gamma_{jk,t+1} a_k\right) \tag{2}$$

where $d_{j,t+1}$ is the dividend received in the next period and E is the expectation operator. Repeated substitution of (2) into (1), along with the assumption that dividends are expected to grow indefinitely at the constant rate g produces an appropriate stock price equation for period zero that is remarkably similar to the textbook version of the Discounted Cash Flow Model:

$$P_{jo} = d_{jo}(1 + g_j)/(\bar{\rho} - g_j) + \sum_{k=1}^{K} a_k \gamma_{jk} (1 + \bar{\rho})/\bar{\rho} \qquad (3)$$

where $\bar{\rho}$ is the risk-free rate.

Dividing both sides of equation (3) by the firm's current earnings, we see that the Cragg-Malkiel model implies the existence of a functional relationship between the security's price/earnings ratio and K + 3 other variables: the firm's dividend payout ratio, investors' growth expectation, the risk-free rate of interest, and K common risk factors. This is the functional relationship that we shall explore in the remainder of this study.

DESCRIPTION OF DATA

Our data sets include both historically-based measures of future growth and the consensus analysts' forecasts of 5-year earnings growth supplied by the Institutional Brokers Estimate System of Lynch, Jones & Ryan. They also include the firm's dividend-payout ratio and various measures of the firm's risk. The latter data items are included in the regression, along with earnings growth, to account for other variables that may affect the firm's stock price.

A more detailed description of our data set follows:

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 pre-tax 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 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. The contributing brokers have been selected by IBES "because of the superior quality of their research, professional reputation, and client demand." (IBES Monthly Summary book. [7])

5. Risk Variables Although there are a great many risk factors that could potentially affect the firm's stock price, most of these are highly correlated with one another. We have decided to restrict our attention to four risk measures that have intuitive appeal and are followed by many financial analysts. These include: a) B, the firm's "beta" as published by Value Line; b) Cov, the firm's pre-tax interest coverage ratio

price/earnings ratio (P/E) is calculated as the closing stock price for the year (i.e., year-end 1981, 1982 and 1983) divided by the consensus analyst earnings expectation for the forthcoming fiscal year, (i.e., 1982, 1983 and 1984).

3. Dividends Dividends per share represent the common dividends declared per share during the calendar year (it includes an 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 earnings per share for the forthcoming calendar year (D/E). Although this definition has the deficiency that it is obviously biased downwards (because 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 3).

4. Growth In comparing historically-based and consensus analysts' forecasts, we calculated 41 different historical growth measures. These included the following: a) the past growth rate in EPS as determined by a log-linear least squares regression for the latest year,[4] two years, three years ... and ten years, b) the past growth rate in DPS for the latest year, two

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

1. Earnings Per Share Since our goal is to determine which earnings variable is embodied in the firm's market price, we need to define this variable with great 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.

In this study, we defined "earnings" as the consensus analyst estimate (as reported by IBES) of the firm's earnings for the forthcoming year.[3] This definition approximates the normalized earnings that investors most likely have in mind when making stock purchase and sell decisions. It implicitly incorporates the analyst's adjustments for differences in accounting treatment among firms and the effects of the business cycle on each firm's results of operations. Although we at first thought that this earnings estimate might be highly correlated with the analyst 5-year earnings growth forecasts, this was not the case. Thus, a potential spurious correlation problem was avoided.

2. Price/Earnings Ratio Corresponding to our definition of "earnings", the

3 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. Since our results were insensitive to reasonable alternative definitions of "earnings", we only report the results for one definition in this paper.

(obtained from Standard & Poor's Compustat); c) Rsq, the stability of the firm's five-year historical EPS (measured by the R^2 from a log-linear least squares regression); and d) 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 more meaningful results could be obtained by imposing several restrictions on the companies included in our study. These restrictions are listed below:

A. 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 13-year period 1971-1983. Only companies with at least a 13-year operating history were included in our study.

B. Since 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 which experienced negative EPS during any of the years 1971-1983.

C. For similar reasons, we also eliminated companies which did not pay a dividend during any one of the years 1971-1983.

D. To insure comparability of time periods covered by each consensus earnings figure in the P/E ratios, we eliminated all companies which did not have a December 31 fiscal year-end.

E. To eliminate distortions caused by highly unusual events that impact current earnings; but not expected future earnings, and thus the firm's price/earnings ratio, we eliminated any firm having a price/earnings ratio greater than 50.

F. Since the evaluation of analysts' forecasts is a major part of this study, we eliminated all firms that were not followed by IBES.

Our final sample consisted of approximately 135 industrial and 65 utility firms.[5]

Linear Approximation

As noted earlier, our study is designed to test which estimate of expected dividend growth is embodied in current market prices. For this purpose, we shall employ a linear approximation to the stock price model (3) that takes the form:

$$(P/E)_j = a_o + a_1(D/E)_j + a_2g_j + a_3B_j + a_4Cov_j + a_5Rsq_j + a_6Sa_j + e_j \qquad (4)$$

where $(P/E)_j$ is firm j's price/earnings ratio, $(D/E)_j$ is firm j's dividend payout ratio, g_j is an estimate of firm j's future growth, B_j is firm j's Value Line beta, Cov_j is firm j's pre-tax interest coverage ratio, Rsq_j is a measure of the stability of firm j's five-year historical EPS, Sa_j is the

5 We use the word "approximately" because the set of available firms varied each year. However, in each case it was only from 0-3 firms on either side of the figures cited here.

standard deviation of the consensus analysts' five-year EPS growth forecast for firm j, and e_j is an error term that is assumed to obey the standard ordinary least squares (OLS) assumptions:

$$E(e_i) = 0 \qquad \text{for all } i = 1, 2, \ldots, n$$

$$E(e_i e_j) = \begin{matrix} 0 \\ \sigma_e^2 \end{matrix} \qquad \begin{matrix} \text{for } i \neq j;\ i,j = 1, 2, \ldots, n \\ \text{for } i = j;\ i,j = 1, 2, \ldots, n \end{matrix} \qquad (5)$$

$$E(e_i X_{ik}) = 0 \qquad \begin{matrix} \text{for all } i = 1, 2, \ldots, n \\ k = 1, 2, \ldots, m \end{matrix}$$

where n is the number of firms and m is the number of independent variables.

Although the use of the linear approximation to the price/earnings equation (3) is convenient for estimation purposes, there is a legitimate concern that it may seriously interfere with our ability to draw correct inferences from our study results. If the linear approximation to the price/earnings equation is not very accurate, then there is a high likelihood that the OLS assumptions (5) do not hold, and thus there exists the possibility of reaching incorrect conclusions.

RESULTS

To keep the number of calculations in our study at a reasonable level, we performed the study in two stages. In stage 1, all 41 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. Because we felt the results of our study might vary over time and across groups of firms, we performed our regressions on two groups of firms in each of three recent time periods. The two candidate groups of firms were (1) the S & P 400 Industrials and (2) the 178 utilities tracked by IBES, to the extent that these companies met our criteria for inclusion.

First-Stage Correlation Study

Table 1 (Parts A and B) contains 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 various time periods (one-year, two-year, three-year, etc.) 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 current year and its return on book equity for that year. In all, we calculated 41 historically-oriented growth rates for each group of firms in each study period.

The goal of the first-stage correlation analysis is to determine which historically-oriented growth rate is most highly correlated with each group's year-end P/E ratio. Ten-year BVPS has the highest correlation with the year-end P/E ratio in each year of the study period for the industrial group of firms (see Table 1A). For the utility group, 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 (see Table 1B). In all cases, the "plowback" estimate of future growth performed very poorly, indicating that it is not a factor in investors' expectations of future growth.

Table 1 (Part A)

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

Industrial Group

	Current Year	Historical Growth Rate Period in Years 1	2	3	4	5	6	7	8	9	10
1981											
EPS		-.04	-.06	-.14	-.10	-.09	-.06	-.00	-.00	-.01	-.02
DPS		-.03	-.04	.02	.08	.08	.09	.08	.08	.10	.09
BVPS		.14	.12	.12	.16	.19	.21	.24	.25	.25	.26
CFPS		-.06	-.00	.21	.03	.06	.08	.14	.14	.14	.16
Plowback	.23										
1982											
EPS		.01	-.06	-.13	-.17	-.07	-.07	-.02	-.00	-.03	-.03
DPS		-.14	-.13	-.13	-.03	.02	.00	.02	.00	.01	.04
BVPS		.06	.10	.10	.11	.14	.16	.17	.17	.18	.18
CFPS		-.03	-.07	-.07	-.08	-.03	.01	.06	.08	.07	.06
Plowback	.04										
1983											
EPS		-.05	-.22	-.25	-.21	-.21	-.16	-.16	-.14	-.14	-.12
DPS		-.05	-.10	-.10	-.11	-.09	-.08	-.06	-.05	-.04	.00
BVPS		-.07	-.01	-.04	-.04	-.02	-.01	-.01	.00	.00	.02
CFPS		.01	-.20	-.20	-.13	-.12	-.10	-.11	-.10	-.12	-.11
Plowback	-.21										

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Second-Stage Regression Study

In the second stage of our regression study, we ran regression 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 are shown in Table 2.

These results support at least four general conclusions regarding the pricing of equity securities. First, there is 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. Furthermore, the regression coefficients in the equation containing the consensus analysts' forecast 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. They are also consistent with the hypothesis that investors use analysts' forecasts, rather than historically-oriented growth calculations, in making stock buy and sell decisions.

Second, there is some evidence that investors tend to view risk in fairly traditional terms: the interest coverage variable is statistically significant in all but one of our samples and the stability of the operating income

Table 1 (Part B)

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

Utility Group

	Current Year	Historical Growth Rate Period in Years									
		1	2	3	4	5	6	7	8	9	10
1981											
EPS		-.02	.07	.03	.01	.03	.12	.08	.09	.09	.09
DPS		.05	.18	.14	.15	.14	.15	.19	.23	.23	.23
BVPS		.01	.11	.13	.13	.16	.18	.15	.15	.15	.15
CFPS		-.05	.04	.13	.22	.28	.31	.30	.31	-.57	-.54
Plowback	.19										
1982											
EPS		-.10	-.13	-.06	-.02	-.02	-.01	-.03	-.03	.00	.00
DPS		-.19	-.10	.03	.05	.07	.08	.09	.11	.13	.13
BVPS		.07	.08	.11	.11	.09	.10	.11	.11	.09	.09
CFPS		-.02	-.08	.00	.10	.16	.19	.23	.25	.24	.07
Plowback	.04										
1983											
EPS		-.06	-.25	-.25	-.24	-.16	-.11	-.05	.00	.02	.02
DPS		.03	-.10	-.03	.08	.15	.21	.21	.21	.22	.24
BVPS		.03	.10	.04	.09	.15	.16	.19	.21	.22	.21
CFPS		-.08	.01	.02	.08	.20	.29	.35	.38	.40	.42
Plowback	-.08										

variable is statistically significant in six of the twelve samples we studied, while the beta is never statistically significant and the standard deviation of the analysts' 5-year growth forecasts is statistically significant in only two of our twelve samples. However, this evidence is far from conclusive since, as we demonstrate later, there is a significant degree of cross-correlation among our four risk variables. This cross-correlation makes any general conclusions about risk extremely hazardous.

Finally, the study results suggest that our price/earnings model "works" significantly better for utilities than it does for industrials, as evidenced by the significantly higher R^2 values for the utility regressions. We shall explore the possibility that this result is explained by the fact that the linear approximation to our theoretical price/earnings equation is more exact for the utilities than for the industrials in the next section.

Table 2 (Part A)

Regression Results - Industrials
Model I - with P/E as Dependent Variable

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	a_0	a_1	a_2	a_3	a_4	a_5	a_6	R^2	F Ratio
1981	-9.15*	16.29*	20.54*	4.27	0.06*	4.27*	36.94*	0.45	18.82
	(2.61)	(8.01)	(3.30)	(1.63)	(2.69)	(3.19)	(4.93)		
1982	-6.52	18.19*	19.17*	-1.31	0.11*	7.63*	142.46	0.51	24.33
	(1.48)	(10.22)	(2.05)	(0.33)	(3.17)	(4.42)	(4.45)		
1983	-5.23	19.84*	18.08*	4.74	0.04*	2.27	30.19	0.41	16.12
	(1.45)	(9.18)	(2.22)	(1.55)	(1.65)	(1.64)	(1.44)		

Part B: Analysts

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

Year	a_0	a_1	a_2	a_3	a_4	a_5	a_6	R^2	F Ratio
1981	-15.30*	17.73*	101.45*	-0.19	0.06*	3.82*	-7.31	0.67	43.00
	(5.23)	(11.15)	(8.85)	(0.08)	(3.36)	(3.62)	(0.91)		
1982	-16.77*	18.98*	146.20*	-3.46	0.12*	3.09*	89.03	0.66	43.93
	(4.19)	(12.79)	(7.82)	(0.98)	(4.14)	(1.99)	(2.02)		
1983	-14.92*	19.83*	112.83*	4.85	0.04	-0.92	13.14	0.59	32.59
	(4.49)	(11.56)	(7.76)	(1.86)	(1.64)	(0.73)	(0.72)		

Notes:

* = Coefficient is significant at the 5% level (using a 1-tailed test) and has the correct sign.

The t-statistic is indicated in parentheses.

Table 2 (Part B)

Regression Results - Utilities
Model I - with P/E as Dependent Variable

Part A: <u>Historical</u>

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

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* (5.50)	10.31* (14.79)	7.67* (2.20)	3.24 (2.86)	0.54* (2.50)	1.42* (2.85)	57.43 (4.07)	0.83	46.49
1982	-2.90* (2.75)	9.32* (18.52)	8.49* (4.18)	2.85 (2.83)	0.45* (2.60)	-0.42 (0.05)	3.63 (0.26)	0.86	65.53
1983	-5.96* (3.70)	10.20* (12.20)	19.78* (4.83)	4.85 (2.95)	0.44* (1.89)	0.33 (0.50)	32.49 (1.29)	0.82	45.26

Part B: <u>Analysts</u>

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

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* (6.23)	10.62* (21.57)	54.85* (8.56)	-0.61 (0.68)	0.33* (2.28)	0.63* (1.74)	4.34 (0.37)	0.91	103.10
1982	-2.16* (2.59)	9.47* (22.46)	50.71* (9.31)	-1.07 (1.14)	0.36* (2.53)	-0.31 (1.09)	119.05* (1.60)	0.90	97.62
1983	-8.47* (7.07)	11.96* (16.48)	79.05* (7.84)	2.16 (1.55)	0.56* (3.08)	0.20 (0.38)	-34.43 (1.44)	0.87	69.81

<u>Notes</u>:
* = Coefficient is significant at the 5% level (using a 1-tailed test) and has the correct sign.

The t-statistic is indicated in parentheses.

STATISTICAL ISSUES

Although the results of our study provide convincing evidence in support of our conclusions, we feel it is important to investigate whether, and to what extent, our conclusions may have been affected by the nature of our statistical assumptions. In this section, we investigate (1) the amount of independent variation in the explanatory variables, (2) the accuracy of the linear approximation to the theoretical price-earnings relationship and (3) the effect of a possible misspecification of the risk variables.

Independent Variation in the Explanatory Variables

In an effort to understand why we were unable to find a strong and consistent relationship between firms' price-earnings ratios and their risk measures, we performed a principal-axis factor analysis (with a varimax rotation) of our six explanatory variables. The results are summarized in Tables 3 and 4.

Table 3 shows the cumulative percentage of the total variation in the six explanatory variables in each sample that is accounted for by the four principal components with the highest eigenvalues. In all cases, roughly 75% of the total variation in the six explanatory variables is accounted for by the first three principal components. This means that there are really at most three independent dimensions of variation in our explanatory variables and there may very well be less. In fact, the subsequent factor analysis demonstrates that there are really only two statistically significant independent dimensions of variation in all cases but one, where there are three (See Table 4). Thus, we should not be surprised to get less than a full set of significant coefficients in our regressions.

Table 4 displays the factor loadings of the six explanatory variables on the (two or three) statistically significant principal factors obtained from the factor analysis. We see that the six original variables tend to fall into two 3-member subgroups, whose members load on the same factor. In the utility sample, for instance, the three variables g_a, B and s_a always load heavily on one of the two factors, while the three variables D/E, Cov, and Rsq load heavily on the other. This means that the variables within each group are so highly correlated that it is virtually impossible to distinguish between them statistically.

Table 3

Cumulative Percentage of Total Variance Accounted for by Four Principal Components with Highest Eigenvalues in Descending Order

Principal Component	Study Group* 1-81	2-81	1-82	2-82	1-83	2-83
1	31%	40%	31%	34%	30%	35%
2	54%	64%	59%	62%	53%	62%
3	74%	78%	73%	75%	69%	74%
4	86%	88%	85%	85%	82%	86%

* The study groups are labeled to reflect both the year (1981, 1982, 1983) and whether the sample consisted of industrial firms (1) or utility firms (2).

Table 4 (Part A)

Rotated Factor Loadings of Industrial and Utility Firm Samples in 1981

Original Variable	Industrial Firms Factor 1	Industrial Firms Factor 2	Industrial Firms Factor 3	Utility Firms Factor 1	Utility Firms Factor 2
D/E	-0.056	0.822	-0.188	-0.677	-0.077
g_a	0.859	-0.290	0.143	0.372	0.861
B	0.132	-0.756	-0.183	0.370	0.565
Cov	0.036	0.371	0.736	0.668	0.357
Rsq	-0.103	-0.318	0.774	0.812	-0.001
Sa	0.898	0.062	-0.195	-0.423	0.793

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Table 4 (Part B)

Rotated Factor Loadings of Industrial and Utility Firm Samples in 1982

Original Variable	Industrial Firms Factor 1	Industrial Firms Factor 2	Utility Firms Factor 1	Utility Firms Factor 2
D/E	-0.717	0.030	-0.170	-0.649
g_a	0.732	0.303	0.817	0.371
B	0.222	0.801	0.827	0.032
Cov	0.343	-0.369	-0.119	0.771
Rsq	0.774	-0.371	-0.011	0.750
Sa	-0.094	0.815	0.733	-0.251

Table 4 (Part C)

Rotated Factor Loadings of Industrial and Utility Firm Samples in 1983

Original Variable	Industrial Firms Factor 1	Industrial Firms Factor 2	Utility Firms Factor 1	Utility Firms Factor 2
D/E	-0.638	0.073	0.004	-0.750
g_a	0.740	0.345	0.882	0.181
B	0.039	0.716	0.775	-0.008
Cov	0.402	-0.483	0.255	0.670
Rsq	0.764	-0.237	-0.226	0.633
Sa	-0.029	0.756	0.712	-0.497

Accuracy of Linear Approximation

Since nonlinearity can be a serious problem in statistical inference, we need to test carefully how closely the linear equation (4) approximates the true price/earnings relationship (3). A straightforward approach is to run an OLS regression, assuming that (4) is reasonable (and hence (5) applies), and then to examine the appropriate test statistics to see whether the linear approximation "works". (see Theil [11])

On the other hand, there are at least two drawbacks to the straightforward approach to testing for nonlinearity. Since the straightforward approach makes no assumption about the form of the nonlinear relationship we are testing for, it is necessarily an indirect, and hence not very powerful, test. Furthermore, the test itself is biased by the fact that the covariance matrix of the least squares residuals is generally nonscalar (i.e, $Var(e) \neq \sigma^2 I$), even when the covariance matrix of the true residuals is scalar. Thus, uncorrelated disturbances do not guarantee that the OLS residuals are uncorrelated.

Given the above uncertainties with the straightforward approach to testing for nonlinearity and the importance of the linear assumption to the interpretation of our results, we conducted a second test of the reasonableness of the linear approximation to the price/earnings equation (3), using the multi-variable version of Taylor's Theorem. For the purposes of this test, we ignored the risk variables appearing in (3), since they clearly appear in a strictly linear form.

From Taylor's Theorem[6], we know that any continuous function $f(p)$ of two variables with continuous derivatives up to third order in a neighborhood of the point $p_o = (x_o, y_o)$ can be expressed as

$$f(p) = f(p_o) + \frac{(x-x_o)}{1} \left.\frac{\partial f}{\partial x}\right|_{p_o} + \frac{(y-y_o)}{1} \left.\frac{\partial f}{\partial y}\right|_{p_o} \qquad (6)$$

$$+ \frac{(x-x_o)^2}{2!} \left.\frac{\partial^2 f}{\partial x^2}\right|_{p^*} + \frac{(x-x_o)(y-y_o)}{1! \quad 1!} \left.\frac{\partial^2 f}{\partial x \partial y}\right|_{p^*} + \frac{(y-y_o)^2}{2!} \left.\frac{\partial^2 f}{\partial y^2}\right|_{p^*}$$

where $p = (x,y)$ and p^* is a point on the line segment joining p_o and p. Applying this knowledge to the nonlinear term in equation (3), we have

$$p_{jo}(D,g) = \frac{(1+\bar{g})\bar{D}}{\bar{\rho} - \bar{g}} + \frac{(1+g)}{\bar{\rho} - g}(D-\bar{D}) + \frac{(\bar{\rho}+1)}{(\bar{\rho}-g)^2}(g-\bar{g}) + R_n(D,g) \qquad (7)$$

where a bar over a variable indicates the mean value of that variable and R_n is the sum of second order terms evaluated at (D^*, g^*).

Let us denote the first order Taylor approximation to $p_{jo}(D,g)$ by p_L. Then we can investigate the relative accuracy of the linear approximation to equation (3) by calculating

$$\frac{p_{jo} - p_L}{p_{jo}}$$

for various values of D and g. Table 5 (Parts A and B) shows the resulting calculations for 20 D and g values taken from both the industrial and utility samples. The only criterion used in selecting these values was that the firm's

6 Buck, R. Creighton and E. F. Buck, <u>Advanced Calculus</u>, McGraw-Hill Book Company, New York, 1965, pp. 260-261.

TABLE 5 (PART A)

Analysis of Accuracy of Linear Approximation for 20 D/E and

g Values Taken from Industrial Sample

D/E	g	p	p_L	$\frac{p-p_L}{p}$
0.518	0.104	35.742	35.113	0.176
0.539	0.109	54.341	82.273	-0.514
0.863	0.092	33.657	32.096	0.046
0.499	0.099	26.114	21.852	0.163
0.390	0.095	17.082	13.974	0.182
0.794	0.107	67.612	77.936	-0.153
0.286	0.093	11.578	9.470	0.182
0.382	0.103	24.785	22.534	0.091
0.534	0.113	84.906	238.466	-1.809
0.516	0.101	29.901	25.993	0.131
0.419	0.103	27.186	24.935	0.083
0.365	0.109	36.799	64.730	-0.759
0.541	0.108	49.952	67.492	-0.351
0.564	0.111	69.623	135.132	-0.941
0.801	0.109	80.755	108.687	-0.346
0.317	0.101	18.369	14.461	0.213
0.408	0.109	41.134	69.065	-0.679
0.627	0.111	77.400	142.909	-0.846
0.469	0.082	13.354	17.446	-0.306
0.863	0.092	33.657	32.096	0.046

Note: $\overline{D/E}$ = 0.71

$\bar{g}$ = 0.061

$\bar{\rho}$ = .12

TABLE 5 (PART B)

Analysis of Accuracy of Linear Approximation for D/E and

g Values Taken from Utility Sample

D/E	g	P	P_L	$\frac{P-P_L}{P}$
0.603	0.063	11.234	11.985	-0.066
0.633	0.054	10.109	9.910	0.020
0.545	0.064	10.355	11.277	-0.089
0.927	0.043	12.592	12.237	0.028
0.659	0.087	21.707	41.089	-0.893
0.646	0.030	7.393	7.443	-0.007
0.550	0.081	15.245	25.152	-0.650
0.755	0.036	9.312	9.131	0.019
0.631	0.067	12.703	14.309	-0.126
0.637	0.069	13.352	15.550	-0.165
0.567	0.065	10.979	12.105	-0.103
0.668	0.052	10.334	10.050	0.028
0.630	0.085	19.530	35.035	-0.794
0.880	0.047	12.621	12.247	0.030
0.923	0.050	13.845	13.506	0.025
0.946	0.038	11.975	11.732	0.020
0.729	0.046	10.305	9.929	0.036
0.695	0.055	11.280	11.138	0.013
0.849	0.053	13.343	13.098	0.018
0.713	0.055	11.573	11.430	0.012

Note: $\overline{D/E} = 0.61$

$\bar{g} = 0.061$

$\bar{\rho} = .12$

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growth estimate had to be less than the risk-free rate $\bar{\rho}$, which we chose to be 12% since this was indicative of rates on long-term U. S. government securities in the 1981-83 period. The use of this criterion meant that we excluded certain industrial firms with extremely high growth expectations; it had no effect on our choice of utility company values. We included observations from all three years of our study.

On the basis of this investigation and our further statistical tests, we believe that at least three conclusions regarding the accuracy of the linear approximation are justified:

1. The linear approximation is reasonably accurate for sample values of the independent variables centered around the mean observations.
2. The linear approximation is considerably more reasonable for the utility sample than it is for the industrial sample (which helps to explain why the R^2s in the utility regressions are higher).
3. The accuracy of the linear approximation can be improved by eliminating extreme observations.

Possible Misspecification of Risk

Since the stock valuation theory says nothing about which risk variables are most important to investors, we need to consider the possibility that the risk variables of our study are actually only proxies for the "true" risk variables used by investors. It is well known that 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.[7]

7 See Maddala, G.S., Econometrics, McGraw-Hill Book Company, New York, 1977, pp. 158-162.

Table 6 (Part A)

Regression Results -- Industrials
Model II - with P/E as Dependent Variable

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	-0.59 (.39)	15.40 (7.48)*	31.33 (4.93)*	.30	30.30
1982	-0.31 (0.15)	17.97 (9.03)*	40.75 (4.30)*	.36	40.79
1983	2.09 (1.14)	19.03 (8.89)*	22.17 (2.81)*	.37	41.80

Part B: Analysts

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

Year	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	R^2	F Ratio
1981	-10.99 (6.34)*	16.88 (10.46)*	95.31 (10.31)*	.57	88.79
1982	-17.60 (6.52)*	18.30 (12.16)*	172.41 (9.68)*	.59	98.58
1983	-9.95 (4.85)*	19.28 (11.86)*	111.00 (8.40)*	.58	92.79

Notes:

* = Coefficient is significant at the 5% level (using a 1-tailed test) and has the correct sign.

The t-statistic is indicated in parentheses.

Table 6 (Part B)

Regression Results - Utilities
Model II - with P/E as Dependent Variable

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 (1.61)	9.59 (12.13)*	21.20 (7.05)*	.73	82.95
1982	0.54 (1.38)	8.92 (17.73)*	12.18 (6.95)*	.83	167.97
1983	-0.75 (1.13)	8.92 (12.38)*	12.18 (7.94)*	.77	107.82

Part B: Analysts

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

Year	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	R^2	F Ratio
1981	3.96 (8.31)*	10.07 (20.91)*	60.53 (15.79)*	.90	274.16
1982	-1.75 (4.00)*	9.19 (21.35)*	44.92 (11.06)*	.88	246.36
1983	-4.97 (6.93)*	10.95 (15.93)*	82.02 (11.02)*	.83	168.28

Notes:

* = Coefficient is significant at the 5% level (using a 1-tailed test) and has the correct sign.

The t-statistic is indicated in parentheses.

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 regression equation (4) with the risk variables excluded. The results of these regressions are shown in Table 6 (Parts A and B). 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 database 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 database, we have conducted extensive studies that 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 those valuation models whose input includes expected growth rates.

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Exhibit AG 1-20

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THE ACCURACY OF LONG-TERM EARNINGS FORECASTS IN THE ELECTRIC UTILITY INDUSTRY

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This paper examines the accuracy of various methods of forecasting long-term earnings growth for firms in the electric utility industry. In addition to a number of extrapolative techniques, *Value Line* analyst forecasts are also evaluated. *Value Line* analyst forecasts for a five-year time horizon are found to be superior to many of the extrapolative models. Among the extrapolative models examined, implied growth and historical book value per share growth rate models performed best. These results provide strong support for using *Value Line* growth forecasts in cost of capital estimates for electric utilities in the context of utility rate cases. *Value Line* forecast errors could be explained by changes in dividend payout ratios, the firm's regulatory environment and bond rating changes.

Keywords: Earnings forecasting, Utility forecasting, Analysts' forecasts, Electric utilities.

1. Introduction

A central issue in most public utility rate cases is the determination of the cost of equity capital for the utility. In the regulatory process the return required by investors is considered a legitimate cost of doing business that is appropriately charged to customers. Other things being equal, the lower the rate of return which a utility is permitted to earn from its customers, the higher the level of customer welfare. However, if the utility does not have the opportunity to earn investor-required rates of return on capital, investment in plant and equipment will lag and the demand for service at the established price will be greater than the utility can supply. Accordingly, it is important to permit a utility to earn a fair return on its invested capital in order to assure that adequate levels of service will be provided.

Two landmark judicial decisions have provided the general framework within which this analysis must be done. The Supreme Court concluded in the Bluefield Water Works case [Bluefield Water Works (1923)] that the 'return must be reasonably sufficient to ... support its credit and enable it to raise the money necessary for the proper discharge of its public duties.' Recognition must be given to the returns currently earned 'on investments in other business undertakings which are attended by

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corresponding risks and uncertainties ...'. In the Hope Natural Gas case [Federal Power Commission (1944)] the Supreme Court stated that the return must also enable a firm to 'maintain its credit and attract capital'.

These judicial guidelines provide a general framework for implementing the determination of the cost of equity capital in utility rate cases. Neither the Hope nor the Bluefield decisions provides guidance about what specific method(s) should be used to establish the cost of equity. In the Hope case, the Court stated that 'under the statutory standard of 'just and reasonable' it is the result reached not the method employed which is controlling' [Federal Power Commission (1944, p. 603)].

In contrast, the rich academic literature in this area has emphasized the appropriateness of various methods employed to determine the cost of equity capital [Brigham and Gordon (1968), Elton and Gruber (1971), Gordon (1974), Gordon and Gould (1978), Litzenberger, Ramaswamy and Sosin (1980), Myers (1972) and Robichek, Higgins and Kinsman (1973)]. In practice, three models have dominated recent utility rate cases. These are the capital asset pricing model, the comparable earnings model, and the constant-growth form of the dividend valuation model (often called the DCF or discounted cash flow methodology).

This paper focuses on the DCF model as it is commonly applied in utility rate cases. Specifically, we examine the long-term accuracy of a number of forecasting techniques which are used to estimate the growth rate component in the DCF cost of equity model. [1] Based on a rational expectations view of the formation of investor expectations, [2] we find support for the use of *Value Line* analyst forecasts, [3] implied growth techniques, and historical book value growth rate models. However, *Value Line* forecast accuracy deteriorates significantly if the forecast is evaluated over a three or four year time horizon rather than the maximum five year horizon reported by *Value Line*.

Section 2 of the paper develops the DCF model as it is normally applied in rate cases. Section 3 describes the data used, and Section 4 discusses the various forecasting techniques tested. In Section 5 the statistical tests used in the analysis are discussed; Section 6 presents the results of the tests. Section 7 reports the results of tests conducted to explain the errors in *Value Line* analyst forecasts. Section 8 offers conclusions and implications.

2. The DCF model

The DCF model of valuation is based on the proposition that the value of a share of stock is equal to the present value of all expected future dividends, discounted at the shareholders' required rate of return. Expert witnesses in utility rate cases commonly rely on a constant growth form of the basic dividend valuation model, such as $k_e = D_1/P_0 + g$, as the basis for their cost of equity recommendations. [4] Expert witnesses do so because it is thought that many utility firms meet or nearly meet the requirements necessary to use the constant growth DCF model. Whether the constant growth DCF

[1] There is an extensive literature, including Brown and Rozeff (1978), Cragg and Malkiel (1968), Elton and Gruber (1972), Johnson and Schmitt (1974) and Ruland (1980) that considers the accuracy of short-term forecasting models. With the exception of a recent paper by Rozeff (1983), there has been very little analysis of the accuracy of long-term earnings forecasts.

[2] We use the term 'rational expectations' in the same sense as Sargent (1972, p. 74), and Brown and Rozeff (1978, p. 1). We use the term, basically, to mean that rational investors' expectations are the same as the best availabe forecasts.

[3] *Value Line* is a well-known, widely available, investment advisory service which is published quarterly and includes, among other things, five year earnings forecasts for the over 1700 firms followed by the service.

[4] Twenty-four witnesses who were authorities on the cost of capital testified before the Federal Energy Regulatory Commission in eleven separate rate cases between 1980 and 1982. An analysis of their testimony showed that all used $k_e = D_1/P_0 + g$ as the basis of their DCF analysis, where k_e is the cost of equity capital, D_1 is dividends expected over the next period, P_0 is the current market price of the firm's stock and g is the long-term perpetual growth rate in dividends.

model or the non-constant growth model is employed, long-term (three to five year) earnings and dividend growth forecasts are essential inputs.

The application of this model invariably results in considerable controversy among expert witnesses regarding the appropriate method by which to estimate the growth (g) component. Theoretically, this growth component is the growth rate expected by investors at the margin. Since expectations cannot be directly observed, experts focus on a wide range of alternative techniques as a proxy for g. According to the rational expectations hypothesis [Sargent (1972)], the best forecasting method should be used to estimate g. In practice, proxies for g have included historical earnings and dividend growth rates, historical book value growth rates, implied growth rates (the product of the retention ratio times the return on book equity), and analysts' forecasts such as *Value Line*.

This paper examines the long-term accuracy of different methods of forecasting earnings growth of electric utility corporations and compares the results with *Value Line* forecasts of future earnings growth. On an ex-post basis the different methods are evaluated to determine the most accurate, long-range (three to five year) forecast. [5]

3. The data

The sample consists of the ninety-eight electric utilities that *Value Line* followed between 1971 and 1976 and the ninety-three electric utilities followed by *Value Line* between 1977 and 1982. Per share data have been adjusted for stock splits and dividends. Generally, *Value Line* reports on each firm four times a year. The *Value Line* data come from its second quarterly report of each year since this is the first *Value Line* report which generally includes actual data for the previous year. For example, *Value Line* earnings forecasts for 1976 are those reported in its second quarterly report in 1972.

All data, both actual earnings and forecasts of earnings, have been converted to compound annual growth rates. Hence, all comparisons of forecast accuracy are based on annual growth rates. Two five-year forecast horizons are used in the analysis: 1971-1976 and 1977-1982. *Value Line* makes its earnings per share forecasts for a three-year range, e.g., the forecast made in 1972 (which is conditional on actual 1971 data) is for the 1974-1976 time period. Thus, forecasted *Value Line* growth rates can be computed assuming a three, four, or five-year horizon. We considered each possible *Value Line* horizon in the paper, i.e., earnings forecasting accuracy is evaluated for the 1971-1974, 1971-1975 and the 1971-1976 time periods, as well as the 1977-1980, 1977-1981, and the 1977-1982 time periods.

These time periods are especially important for the electric utility industry because of the unsettled conditions prevailing in that industry through the 1970s. These conditions include the effects of rapidly escalating fuel costs, the need to convert large amounts of capacity from natural gas and oil to coal and nuclear power, and the impact of high inflation and rapidly rising capital costs.

4. Forecasting methods

The forecasting methods tested have been selected for analysis because of their use in prior studies and because of the extent to which they are commonly used in utility rate cases. These methods are:

X2. *Value Line* 3, 4, and 5-year earnings forecast.
X3. The 5-year historical compound dividend per share growth rate; for example, the 1971-1976 forecast horizon uses the actual annual compound growth rate from 1966-1971.

[5] The three to five year horizon was chosen since this is the longest forecast horizon available from *Value Line* analysts.

X4. The 5-year historical compound earnings per share growth rate.
X5. The 5-year historical compound book value per share growth rate.
X6. The 10-year historical compound dividend per share growth rate.
X7. The 10-year historical compound earnings per share growth rate.
X8. The 10-year historical compound book value per share growth rate.
X9. The 5-year average implied earnings growth rate, i.e., the 5-year historical average return on equity times the 5-year historical average retention rate.
X10. The 10-year average implied earnings growth rate.
X11. The current implied earnings growth rate (e.g., the implied growth rate for the 1971-1976 forecasting horizon is equal to the return on equity in 1971 times the 1971 retention rate).
X12. Brigham-Shome method of smoothing to compute the implied earnings growth rate [Brigham and Shome (1981)]; for example, the implied growth rate for the 1971-1976 forecasting horizon is equal to smoothed *ROE* times smoothed retention rate and the smoothed *ROE* is computed as

$$0.1ROE_{t-4} + 0.2ROE_{t-3} + 0.3ROE_{t-2} + 0.4ROE_{t-1} = ROE \text{ forecast.}$$

A similar computation is done for the retention rate forecast.
X13. The growth rate computed from the following trend line in book value per share (*BPS*) over a five year period

$$\ln BPS = a + bt.$$

X14. Same as X13 except for the use of 10 years of historical data.
X15. The growth rate computed from a trend line in dividends per share over a 5-year period.
X16. Same as X15 except for the use of 10 years of historical data.
X17. The growth rate computed from a trend line in earnings per share over a 5-year period.
X18. Same as X17 except for the use of 10 years of historical data.

X1 is defined as the actual 3, 4 or 5-year compound annual growth rate in earnings per share, e.g., the growth rate for the 1971 to 1976 time horizon is the actual compound annual growth computed using 1971 earnings per share as the start point and 1976 earnings per share as the end point. Similar computations are made for each horizon.

5. Statistical tests

First we examined the directional relationship between individual forecasts and actual earnings per share (*EPS*) growth rates. Kendall rank order correlations were calculated between the forecasted growth rates for each of the forecasting methods and the actual earnings growth rates. Next, similar to Rozeff (1983), the average deviation (average forecast growth minus average actual growth), mean absolute error (*MABE*) and root mean square error (*RMSE*) were calculated for each forecasting method. The *MABE* is the sample average of the absolute value of the forecast error calculated for each forecast method on the entire sample of firms. The *RMSE* is the square root of the sample average of the squared forecast error. As such, *RMSE* gives more weight to large forecast errors than does *MABE*.

A method similar to that used by Brown and Rozeff (1978) was employed to test for significant differences in the accuracy of each forecasting model and of *Value Line*. The measure of forecast accuracy used was the absolute value of the difference between forecasted growth in *EPS* for each of n forecast methods (for each time horizon) over i firms (g_{in}) and actual growth in *EPS* over the same horizon (a_i), or $|g_{in} - a_i|$. The forecast errors were then compared across firms.

We used the Friedman test [Friedman (1937)] to test for the relative accuracy of all forecasting methods. The test criterion was the magnitude of forecast error. In practice the distribution of the Friedman test statistic is usually approximated by the chi-square distribution as in Brown and Rozeff (1978), but recent studies by Iman and Davenport (1980) show that the *F*-distribution approximation is superior to the chi-square approximation. Hence, the *F*-distribution approximation to the Friedman test is employed to test the null hypothesis that all seventeen forecasts are equally accurate. If the null hypothesis is rejected, we may conclude that at least one forecasting method is superior to at least one other.

The next step in evaluating the relative accuracy of the forecasting methods was to compare forecast accuracy across firms using pairwise comparisons between forecasts. These comparisons test the accuracy of a method's forecasts against each of the other methods' forecasts using a least significant difference test statistic developed by Conover (1980, p. 300). The Wilcoxian signed ranks test can also be used for these pairwise comparisons as in Brown and Rozeff (1978), but this least significant difference test is more powerful [Conover (1980)]. The null hypothesis tested is that one method's forecasts are as accurate as another method's forecasts.

6. Empirical results

Exhibit 1 reports the Kendall rank order correlations between each of the forecasting methods and the actual earnings per share growth for the two five-year forecast horizons. In both five-year periods,

Exhibit 1
Kendall rank order correlations between actual 5-year annual earnings growth rates and earnings forecasts.

Method	Period 1 (1971-1976)	Period 2 (1977-1982)
X2	0.214 [a]	0.269 [a]
X3	−0.153 [b]	−0.118 [c]
X4	−0.093	−0.058
X5	0.013	0.151 [b]
X6	0.021	0.105
X7	−0.020	0.084
X8	0.013	0.033
X9	−0.137 [b]	0.078
X10	−0.091	0.042
X11	−0.209 [a]	−0.164 [b]
X12	−0.149 [b]	0.024
X13	−0.010	0.112
X14	0.006	0.077
X15	0.020	0.193 [a]
X16	0.007	0.109
X17	−0.132 [c]	−0.108
X18	−0.085	0.065

[a] Significant at 1% or better.
[b] Significant at 5%.
[c] Significant at 10%.

Exhibit 2
Summary of error statistics 1971–1976.

Method	Average deviation (forecast–actual)	*MABE*	*RMSE*
X2	0.021	0.036	0.044
X3	−0.013	0.047	0.066
X4	0.013	0.042	0.053
X5	0.006	0.038	0.051
X6	0.016	0.039	0.048
X7	0.003	0.037	0.046
X8	0.013	0.039	0.050
X9	−0.002	0.036	0.046
X10	0.000	0.035	0.045
X11	−0.007	0.040	0.056
X12	−0.004	0.037	0.049
X13	0.007	0.038	0.046
X14	0.009	0.036	0.045
X15	0.000	0.038	0.050
X16	0.015	0.039	0.047
X17	−0.017	0.050	0.070
X18	0.007	0.040	0.050

Value Line forecasts (X2) are positively and significantly correlated with actual earnings growth.

In period 1, no other forecasting method is both significant and positively correlated with actual earnings growth. In period 2, methods X5 (five-year compound book value per share growth) and X15 (five-year trend line growth in dividends per share) also have statistically significant positive correlations.

Exhibit 1 provides strong cross-sectional evidence of the superiority of *Value Line* forecasts in capturing movement in the *direction* of earnings growth rates. Thus, *Value Line* forecasts higher growth for firms which later show higher growth, and lower growth for firms which later show lower growth. During the highly unstable periods included in the forecast horizons, only *Value Line* forecasts consistently reflected the direction of movement in actual earnings growth rates for the electric utility industry.

Exhibit 1 does not, however, show any indication of the accuracy of *Value Line* relative to alternative forecasting techniques. From a cost of capital perspective, accuracy in forecasting is of greatest importance. Exhibits 2 and 3 report the average deviation, mean absolute error and root mean square error for the two five-year forecast horizons.

The *Value Line* average deviation is the largest in period 1 at 2.1%, but the lowest in period 2 at 1%. In both periods it is positive, indicating that *Value Line* forecasts tend to be on the high side. Hence, it appears that in the long-term (five years) *Value Line* is relatively successful in forecasting the *direction* of future earnings movements, but there is a tendency to overestimate the size of this earnings growth. In order to verify this initial conclusion we next look at two other measures of overall forecasting accuracy – the *MABE* and *RMSE*.

Value Line has a relatively low *MABE* in period 1. Only X10 (ten-year average implied growth of *EPS*) is lower; X9 (five-year average implied growth) and X14 (ten-year trend line growth in book value) are equivalent. In period 2 *Value Line* has the lowest *MABE*. *Value Line* appears even better when accuracy is evaluated using *RMSE*. In both periods *Value Line* has the lowest *RMSE*.

Thus, in addition to forecasting successfully the direction of movement, *Value Line* is relatively accurate as a predictor of the future growth rate itself. Its forecasts tend to be on the high side but

Exhibit 3
Summary of error statistics 1977–1982.

Method	Average deviation (forecast–actual)	*MABE*	*RMSE*
X2	0.010	0.039	0.059
X3	−0.030	0.067	0.094
X4	−0.019	0.053	0.075
X5	−0.013	0.044	0.063
X6	−0.013	0.044	0.063
X7	−0.024	0.051	0.070
X8	−0.011	0.045	0.065
X9	−0.016	0.046	0.067
X10	−0.013	0.045	0.065
X11	−0.015	0.052	0.074
X12	−0.017	0.048	0.070
X13	−0.027	0.052	0.070
X14	−0.014	0.045	0.065
X15	−0.012	0.045	0.068
X16	−0.016	0.046	0.065
X17	−0.015	0.065	0.093
X18	−0.020	0.049	0.071

when compared to the sixteen mechanical forecasting methods, it is among the most accurate.

Finally, we consider two statistical tests of relative accuracy – the Friedman test and the least significant difference test. Exhibits 4 and 5 report the results from these two tests for periods 1 and 2 respectively. The Friedman test rejects the null hypothesis at the 1% level for both periods. Thus, the alternative hypothesis that at least one forecasting method is more accurate than at least one other forecasting method may be accepted.

The least significant difference test of the multiple pairwise comparisons is performed at a 5% significance level. The results indicate that *Value Line* is dominated only by X10 (ten-year average implied growth) in period 1 and is not dominated by any forecasting method in period 2.

Several of the forecasting methods performed exceedingly well in the multiple pairwise comparisons. X5, X8 (five and ten-year compound book value per share growth), X9, X10 (five and ten-year average implied growth), X14 (ten-year trend line growth in book value), and X15 (five-year trend line growth in dividends) are not dominated by any other forecasting method in either period.

In summary, *Value Line* performs very well relative to the 16 extrapolative forecasting methods in the five-year forecast horizons. It is relatively successful at forecasting the direction of future earnings growth. Also, the *MABE*, *RMSE*, and multiple pairwise comparisons indicate that *Value Line* is relatively accurate in predicting the actual future growth rate.

Value Line forecasts are made for a three to five-year forecast horizon. The preceding results have focused on the five-year horizon. Identical statistical tests were performed for two three-year horizons (1971–1974 and 1977–1980) and two four-year horizons (1971–1975 and 1977–1981). Because *Value Line* forecasts per share earnings for a three to five-year horizon, the calculated growth rate will be greater the shorter the horizon. Since the *Value Line* forecasts tended to overestimate the actual growth rate for five-year horizons, one would expect the same dollar earnings forecast for a three or four-year horizon to perform less well.

The correlation results for three and four-year horizons are similar to those for five years. *Value Line* forecasts are positively and significantly correlated with actual earnings growth in both periods for both the three and four-year horizons. In addition to *Value Line*, only X5 and X10 are significant

Exhibit 4
Multiple pairwise comparisons period 1 (1971-1976). ᵃ

	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	Times superior	Times inferior
X2			+						−									1	1
X3								−	−		−		−	−				0	5
X4	−			−		−	−	−	−	−	−		−	−				0	10
X5			+													+		2	0
X6								−	−									0	2
X7			+													+		2	0
X8			+													+		2	0
X9		+	+		+							+			+	+	+	7	0
X10	+	+	+		+							+			+	+	+	8	0
X11			+													+		2	0
X12		+	+													+		3	0
X13								−	−									0	2
X14		+	+													+		3	0
X15		+	+													+		3	0
X16								−	−									0	2
X17				−		−	−	−	−	−	−		−	−				0	9
X18								−	−									0	2

ᵃ Friedman test. F-value is 2.63, significant at 1% level. A plus sign (negative sign) in the table indicates the forecast method represented by the row is superior (inferior) to the forecast method represented by the column at a significance level of 5%.

Exhibit 5
Multiple pairwise comparisons period 2 (1977-1982). ᵃ

	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	Times superior	Times inferior
X2		+	+			+				+		+				+		6	0
X3	−			−	−	−	−	−	−	−	−	−	−	−	−		−	0	14
X4	−			−	−		−	−	−		−		−	−	−		−	0	11
X5		+	+			+				+		+				+	+	7	0
X6		+	+			+				+		+				+	+	7	0
X7	−	+		−	−		−	−	−		−		−	−	−			1	10
X8		+	+			+				+		+				+		6	0
X9		+	+			+				+		+				+		6	0
X10		+	+			+				+		+				+		6	0
X11	−	+		−	−		−	−	−				−	−	−			1	9
X12		+	+			+						+		−		+		5	1
X13	−	+		−	−		−	−	−		−		−	−	−			1	10
X14		+	+			+				+		+				+		6	0
X15		+	+			+				+	+	+				+	+	8	0
X16		+	+			+				+		+				+		6	0
X17	−			−	−		−	−	−		−		−	−	−		−	0	11
X18		+	+		−									−		+		3	3

ᵃ Friedman test. F-value is 8.24, significant at 1% level. A plus sign (negative sign) in the table indicates the forecast method represented by the row is superior (inferior) to the forecast method represented by the column at a significance level of 5%.

and positively correlated. Moreover, this phenomenon persists only in period 2 for three and four-year horizons.

The average deviation, *MABE*, and *RMSE* show *Value Line*'s forecast to decline appreciably in relative accuracy. With the exception of the *RMSE* in period 2 of the three and four-year horizons, *Value Line* is outperformed in these measures of relative accuracy by all or most of the sixteen forecasting methods.

The multiple pairwise comparisons for the four-year horizon still show *Value Line* to be relatively accurate. It is less accurate than only one method in both periods. However, for the three-year horizon, it is less accurate than all the other methods in period 1 and less accurate than 14 of 16 methods in period 2. [6]

These results indicate that, whether it is intentional or not, *Value Line* tends to forecast most accurately to the five-year end of their three to five-year forecast horizon. In forecasting earnings for a five-year horizon, *Value Line* is very successful relative to the sixteen extrapolative forecasting methods examined in this study.

7. Error analysis of value line forecasts

The results reported in section 6 indicate that *Value Line* earnings growth rate forecasts for a five-year horizon are significantly, positively correlated with actual earnings growth rates. In addition, *Value Line* forecasts have mean absolute errors and root mean square errors which are among the lowest when compared with the sixteen extrapolative models. The multiple pairwise comparison tests reported in exhibits 4 and 5 indicate that *Value Line* forecasts are less accurate than only one other forecast method in the 1971-1976 period, and are not less accurate than any other method during the 1977-1982 period.

In this section we perform a micro-analysis of errors in order to discover causes for over and under-estimates of forecasted earnings growth rates made by *Value Line*. This analysis can help users of *Value Line* earnings forecasts to identify instances where *Value Line* forecasts are likely to be least reliable.

We have examined a number of firm-specific/regulatory environment variables which might be expected to influence the accuracy of *Value Line* forecasts. These variables are

(1) *Regulatory environment. Value Line* rates the regulatory environment faced by each firm as either above average, average, or below average. It is possible that regulatory environments that are perceived to be more (less) favorable cause the analysts to over-(under-)estimate actual earnings growth potential for the firm. Two dummy variables are used to represent regulatory environment at the end of each forecast horizon ($D_1 = 1$ if above average, 0 otherwise; $D_2 = 1$ if average, 0 otherwise; below average is the excluded class).
(2) *Percent of electric revenues from residential customers* (measured at the end of each forecast horizon). Residential electric revenue is less subject to cyclical fluctuations than commercial and industrial electric revenue. Hence, firms with a high proportion of residential demand might be expected to have more stable and easily forecasted earnings.
(3) *Percent of revenues from electric sales* (measured at the end of each forecast horizon). Some firms in the sample had a significant portion of total revenues attributable to natural gas distribution services and/or other diversified business efforts. During the 1971-1982 time period, natural gas demand was highly volatile because of shortages and large price increases. Hence, firms that

[6] Complete statistical results for the three and four-year horizons are available on request from the authors.

concentrated on providing electric service might also be expected to have more stable and easily forecasted earnings.

(4) *Percent of generation from oil and gas capacity* (measured at the end of each forecast horizon). Oil and gas prices increased dramatically during the time periods examined, and not all firms had the benefit of perfectly effective fuel adjustment clauses. Hence, it is hypothesized that those firms with a greater proportion of oil and gas generating capacity were faced with more volatile and less easily forecasted earnings during this period.

(5) *Nuclear construction.* Firms with a significant nuclear construction program [defined with a dummy variable (D_3) as a firm having a greater than 10% ownership interest in a nuclear plant under construction at the end of each forecast horizon] were expected to have more volatile and less easily forecasted earnings than non-nuclear firms. This is particularly true during the 1977–1982 period when, following the accident at Three Mile Island, the Nuclear Regulatory Agency ordered plant shutdowns. At that time, also, cancelled projects began to affect adversely the earnings of electric utilities.

(6) *Percentage change in dividend payout ratio* (defined as the 1976 payout ratio minus the 1971 payout ratio for the first period and the 1982 payout ratio minus the 1977 payout ratio for the second period). An increase in the payout ratio reduces funds for reinvestment in the firm and is hypothesized to be directly related to overestimates of earnings made by *Value Line*.

(7) *Percentage change in net plant* (measured as the percentage increase (decrease) in net plant over the period). The hypothesized direction of the effect of this variable is indeterminant since a rapid growth in net plant might be associated with growth in demand and future earnings. Alternatively, firms with large construction programs during the 1970s and 1980s have been under heavy financing and regulatory pressures that have negatively influenced earnings.

(8) *Change in bond ratings* (measured from the beginning to the end of each period by two dummy variables: $D_4 = 1$ if downgraded by Moody's, 0 otherwise; $D_5 = 1$ if upgraded by Moody's, 0 otherwise; firms with no rating change are the excluded set). When a firm is upgraded (downgraded), this indicates an improvement (decline) in its financial profile. Hence, upgradings (downgradings) might be associated with underestimates (overestimates) of future earnings.

(9) *Coefficient of variation of earnings per share* (measured over the ten years prior to the start of each forecast horizon). Highly volatile earnings are expected to be positively related to *Value Line* earnings forecasting errors.

For each forecasting horizon (1971–1976 and 1977–1982), two regressions were run using the above independent variables and (1) positive forecasting errors (*Value Line* minus actual) and (2) negative forecasting errors as the dependent variables.

During the 1971–1976 period, the factors identified above explained 24% (adjusted) of the variation in the positive *Value Line* errors and 13% (adjusted) of the variation in negative *Value Line* errors. The only factor significant at the 5% or better level was the percentage change in the payout ratio. Increases in a firm's payout ratio were significantly associated with overestimates of earnings (positive errors) made by *Value Line* analysts. This result is consistent with the support found for the use of implied growth techniques for forecasting future earnings. No factors were found to be statistically significant in explaining negative *Value Line* forecast errors during the 1971–1976 period.

During the 1977–1982 horizon, the percentage change in the payout ratio again was associated significantly with positive *Value Line* errors. In addition, there was a significant, positive relationship between bond downgradings and positive *Value Line* errors. Negative *Value Line* errors were significantly associated with bond upgradings. There was also evidence that *Value Line* significantly underestimated future earnings growth for firms with a high coefficient of variation of earnings.

In sum, this evidence suggests the *Value Line* earnings forecasts adequately consider each of the

factors identified above except the impact of changes in a firm's dividend payout ratio, the effects of bond rating changes, and, to a lesser extent, the volatility of past earnings. Consequently, users of *Value Line* data should be aware of potential biases in *Value Line* earnings forecasts for firms likely to change significantly their dividend payout policy, for firms likely to have a bond downgrading or upgrading over the forrecast horizon, and for firms with historically volatile earnings. Unfortunately, forecasting changes in dividend payout ratios and bond ratings is itself a difficult matter. It can be noted, however, that although the explanatory variables examined were not generally significantly correlated with each other, there were significantly positive (+0.287 and +0.317) correlations between downgradings and nuclear construction during the 1971–1976 and 1977–1982 period respectively) and significantly negative correlations (−0.212 and −0.170) between upgradings and nuclear construction. This suggests that *Value Line* earnings forecasts were less reliable for firms with significant nuclear construction programs. Additional support for this fact can be inferred by observing that during the 1977–1982 time period, 62% (32 of 52) of the firms whose earnings were overestimated by *Value Line*, were involved with nuclear construction while only 37% (14 of 38) of the firms where *Value Line* underestimated earnings were involved with nuclear construction.

8. Summary

Value Line performed very well in forecasting earnings per share in the 1971–1976 and 1977–1982 time horizons relative to extrapolative forecasting methods. It was clearly superior in forecasting the direction of future earnings growth and provided forecasts that were among the best when evaluated using various tests of accuracy. Among the extrapolative models, implied growth and historical book value growth rate models performed best.

The results are from two specific past time periods, but *Value Line* performed consistently well in both periods. The evidence supports the use of five-year *Value Line* earnings forecasts as an estimate of future growth rates in future cost of capital rate cases. *Value Line* forecasts based on three and four-year time horizons appear to have a significant upward bias.

The results of the micro-analysis of *Value Line* forecast errors might assist users to detect biases in the *Value Line* forecasts. In this study *Value Line* forecasts overestimated future earnings when firms increased their payout ratios or if a firm's bonds were downgraded. They underestimated when a firm's bonds were upgraded or if a firm had very volatile earnings prior to the beginning of the forecast horizon. As is true with all empirical studies, the results may pertain only to the industry and time-periods studied. Additional work is needed to ascertain whether the findings will prove applicable to other industries, time-periods, and analyses.

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Predicting Long-term Earnings Growth: Comparisons of Expected Return Models, Submartingales and Value Line Analysts

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ABSTRACT

This paper derives four-five year predictions of growth rates of accounting earnings per share implicit in four expected return models commonly used in financial research. A comparison of such growth rates with those produced and reported by Value Line analysts and those generated by a submartingale model revealed the following: two expected return models -- the Sharpe-Lintner-Mossin model and the Black model -- were significantly more accurate than the submartingale model, though not significantly more accurate than the other return models. However, the growth rate forecasts provided by Value Line significantly outperformed all the other models tested -- none of which relied on the direct input of a security analyst.

KEY WORDS Forecasting Earnings growth Comparisons Empirical study Analysts Value Line

An extensive body of literature evaluates the short-run (less than 15 months) earnings forecasts of security analysts and time-series models.[1] The importance of this subject to accounting and finance is that a variety of applications such as firm valuation, cost of capital, and event studies require the measurement of earnings expectations. However, except for a recent paper by Moyer *et al.* (1983), little work has been done to this point in studying long-run earnings forecasts. Moreover, a potential source of earnings forecasts—expected return models—has been overlooked.

This paper evaluates the accuracy of long-term forecasts of growth rates of annual earnings per share. Six sources of forecasts are used: a submartingale model, the *Value Line Investment Survey*, and four expected return models. Each expected return model is combined with the Gordon Shapiro constant growth model. Further, certain expected return models use the beta coefficient and, as such, lend insight into the usefulness of beta in a forecasting context.

The paper comprises three sections. Section 1 describes the six forecasting sources and states the

[1] See Cragg and Malkiel (1968), Elton and Gruber (1972), Barefield and Comiskey (1975), Brown and Rozeff (1978), Abdel-khalik and Thompson (1977-78), Critchfield *et al.* (1978), Givoly and Lakonishok (1979), Collins and Hopwood (1980), Jaggi (1980), Elton *et al.* (1981), Hopwood *et al.* (1981), Fried and Givoly (1982) and Imhoff and Pare (1982) for studies of analyst forecasts and time-series models. See Ball and Watts (1972), Brooks and Buckmaster (1976), Albrecht *et al.* (1977), Watts and Leftwich (1977), Foster (1977), Griffin (1977), Brown and Rozeff (1979), Lorek (1979), Hopwood and McKeown (1981), Hopwood *et al.* (1981) and Manegold (1981) for studies of the time-series properties of earnings.

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hypotheses. Tests of the hypotheses are presented in Section 2. Section 3 offers tentative conclusions.

1. FORECASTING SOURCES AND HYPOTHESES

This section (1) describes how six sets of growth rate forecasts of earnings per share are derived and (2) discusses the formal hypotheses to be tested.

Submartingale model

Evidence that measured annual accounting income is a submartingale or some similar process can be found in Ball and Watts (1972), Albrecht *et al.* (1977), and Watts and Leftwich (1977).[2] Although measured (reported) annual earnings per share may not be precisely a submartingale, a submartingale process is included because of its appearance in numerous studies as a benchmark forecasting technique. Another reason for including the submartingale model is to compare its forecasts to those reported in the *Value Line Investment Survey*. Such comparisons have been done for forecasts of three to fifteen months (Brown and Rozeff, 1978) but not forecasts of four to five years.

The submartingale model (SUB), as used here, estimates the expected annual growth rate of accounting earnings per share as the average compound annual rate of growth of earnings per share of the ten-year period preceding the test period. These historical growth data are obtained from various issues of the *Value Line Investment Survey*.

Value Line forecasts

The *Value Line Investment Survey* (VL) contains forecasts of earnings per share made by the Value Line security analysts for time periods four to five years into the future. After adjustment for capital changes, these forecasts, in conjunction with actual earnings per share in the base period, are converted to VL forecasts of a compound annual growth rate for each firm in the sample.

The importance of testing analyst forecasts is explained by Brown and Rozeff (1978). They argue that since analyst forecasts are purchased in a free market they are likely to be informed forecasts with a marginal value exceeding that of less costly forecast alternatives. According to this reasoning, the VL forecasts should be more accurate than the SUB forecasts and those derived from the expected return models (stated next).

Expected return model forecasts

A technique that has not previously been exploited to obtain earnings forecasts is to use expected stock rate of return models in conjunction with the Gordon–Shapiro (1956) constant growth model. This subsection shows how to extract earnings per share growth rate forecasts from these models. First, the four expected stock rate of return models are explained. Secondly, the paper proceeds to show how growth rate forecasts are obtained.

Four expected return models

The four models of how the market sets expected rates of return on securities are:

(1) the comparison returns (CMR) model (Masulis, 1980; Brown and Warner, 1980).
(2) the market adjusted returns (MAR) model (Latane and Jones, 1979; Brown and Warner, 1980).
(3) the Sharpe–Lintner–Mossin (SLM) model (Sharpe, 1964; Lintner, 1965; Mossin, 1966).
(4) the Black (BLK) model (Black, 1972).

[2] For example, Ball and Watts (1972, p 680) conclude: 'Consequently, our conclusion ... is that income can be characterized on average as a submartingale or some similar process.'

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The CMR model assumes that the expected return on stock i at time T ($E(R_{iT})$) is an expectation that is specific to each security. However, a risk parameter such as the beta coefficient is not explicitly included in the expected return calculation. Instead, the expected stock return at time T is measured as the arithmetic mean of the realized returns of the stock in a prior period. To the extent that individual means of stock return distributions differ as a reflection of risk differences, the CMR model allows for individual differences in risk. This model (see Masulis, 1980) has been tested by Brown and Warner (1980) who found that it compared favourably with alternative expected return models in detecting abnormal performance.

The MAR model states that the expected return on stock i at time T equals the expected return on the market (denoted $E(R_{MT})$), which is the same for all stocks. As for the CMR model, no beta coefficient is used in calculating expected returns. However, unlike the CMR model, the MAR model does not allow for individual risk differences among stocks, since all stocks are assumed to have the same expected return, namely, the expected market return. To estimate expected market returns, an arithmetic average of past returns on the equally-weighted (Center for Research in Securities Prices) CRSP index is used.

The SLM model is infrequently referred to as the capital asset pricing model or CAPM. It is used in its *ex ante* form:

$$E(R_{iT}) = R_{fT} + [E(R_{MT}) - R_{fT}]\beta_i \qquad (1)$$

where

R_{fT} = interest rate on a U.S. Treasury security over the forecast horizon,
β_i = beta coefficient of stock i expected to prevail over the forecast horizon.

This study examines two annual growth rate forecasts over two non-overlapping horizons of five years and four years. The five year forecast period is 1968–1972 and its base year is 1967. The four year forecast period is 1973–1976 and its base year is 1972. In estimating expected returns using the SLM model, R_{fT} for the forecast period 1968–1972 is taken as the yield-to-maturity on a five year U.S. Government security as of December 1967. Similarly, for the forecast period 1973–1976, R_{fT} is the yield-to-maturity on a four year U.S. Government security as of December 1972.[3]

$E(R_{MT})$ is estimated precisely in the same manner as in the CMR model, namely, as an average over past realized market returns.

The beta coefficients of individual stocks were estimated in two ways. First, the expected beta was measured as the historical beta coefficient of the stock over the 84 months up to and including month T. This beta was simply the covariance of the stock's returns with the market divided by the variance of the market's returns over the sample period. Secondly, in an attempt to obtain a more accurate estimate of the future expected beta, the tendency of betas to regress towards the value 1.0 noted by Blume (1971) was taken into account. The method for doing this is Blume's method.[4]

The last expected return model is the BLK model. This can be stated in *ex ante* form (Black, 1972) as:

$$E(R_{iT}) = E(R_{ZT}) + [E(R_{MT}) - E(R_{ZT})]\beta_i \qquad (2)$$

where $E(R_{ZT})$ is the expected return on the minimum variance portfolio whose return is

[3] Schaefer (1977) points out the pitfalls of using yield-to-maturity as a surrogate for the interest rate on a no-coupon bond. Livingston and Jain (1982) estimate the biases involved. Since for bonds of maturity four to five years, the coupon bias is confortably small (of the order of ten basis points), the effect is neglected in this paper.

[4] For example, to adjust the betas computed over the 1961–1967 time period, the betas of all stocks on the CRSP file from the 1954–1960 period were regressed on the betas of the same stocks from the 1947–1953 period. The resulting regression coefficients were then used to adjust linearly the 1961–1967 betas.

uncorrelated with the return on the market portfolio. Unlike R_{fT} in the SLM model, $E(R_{ZT})$ is not observable at time T. Historical returns are frequently used to estimate this model (Black *et al.*, 1972). When this is done, the BLK model can be written

$$E(R_{iT}) = \bar{\gamma}_0 + \bar{\gamma}_1 \beta_i \tag{3}$$

$\bar{\gamma}_0$ and $\bar{\gamma}_1$ are arithmetic averages of monthly estimates of $E(R_{ZT})$ and $E(R_{MT}) - E(R_{ZT})$. The estimation method of Fama and Macbeth (1973) was used to obtain the gamma estimates.[5]

The forecasting model can now be formulated by obtaining $\bar{\gamma}_0$ and $\bar{\gamma}_1$ as of time T and using these as estimates of future gammas. The procedure is legitimate since Fama and Macbeth have shown that the gamma variables are stationary and have autocorrelations that are essentially nil.

Obtaining growth rate forecasts

Suppressing the time subscript T for simplicity, the expected return of security i according to model j is denoted $E(R_{ij})$. Given the expected rate of return of security i from model j, each model's expected growth rate of earnings per share will be extracted by assuming that each firm possesses investment opportunities which are expected to provide a constant rate of growth of earnings in perpetuity. In other words, the 'constant growth' model is assumed to hold for each stock (Gordon and Shapiro, 1956, Miller and Modigliani, 1961).

Let g_{ip} be firm i's rate of price increase, g_{id} be its rate of growth of dividends per share, and g_{ie} be its rate of growth of earnings per share. In the constant growth model, the expected rate of return of security i is given by:

$$E(R_i) = \frac{\tilde{P}_{i1} + \tilde{D}_{i1} - P_{i0}}{P_{i0}} = \frac{\tilde{D}_{i1}}{P_{i0}} + \frac{\tilde{P}_{i1} - P_{i0}}{P_{i0}} \tag{4}$$

where

$\tilde{P}_{i1}$ = random end-of-period price per share
$\tilde{D}_{i1}$ = random end-of-period dividend per share
P_{i0} = current price per share
D_{i0} = current dividend per share.

Hence:

$$\frac{\tilde{D}_{i1}}{P_{i0}} + \frac{\tilde{P}_{i1} - P_{i0}}{P_{i0}} = \frac{D_{i0}(1 + g_{id})}{P_{i0}} + g_{ip} \tag{5}$$

Assuming $g_{id} = g_{ip} = g_i$

$$E(R_i) = \frac{D_{i0}(1 + g_i)}{P_{i0}} + g_i \tag{6}$$

A key assumption to obtain the constant growth is that the firm's payout ratio of dividends from earnings is constant. This ensures the equality of the growth rates of dividends, earnings, and price per share. Violation of the constant payout ratio assumption occurs for a variety of reasons such as a change in the firm's investment opportunities or a change in its financing mix. To the extent that the constant growth model fails to describe the firm's expected rate of return, the derived estimates of g_i will contain measurement error which will bias the tests against the expected return models.

[5] I am grateful to Gary Schlarbaum for supplying these estimates.

Since each expected return model estimates $E(R_i)$ by $E(R_{ij})$, equation (6) can be solved to obtain model j's implicit forecast of g_i, denoted g_{ij} or:

$$g_{ij} = \frac{E(R_{ij}) - D_{i0}/P_{i0}}{1 + D_{i0}/P_{i0}} \tag{7}$$

Hence, by estimating $E(R_{ij})$ and observing the current dividend yield, a forecast by model j of the firm i's growth rate of earning per share, g_{ij}, is extracted.

Statement of hypotheses

The empirical results in this paper will be interpreted with reference to several hypotheses, which are presented and discussed below:

> *Hypothesis* 1. Expected return models that use *ex ante* information on stock beta coefficients contain implicit earnings per share growth rate forecasts that are not more accurate than the implicit earnings per share growth rate forecasts of expected return models that do not use information on beta coefficients.

The SLM and BLK models include beta information whereas the CMR and MAR models do not. Rejection of Hypothesis 1 means that the beta-based expected return models can be employed to obtain forecasts of earnings per share which are superior to those obtained from the non-beta stock return models. Assuming that earnings growth rates observed for a future period reflect the prices and the expected returns established at the start of the period, rejection of Hypothesis 1 provides an indication that the market, in setting expected returns, uses betas or their informational equivalent as opposed to neglecting betas as the CMR and MAR do.

The forecasts of the expected return models can also be compared with the SUB model forecasts. These comparisons provide a natural check on whether the expected return models combined with the constant growth model are producing forecasts that are reasonably competitive with the process which, at least approximately, generates annual earnings.

> *Hypothesis* 2. Expected return models contain implicit earnings per share growth rate forecasts that are not more accurate than the forecasts of the growth rate of earnings per share derived using the submartingale model of earnings.

A third test compares the forecasting ability of the VL model with the expected return models. If the procedure used in this paper to extract forecasts from the expected return models was efficient enough to extract forecasts that reflected all information available to the market, then the VL model forecasts would not be more accurate than the expected return model forecasts. Since the procedure used is clearly crude compared to the information processing of analysts, it is anticipated that Hypothesis 3 will be rejected in favour of VL.

> *Hypothesis* 3. The VL forecasts of the growth rate of earnings per share are no more accurate than the earnings forecasts of the expected return models.

Finally, since the lengthy literature comparing analyst forecasts with those of time series models is confined to short forecast horizons (see footnote 1), it is of interest to compare the VL forecasts with the SUB forecasts over the long forecast horizons used in this paper.

> *Hypothesis* 4. The VL forecasts of the growth rate of earnings per share are no more accurate than the forecasts of the SUB model.

Rejection of Hypothesis 4 in favour of VL superiority would provide further evidence of analyst forecast superiority relative to time-series models.

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2. TESTS OF HYPOTHESES

Samples

Two replications of the experiment were conducted. In the first, time T was year-end 1967 and forecasted earnings were for 1972. The first 253 firms (in alphabetical order) were selected from the CRSP tape which met the criteria: (1) return data available during 1961–1967; (2) covered by the *Value Line Investment Survey* as of December 1967; (3) December fiscal year; and (4) positive earnings per share in 1967 and 1972. The second replication set T at December 1972. The sample size was 348. The criteria were similar with the corresponding changes in dates, namely, return data available during 1966–1972 and positive earnings per share in the base year 1972 and test year 1976.

The reasons for these criteria follow. The requirement that a sample firm have return data on the CRSP tape in the base period allowed computation of the firm's beta coefficient using this data source. The firm had to be covered by the *Value Line Investment Survey* to allow forecast comparisons to be made. Use of the December fiscal year-end ensured that all six model forecasts were based on comparable amounts of data relative to the fiscal year. Furthermore, the VL model forecasts had to be conditional only on annual earnings of the base year. The requirements of positive earnings per share in the base and test years allowed for positive growth rates. (The positive earnings criterion, as it turned out, was not binding in the first test period. In the second period, ten firms were eliminated because of this criterion.)

Although it is unlikely that the sample selection procedures materially affected the outcomes of the experiments, they did result in noticeably less risky sample firms than the market as a whole. The average beta for both samples was 0.85. As such, the test results may not generalize to the entire population of firms.

Test procedures

Because January 1935 was the starting date for calculating the BLK model estimates, that date was the starting point for most of the other return calculations. Thus, in estimating the CMR model, a stock's mean monthly stock return was found by averaging its returns over the history of the stock available since January 1935. In estimating mean market returns, the average of monthly returns was found over the time period beginning in January 1935. The market index was the equally-weighted return index of all stocks on the CRSP tape. Finally, in estimating the gammas for the BLK model, the monthly averages were also taken over the period starting in 1935.[6]

The SLM model requires risk-free returns and, for this purpose, yields-to-maturity on U.S. Government Bonds of the relevant maturity were employed. The data source was *Moody's Municipal and Government Manual.*

Let a_i = growth rate of actual earnings per share for firm i and g_{ij} = growth rate of forecasted earnings per share for firm i by method j. In each test period, a vector of errors $|a_i - g_{ij}| = e_{ij}$ may be calculated for each method j, where e_{ij} is the absolute value of the difference between the forecasted and realized growth rates. For hypothesis tests of two models, an appropriate design is a one-sample or matched-pairs case with self-pairing by firm. The members of each pair are errors, e_{ij}, from the two models, which are reduced to a single observation by taking the difference in the errors. The t-test is the usual parametric test of the mean difference and the Wilcoxon signed ranks test is an alternative non-parametric test of the median difference. Both tests were conducted. But since the results were similar, only the paired t-test results are reported.

[6] All tests were also conducted using mean returns calculated over the most recent 84 months. The results were essentially the same as those reported in the paper. If anything, the longer estimation period benefited the CMR model.

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Results

Table 1 contains summary statistics of the error distributions generated by the models when regression-adjusted betas were employed.

The average of deviations, $a_i - g_{ij}$, was computed for all sample firms. Such deviations measure the average bias of the forecast models. It appears that, in period 1, all the models tended to overforecast earnings growth. In period 2, the average deviation of the return models was slight, whereas VL tended to overforecast on average. However, the fraction of firms overestimated by VL (58.0 per cent) was quite close to the fractions for the other models. This suggests that the sample average deviation for VL was heavily influenced by a few firms.

Table 1. Summary statistics of error distributions*†

	Error measure	SUB	MAR	CMR	SLM	BLK	VL
Period 1, 1967–1972	Average deviation	−0.001	−0.062	−0.051	−0.049	−0.051	−0.046
	MABE	0.115	0.112	0.117	0.105	0.106	0.088
	MSE	0.046	0.032	0.034	0.031	0.031	0.018
	RMSE	0.213	0.178	0.184	0.176	0.177	0.135
	% Forecasts overestimated	56.1	81.8	72.7	72.3	73.5	64.0
Period 2, 1972–1976	Average deviation	0.040	−0.002	0.012	0.011	0.008	−0.030
	MABE	0.146	0.140	0.147	0.137	0.137	0.118
	MSE	0.071	0.067	0.070	0.066	0.066	0.031
	RMSE	0.266	0.258	0.265	0.256	0.256	0.175
	% Forecasts overestimated	47.2	58.9	53.4	52.9	53.7	58.0

* MAR = Market adjusted return; SUB = Submartingale; CMR = Comparison return; SLM = Sharpe-Lintner-Mossin; BLK = Black; VL = Value Line.
† Based on adjusted betas for the SLM and BLK models.

The mean absolute error (MABE), defined as the sample average of $|a_i - g_{ij}|$, better reflects the overall forecasting performance of the models since it takes into account the average error size. In period 1, VL's MABE was lowest at 0.088, followed by SLM and BLK at 0.105 and 0.106, while the other three models had MABE's between 0.112 and 0.117. Two other summary error measures, which give greater weight to large deviations, are mean square error or MSE (the sample average of $(a_i - g_{ij})^2$) and root mean squared error or RSME (the square root of MSE). Using these measures of forecast accuracy, VL was most accurate followed by the four expected return models all of which were more accurate than SUB.

In time period 2, VL had the most accurate forecasts. Using MABE, it again appears that SLM and BLK had smaller errors than the CMR, MAR, and SUB models. Using MSE, all models other than VL appear to have approximately equal forecast accuracy.

Table 2 contains the t-statistics for all paired comparisons over both sample periods and using both the historical beta and the regression-adjusted beta. In reading this table, a positive t-statistic means that the model at the top has lower errors than the model at the side. Since the results are very similar for both beta estimation methods, the discussion concentrates on the regression-adjusted beta case.

In both sample periods, both the SLM and BLK models produced smaller errors at high levels of confidence than the two non-beta expected return models −MAR and CMR. Hypothesis 1 is thus rejected. If one were attempting to gauge the market's expectation of future earnings growth via

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Table 2. Parametric t-statistics, comparisons of six model's earnings prediction errors for two time periods*†

		Historical beta							Regression-adjusted beta					
		SUB	MAR	CMR	SLM	BLK	VL		SUB	MAR	CMR	SLM	BLK	VL
Period 1, 1967–1972	SUB	—	0.59	−0.50	1.32	1.17	2.69‡	SUB	—	0.59	−0.50	1.76¶	1.58‡	2.69‡
	MAR	—	—	−1.70¶	1.74¶	1.37	3.72‡	MAR	—	—	−1.70¶	4.93‡	4.29‡	3.72‡
	CMR	—	—	—	3.32‡	3.00‡	4.50‡	CMR	—	—	—	4.35‡	3.96‡	4.50‡
	SLM	—	—	—	—	−7.12‡	3.06‡	SLM	—	—	—	—	−8.22‡	2.72‡
	BLK	—	—	—	—	—	3.21	BLK	—	—	—	—	—	2.88‡
Period 2, 1972–1976	SUB	—	1.58	−0.40	2.88‡	2.84‡	2.90‡	SUB	—	1.58	−0.40	2.78‡	2.68‡	2.90‡
	MAR	—	—	−2.25§	2.38§	2.48§	2.35§	MAR	—	—	−2.25§	3.06‡	3.13‡	2.35§
	CMR	—	—	—	3.77‡	3.76‡	2.92‡	CMR	—	—	—	3.83‡	3.72‡	2.92‡
	SLM	—	—	—	—	−0.59	1.86¶	SLM	—	—	—	—	−1.60	1.93¶
	BLK	—	—	—	—	—	1.88¶	BLK	—	—	—	—	—	1.96§

* MAR = Market adjusted return; SUB = Submartingale; CMR = Comparison return; SLM = Sharpe–Lintner–Mossin; BLK = Black; VL = Value Line.

† A positive test statistic indicates superiority (lower forecast error) of model on top as compared with model on side; a negative test statistic indicates superiority of model on side. Forecast error is mean absolute error (MABE).

‡ Significant at the 1 per cent level, two-tailed test.

§ Significant at the 5 per cent level, two-tailed test.

¶ Significant at the 10 per cent level, two-tailed test.

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the market's expected rate of return and the revealed dividend yield, then one would be better off employing either of the two models that use beta. The consistency of the results over the two test periods strengthens the conclusion that use of the beta coefficient enhances the predictability of expected rate of return and hence earnings growth.

To check on the efficacy of the procedure by which the expected return model forecasts were extracted, those models were compared with the SUB model. For the non-beta models, the t-statistics were less than ordinary conventional levels in both of the test periods. A comparison of MAR against SUB produced t-statistics of -0.50 and -0.40. These results indicate that Hypothesis 2 cannot be rejected for the non-beta models, although the MAR model provided slight indication of outperforming the SUB model.

For the SLM and BLK models, the t-statistics were positive and significant in both time periods. A comparison of SLM against SUB yielded t-statistics of 1.76 and 2.78, whereas in similar comparisons, BLK yielded 1.58 and 2.68. This is reasonable evidence for rejecting Hypothesis 2 in favour of the alternative hypothesis that SLM and BLK produce smaller errors than SUB. From another point of view, this result is impressive: a relatively simple manipulation of the expected return models, involving extrapolation of the expected market return and the stock's beta coefficient and subtraction of the stock's dividend yield, produced earnings forecasts that were more accurate than a well known time-series model of annual earnings. This interpretation indicates that the SLM and BLK expected return models appear to capture an important aspect of the market's return generating mechanism, and that the forecast extraction procedure has reasonable power.

The next hypothesis tests involve the VL forecasts. It is clear that Hypothesis 3 can be rejected at high levels of significance. By wide margins, VL produced lower forecast errors than all the expected return models, including the more accurate SLM and BLK models.

The last comparison, Hypothesis 4, evaluates VL against the TS model. In both samples, the forecasts of earnings per share growth were statistically superior to those of the TS model. This provides additional evidence that security analysts produce more accurate forecasts than time-series models.

The results of the tests were quite uniform in the two time periods. The average analyst error in forecasting the future annual growth rate for the following four to five year period tended to be about 1.7 per cent below the errors of the SLM and BLK expected return models, whereas the errors of the latter two models were about 0.7–1.2 per cent below the errors of the remaining models, including the SUB model.

3. CONCLUSIONS

This paper has shown that expected return models commonly used in the finance literature contain implicit forecasts of the growth rate of accounting earnings per share. For the comparison returns model (CMR) and the market-adjusted returns model (MAR), the resulting forecasts were no less accurate than a submartingale model. On the other hand, for the Sharpe–Lintner–Mossin (SLM) and Black (BLK) models, the forecasts were significantly more accurate than those generated by the submartingale model.

Evidence that security analysts forecasts are more accurate than those of less costly alternatives is also provided. The forecasts of four to five year growth rates of earnings per share produced and reported in the *Value Line Investment Survey* were shown to be more accurate than *all* of the other models tested—none of which required the direct input of a security analyst.

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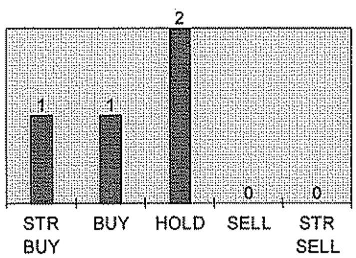
Zacks Company Report as of 12/09/05 — Next EPS Report Date: 01/25/06

AVISTA CORP		AVA	NYSE	Industry: *UTIL-ELEC PWR*		Type: *Mid*	*Value*		
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$18.26	21.2	$887 MM	$0.56	3.1%	$1239 MM	-28%	-20%	3%	Hold

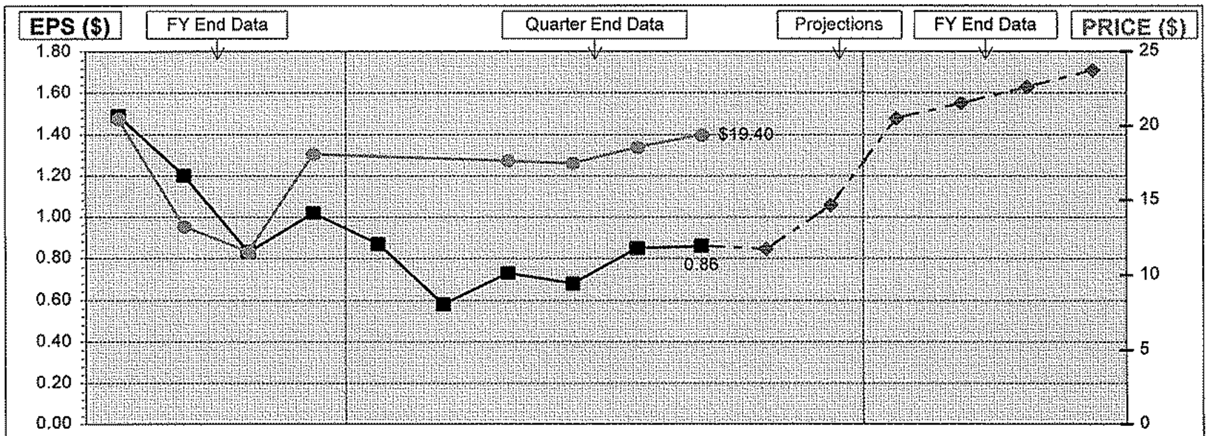
Avista Corp. is a diversified energy company with utility and subsidiary operations located throughout North America. Avista Corp. also operates Avista Capital, which owns all the company's non-regulated energy and non-energy businesses. Avista Capital companies include Avista Energy, Avista Energy Canada, Ltd., Avista Power, Avista Advantage, Avista Labs, Avista Fiber, Avista Communiations, Avista Development and Pentzer Corporation. (PRESS RELEASE)

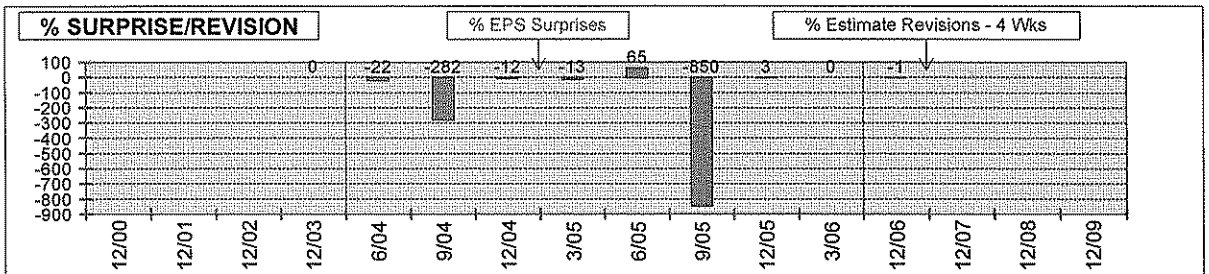
Ave Broker Rec	#Up	#Dn
BUY	0	0



Price/Volume Data	
52-Wk High	$19.97
Low	$16.56
PriceChg-YTD	3%
-YTD(Rel)	-1%
Avg Dly Vol	221 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	8%
Beta	0.65
Shareholder Data	
Shares Out	48.6 MM
Institutions	58.18%
Insiders	3.00%

EPS,P/E and Growth Rates			Yr/Yr
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	0.73	24.2	-28%
12/05 Est	0.79	23.1	8%
12/06 Est	1.48	12.4	87%
Last 5Yr			-20%
Next 3-5Yr (Est)			5%
Other Key Measures			**5-Year**
	Current		**Avg**
P/E (12 Mo)	21.2		17.4
Rel P/E	122%		
Net Margin	3%		2.4%
ROE	5.6%		7.3%
LT Debt/Cap	57%		51%





UTIL-ELEC PWR	Pr Chg	P/E	EPS Gr	Price/	Price/	Price/	Impl Ret/	Div	Net		Debt/
Industry # 193	YTD	(12Mo)	5Yr Est	Book	Sales	CF	P/E	Yield	Margin	ROE	Cap
AVISTA CORP	3%	21.2	5%	1.2	0.7	7.2	0.38	3.1%	3.4%	6%	57%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

(*Industry Comparables*) * 104 Companies in industry group.

Latest Splits: 11/10/93 2.000 — Ex-Div. Date: 11/28/05

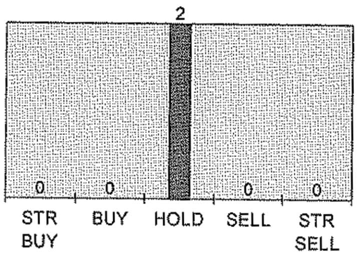
Zacks Company Report as of 12/09/05 | Next EPS Report Date: 03/13/06

CLECO CORP	CNL	NYSE	Industry: *UTIL-ELEC PWR*		Type: *Mid*	*Blend*		
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$22.00	13.4	$1099 MM	$0.90	4.1%	$833 MM	-4%	-3%	-2%	Buy

Cleco Corporation holds investments in several subsidiaries, including Utility Group, Cleco Midstream Resources LLC and Utility Construction & Technology Solutions LLC. Utility Group, incorporated on January 2, 1935 under the laws of the State of Louisiana, contains the LPSC jurisdictional generation, transmission and distribution electric utility operations serving the Company's traditional retail and wholesale customers. Utility Group serves customers in communities and rural areas in the State of Louisiana.

Ave Broker Rec	#Up	#Dn
HOLD	0	0

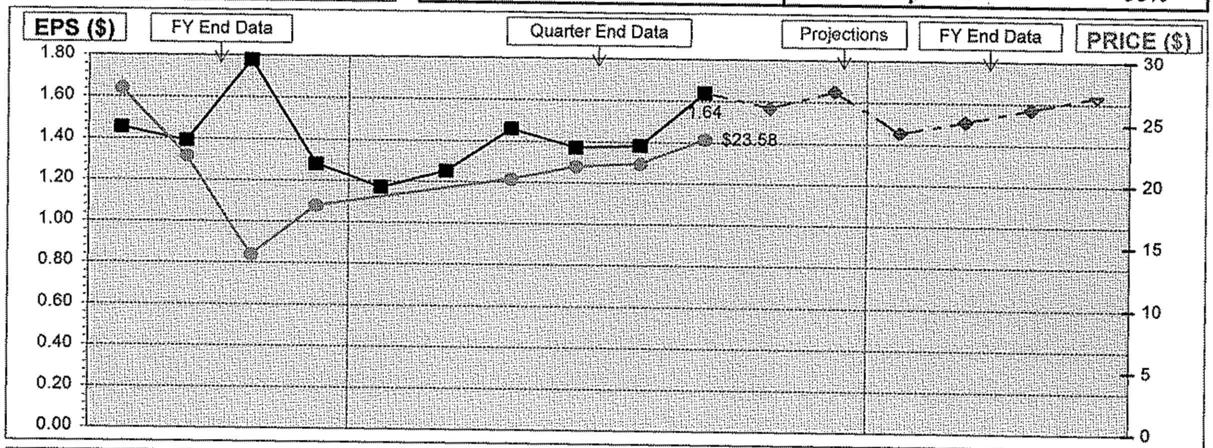
Broker Recommendations

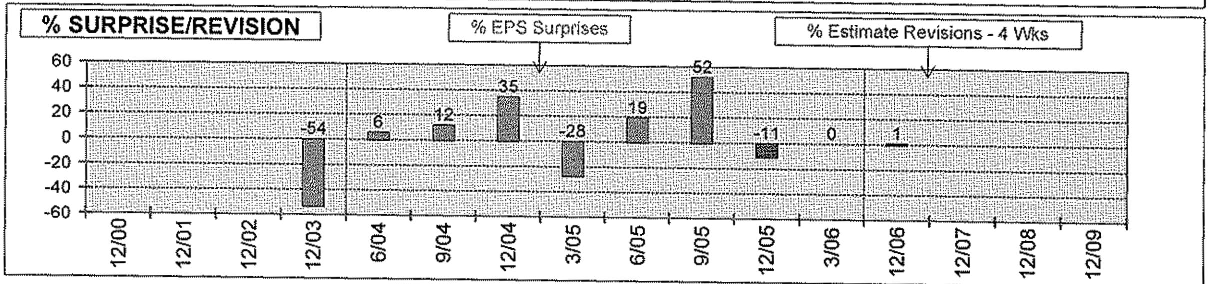


Price/Volume Data	
52-Wk High	$24.05
Low	$18.97
PriceChg-YTD	9%
-YTD(Rel)	4%
Avg Dly Vol	287 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	8%
Beta	0.87
Shareholder Data	
Shares Out	49.9 MM
Institutions	58.04%
Insiders	3.40%

EPS,P/E and Growth Rates			Yr/Yr
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	1.46	13.9	14%
12/05 Est	1.56	14.1	7%
12/06 Est	1.45	15.1	-7%
Last 5Yr			-3%
Next 3-5Yr (Est)			4%

Other Key Measures	**Current**	**5-Year Avg**
P/E (12 Mo)	13.4	13.2
Rel P/E	77%	
Net Margin	10%	5.7%
ROE	15.3%	15.1%
LT Debt/Cap	43%	56%





UTIL-ELEC PWR Industry # 193	*Industry Comparables* Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
CLECO CORP	9%	13.4	4%	1.9	1.3	8.2	0.60	4.1%	10.4%	15%	43%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

* 104 Companies in industry group.

Latest Splits: 05/22/01 2.000 05/26/92 2.000 | Ex-Div. Date: 10/27/05

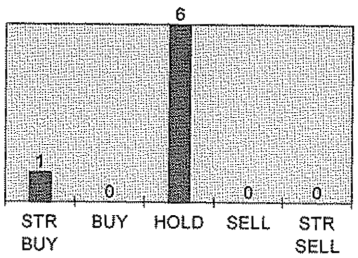
Zacks Company Report as of 12/09/05 | Next EPS Report Date: 02/15/06

DPL INC	DPL	NYSE	Industry: *UTIL-ELEC PWR*		Type: *Mid*	*Blend*			
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$25.63	25.6	$3268 MM	$0.96	3.7%	$1258 MM	-3%	-3%	-2%	Hold

DPL Inc. is a holding company. Its principal subsidiary is The Dayton Power and Light Company. The Dayton Power and Light Company sells electricity and natural gas to residential, commercial and governmental customers in West Central Ohio. Principal industries served include electrical machinery, automotive and other transportation equipment, non-electrical machinery, agriculture, paper, and rubber and plastic products.

Ave Broker Rec	#Up	#Dn
HOLD	0	0

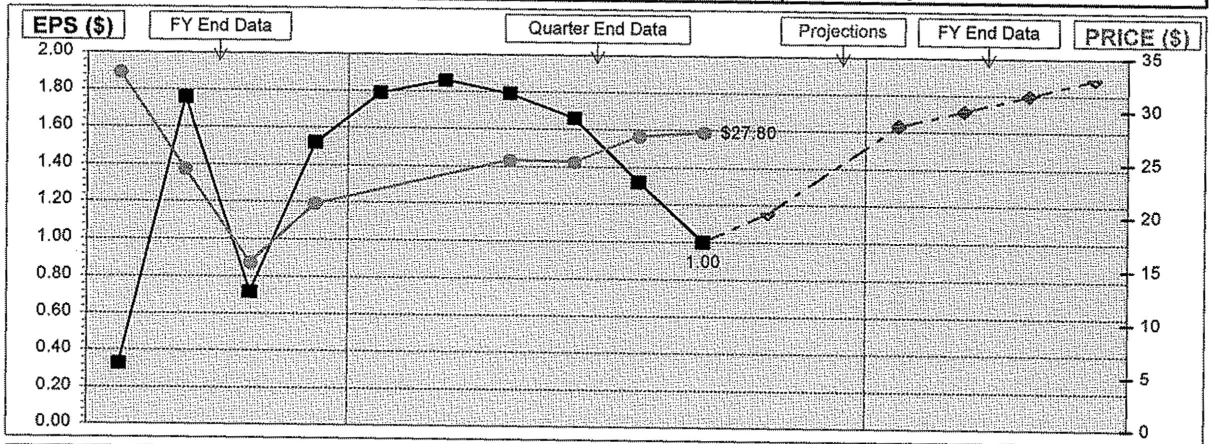
Broker Recommendations

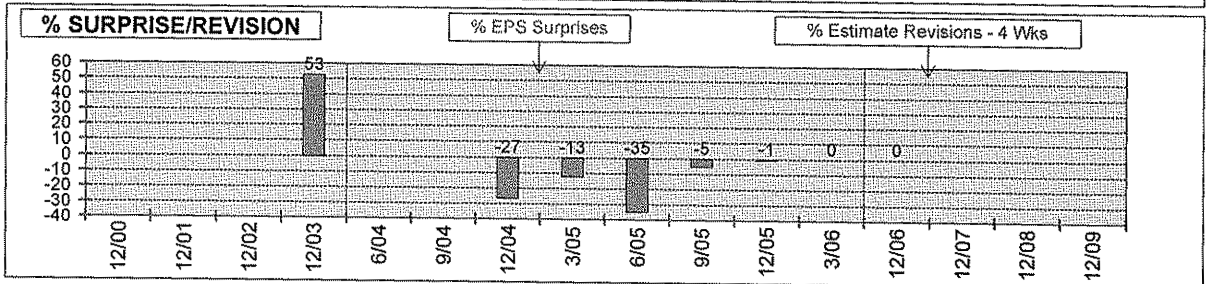


Price/Volume Data	
52-Wk High	$28.12
Low	$23.43
PriceChg-YTD	2%
-YTD(Rel)	-2%
Avg Dly Vol	820 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	9%
Beta	0.66
Shareholder Data	
Shares Out	127.5 MM
Institutions	49.16%
Insiders	2.00%

EPS,P/E and Growth Rates			Yr/Yr
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	1.78	14.1	17%
12/05 Est	1.07	24.0	-40%
12/06 Est	1.63	15.7	53%
Last 5Yr			-3%
Next 3-5Yr (Est)			5%

Other Key Measures	**Current**	**5-Year Avg**
P/E (12 Mo)	25.6	14.3
Rel P/E	147%	
Net Margin	12%	14.4%
ROE	12.2%	22.1%
LT Debt/Cap	61%	70%





UTIL-ELEC PWR Industry # 193	Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
DPL INC	2%	25.6	5%	3.1	2.6	9.0	0.34	3.7%	11.8%	12%	61%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

Industry Comparables

* 104 Companies in industry group.

Latest Splits: 01/13/98 1.500 09/24/92 1.500 05/07/90 1.500 Ex-Div. Date: 11/10/05

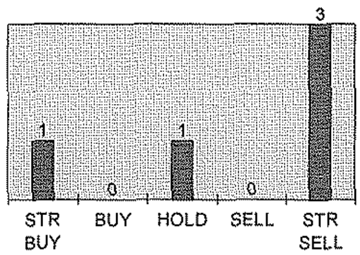
Zacks Company Report as of 12/09/05   Next EPS Report Date: 02/06/06

DUQUESNE LIGHT	DQE	NYSE	Industry: *UTIL-ELEC PWR*			Type: *Mid*	*Blend*		
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$17.08	11.9	$1332 MM	$1.00	5.9%	$922 MM	-10%	-8%	-13%	Hold

Duquesne Light Company transmits and distributes electric energy, offering technological innovation and superior customer service and reliability to more than half a million direct customers throughout southwestern Pennsylvania.

Ave Broker Rec	#Up	#Dn
SELL	0	0

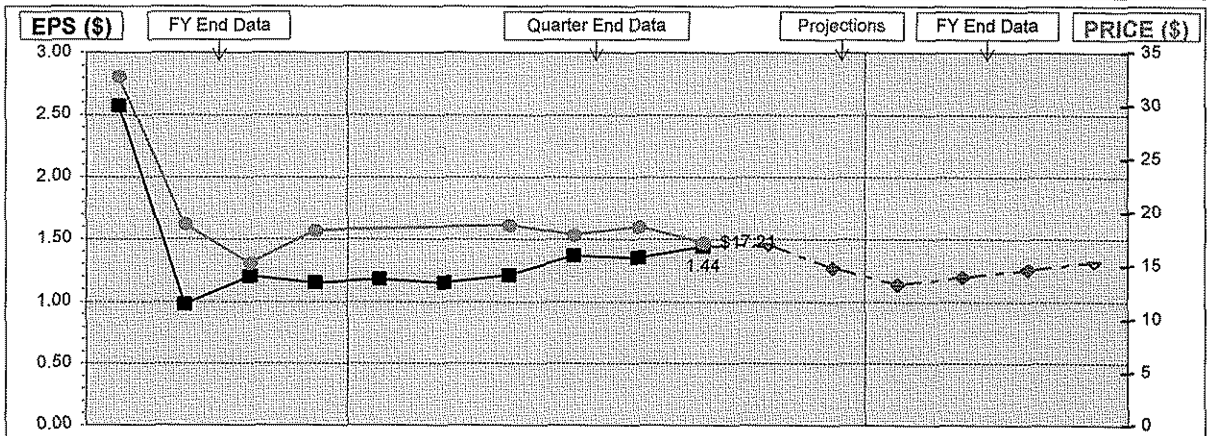
Broker Recommendations

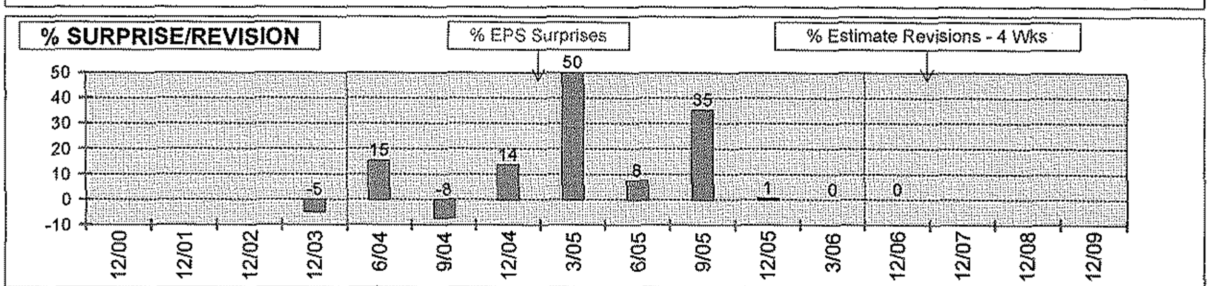


Price/Volume Data	
52-Wk High	$19.43
Low	$16.14
PriceChg-YTD	-9%
-YTD(Rel)	-13%
Avg Dly Vol	343 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	11%
Beta	0.58
Shareholder Data	
Shares Out	78.0 MM
Institutions	59.79%
Insiders	0.60%

EPS,P/E and Growth Rates			**Yr/Yr**
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	1.20	15.7	4%
12/05 Est	1.15	14.9	-4%
12/06 Est	1.14	15.0	-1%
Last 5Yr			-8%
Next 3-5Yr (Est)			5%

Other Key Measures	**Current**	**5-Year Avg**
P/E (12 Mo)	11.9	14.3
Rel P/E	68%	
Net Margin	13%	1.8%
ROE	17.3%	15.3%
LT Debt/Cap	54%	63%





UTIL-ELEC PWR Industry # 193	Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
DUQUESNE LIGHT	-9%	11.9	5%	1.9	1.4	7.5	0.92	5.9%	12.8%	17%	54%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

* 104 Companies in industry group.

Industry Comparables

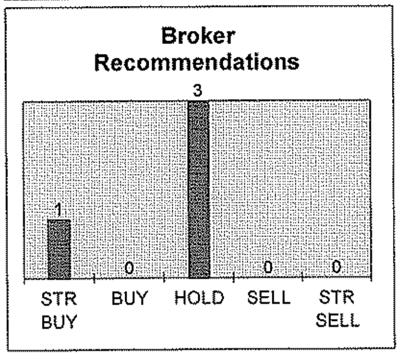
Latest Splits: 05/25/95 1.500   Ex-Div. Date: 09/07/05

Zacks Company Report as of 12/09/05 — Next EPS Report Date: 02/09/06

EMPIRE DISTRICT	EDE	NYSE	Industry: *UTIL-ELEC PWR*		Type: *Small*	*Value*			
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$20.90	21.5	$544 MM	$1.28	6.1%	$367 MM	7%	-2%	0%	Strong Sell

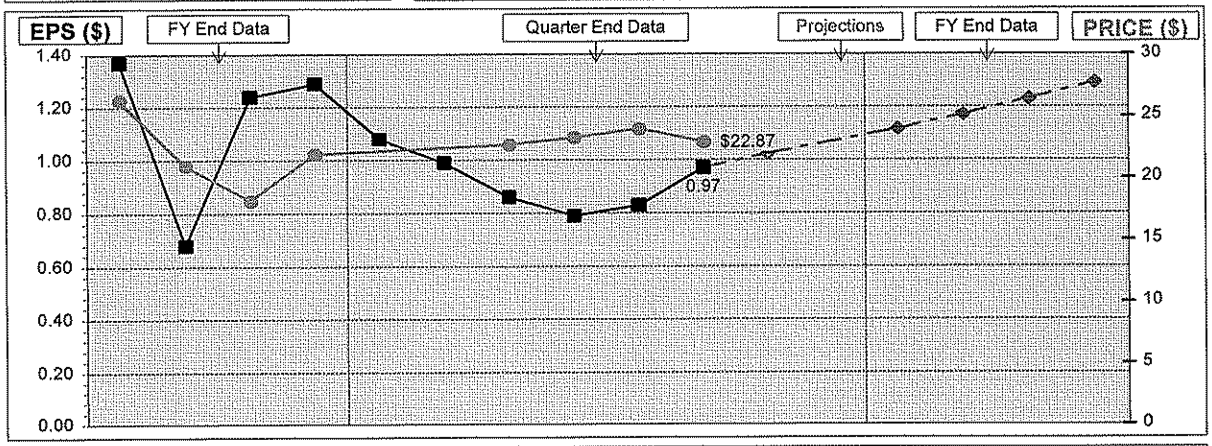
The Empire District Electric Company is an operating public utility engaged in the generation, purchase, transmission, distribution and sale of electricity in parts of Missouri, Kansas, Oklahoma and Arkansas. The Company also provides water service to several towns in Missouri.

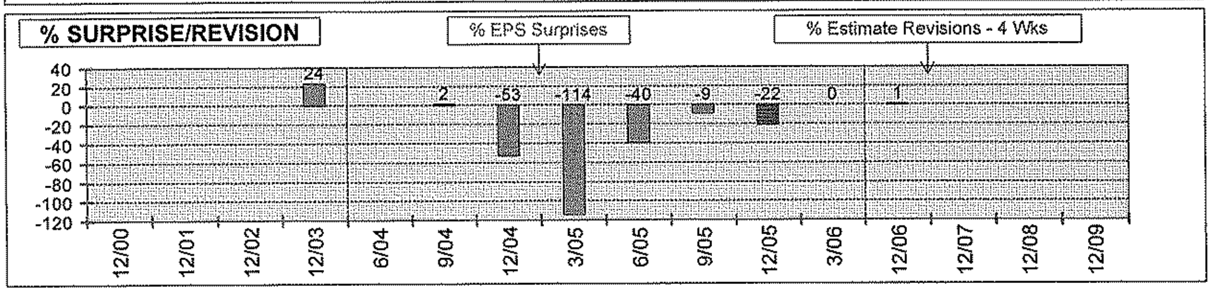
Ave Broker Rec	#Up	#Dn
HOLD	1	0



Price/Volume Data	
52-Wk High	$24.90
Low	$19.99
PriceChg-YTD	-8%
-YTD(Rel)	-11%
Avg Dly Vol	103 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	11%
Beta	0.24
Shareholder Data	
Shares Out	26.0 MM
Institutions	27.25%
Insiders	1.00%

EPS,P/E and Growth Rates			**Yr/Yr**
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	0.86	26.4	-33%
12/05 Est	0.98	21.4	14%
12/06 Est	1.12	18.7	14%
Last 5Yr			-2%
Next 3-5Yr (Est)			5%
Other Key Measures			**5-Year**
	Current		**Avg**
P/E (12 Mo)	21.5		21.1
Rel P/E	124%		
Net Margin	7%		7.2%
ROE	6.6%		7.2%
LT Debt/Cap	51%		52%





UTIL-ELEC PWR Industry # 193	Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
EMPIRE DISTRICT	-8%	21.5	5%	1.4	1.5	9.4	0.52	6.1%	6.9%	7%	51%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

Industry Comparables

* 104 Companies in industry group.

Latest Splits: 01/30/92 2.000 — Ex-Div. Date: 11/29/05

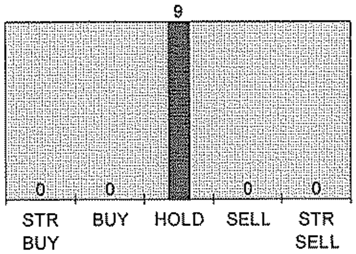
Zacks Company Report as of 12/09/05 | Next EPS Report Date: 02/09/06

ENERGY EAST	EAS	NYSE	Industry: *UTIL-ELEC PWR*		Type: *Mid*	*Value*			
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$23.24	13.0	$3433 MM	$1.16	5.0%	$5084 MM	10%	-5%	5%	Sell

Energy East is a public utility holding company whose principal business is purchasing, transmitting and distributing electricity in New York and Maine and purchasing, transporting and distributing natural gas in New York, Connecticut, Maine and Massachusetts.

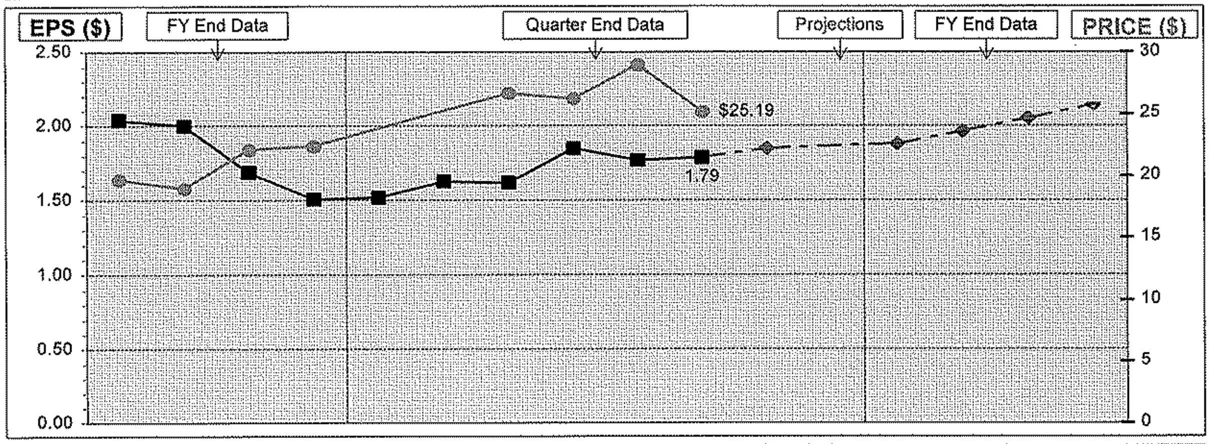
Ave Broker Rec	#Up	#Dn
HOLD	0	0

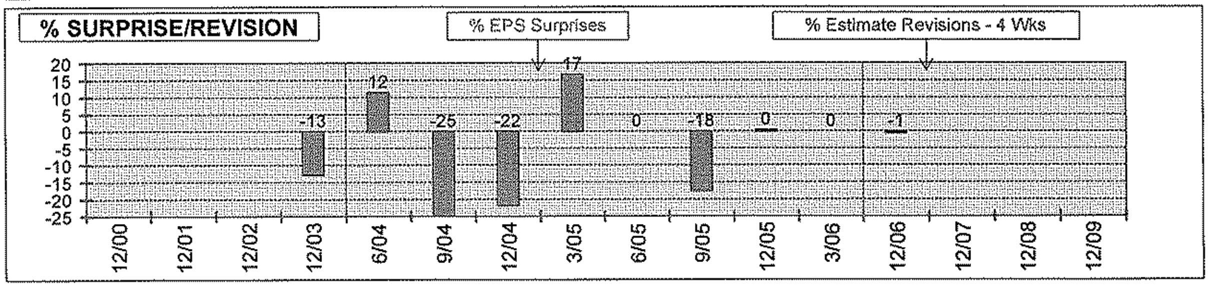
Broker Recommendations



Price/Volume Data	
52-Wk High	$30.06
Low	$22.84
PriceChg-YTD	-13%
-YTD(Rel)	-16%
Avg Dly Vol	522 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	9%
Beta	0.52
Shareholder Data	
Shares Out	147.7 MM
Institutions	49.23%
Insiders	3.00%

EPS,P/E and Growth Rates			**Yr/Yr**
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	1.62	16.5	7%
12/05 Est	1.79	13.0	10%
12/06 Est	1.88	12.4	5%
Last 5Yr			-5%
Next 3-5Yr (Est)			**5%**
Other Key Measures			**5-Year**
	Current		**Avg**
P/E (12 Mo)	13.0		12.8
Rel P/E	74%		
Net Margin	5%		5.2%
ROE	9.4%		10.6%
LT Debt/Cap	56%		56%





UTIL-ELEC PWR	*Industry Comparables*						**Impl**				
	Pr Chg	**P/E**	**EPS Gr**	**Price/**	**Price/**	**Price/**	**Ret/**	**Div**	**Net**		**Debt/**
Industry # 193	**YTD**	**(12Mo)**	**5Yr Est**	**Book**	**Sales**	**CF**	**P/E**	**Yield**	**Margin**	**ROE**	**Cap**
ENERGY EAST	-13%	13.0	5%	1.1	0.7	5.5	0.73	5.0%	4.9%	9%	56%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	
* 104	Companies in industry group.										

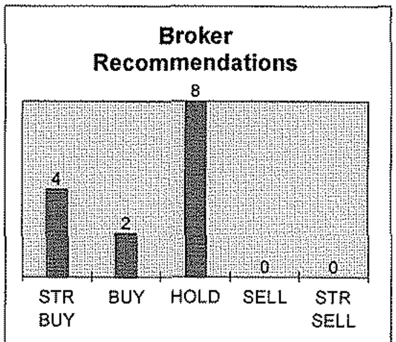
Latest Splits: 04/05/99 2.000 | Ex-Div. Date: 10/14/05

Zacks Company Report as of 12/09/05 Next EPS Report Date: 02/14/06

FIRSTENERGY CP FE NYSE				Industry: *UTIL-ELEC PWR*		Type: *Large Blend*			
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$47.92	16.4	$15806 MM	$1.72	3.6%	$12020 MM	13%	1%	1%	Hold

FirstEnergy Corp. is a diversified energy services holding company as the result of the merger of Ohio Edison Company and Centerior Energy Corporation. FirstEnergy companies provide electricity and natural gas services and a wide array of energy-related products and services. FirstEnergy's four electric utility companies, Ohio Edison and its Pennsylvania Power subsidiary, The Illuminating Company and Toledo Edison, serve customers in northern and central Ohio and western Pennsylvania. (Company Press Release)

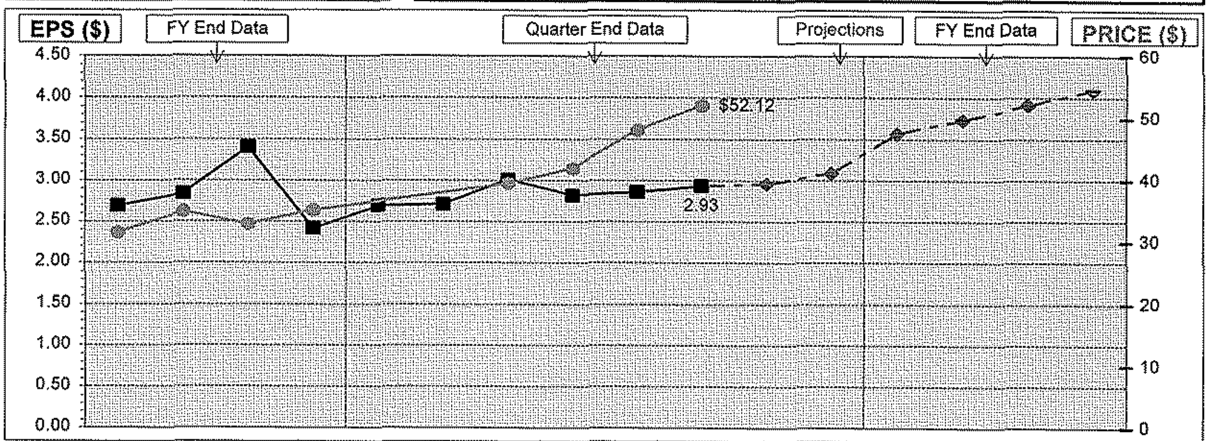
Ave Broker Rec	#Up	#Dn
BUY	1	0

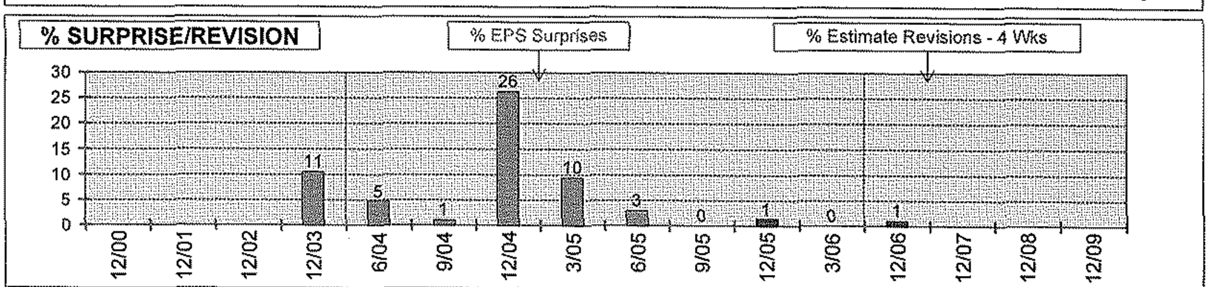


Price/Volume Data	
52-Wk High	$52.73
Low	$38.26
PriceChg-YTD	21%
-YTD(Rel)	17%
Avg Dly Vol	1212 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	8%
Beta	0.11
Shareholder Data	
Shares Out	329.8 MM
Institutions	68.70%
Insiders	0.40%

EPS,P/E and Growth Rates			**Yr/Yr**
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	3.01	13.1	24%
12/05 Est	2.95	16.2	-2%
12/06 Est	3.57	13.4	21%
Last 5Yr			1%
Next 3-5Yr (Est)			**5%**

Other Key Measures		**5-Year**
	Current	**Avg**
P/E (12 Mo)	16.4	13.1
Rel P/E	94%	
Net Margin	7%	6.3%
ROE	11.2%	11.4%
LT Debt/Cap	51%	53%





UTIL-ELEC PWR	*Industry Comparables*						Impl				
Industry # 193	**Pr Chg YTD**	**P/E (12Mo)**	**EPS Gr 5Yr Est**	**Price/ Book**	**Price/ Sales**	**Price/ CF**	**Ret/ P/E**	**Div Yield**	**Net Margin**	**ROE**	**Debt/ Cap**
FIRSTENERGY CP	21%	16.4	5%	1.8	1.3	5.8	0.51	3.6%	7.3%	11%	51%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	
* 104	Companies in industry group.										

Latest Splits: Ex-Div. Date: 11/03/05

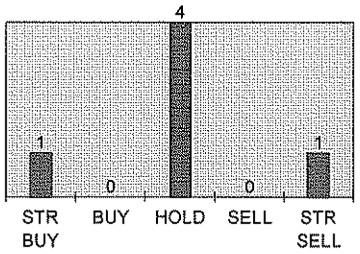
Zacks Company Report as of 12/09/05 — Next EPS Report Date: 02/06/06

HAWAIIAN ELEC	HE	NYSE	Industry: *UTIL-ELEC PWR*			Type: *Mid*	*Blend*		
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$26.58	18.7	$2152 MM	$1.24	4.7%	$2109 MM	4%	2%	0%	Hold

Hawaiian Electric Industries, Inc. is a holding company with subsidiaries engaged in the electric utility, savings bank, freight transportation, real estate development and other businesses, primarily in the State of Hawaii, and in the pursuit of independent power projects in Asia and the Pacific.

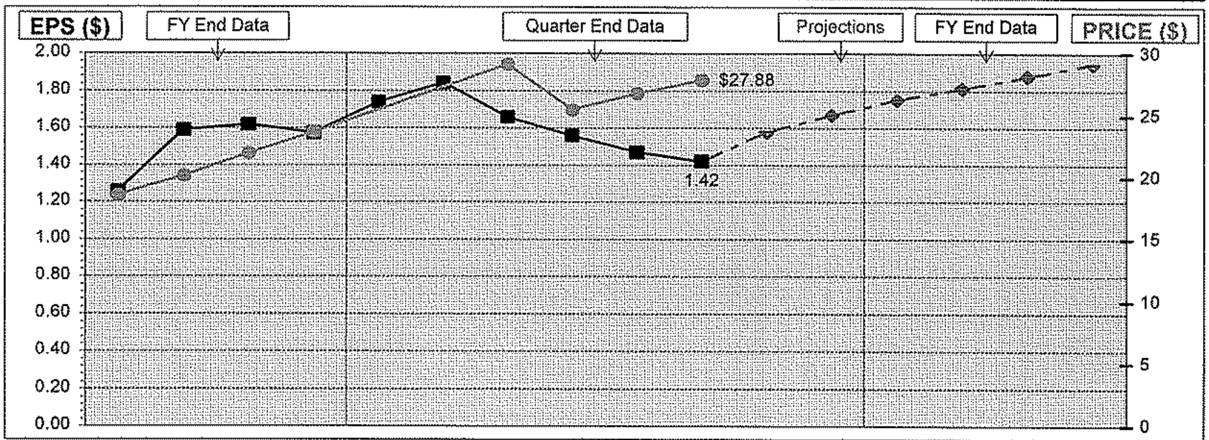
Ave Broker Rec	#Up	#Dn
HOLD	0	0

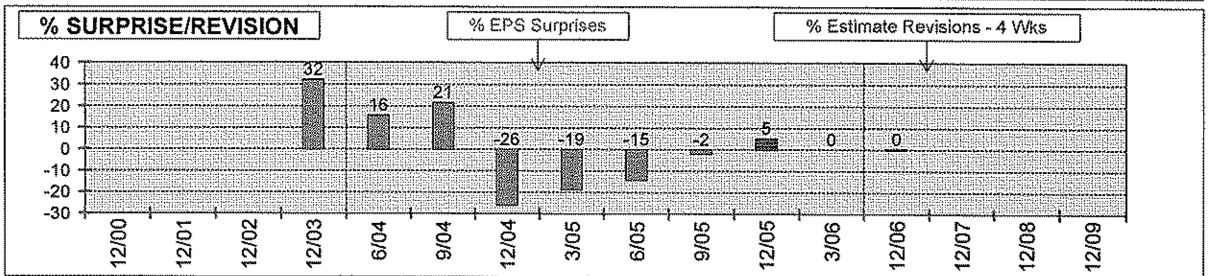
Broker Recommendations



Price/Volume Data	
52-Wk High	$29.76
Low	$24.71
PriceChg-YTD	-9%
-YTD(Rel)	-12%
Avg Dly Vol	239 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	8%
Beta	0.20
Shareholder Data	
Shares Out	81.0 MM
Institutions	29.78%
Insiders	0.74%

EPS,P/E and Growth Rates			**Yr/Yr**
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	1.61	18.1	2%
12/05 Est	1.53	17.4	-5%
12/06 Est	1.75	15.2	15%
Last 5Yr			2%
Next 3-5Yr (Est)			4%
Other Key Measures	**Current**		**5-Year Avg**
P/E (12 Mo)	18.7		14.8
Rel P/E	107%		
Net Margin	5%		5.3%
ROE	9.5%		11.1%
LT Debt/Cap	64%		63%





UTIL-ELEC PWR Industry # 193	Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
HAWAIIAN ELEC	-9%	18.7	4%	1.8	1.0	7.9	0.44	4.7%	5.4%	10%	64%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

* 104 Companies in industry group.

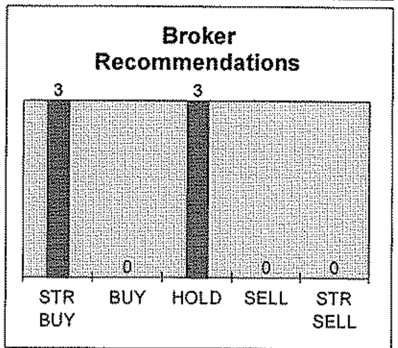
Latest Splits: 06/14/04 2.000 05/25/84 2.000 — Ex-Div. Date: 11/17/05

Zacks Company Report as of 12/09/05 — Next EPS Report Date: 02/10/06

NORTHEAST UTIL NU NYSE	Industry: *UTIL-ELEC PWR*					Type: *Mid* *Value*			
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$19.56	20.8	$2544 MM	$0.70	3.6%	$7226 MM	2%	-3%	11%	Strong Sell

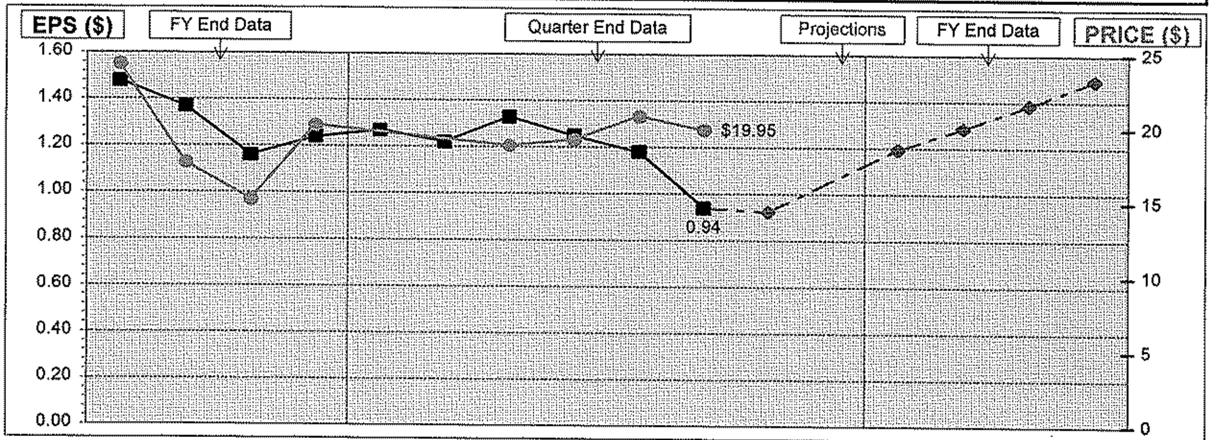
Northeast Utilities is the parent company of the Northeast Utilities system. The Northeast Utilities system furnishes franchised retail electric service in Connecticut, New Hampshire and western Massachusetts through three of the company's wholly owned subsidiaries: The Connecticut Light and Power Company; Public Service Company of New Hampshire; and Western Massachusetts Electric Company. It also provides service to a limited number of customers through another wholly owned subsidiary, Holyoke Water Power Company.

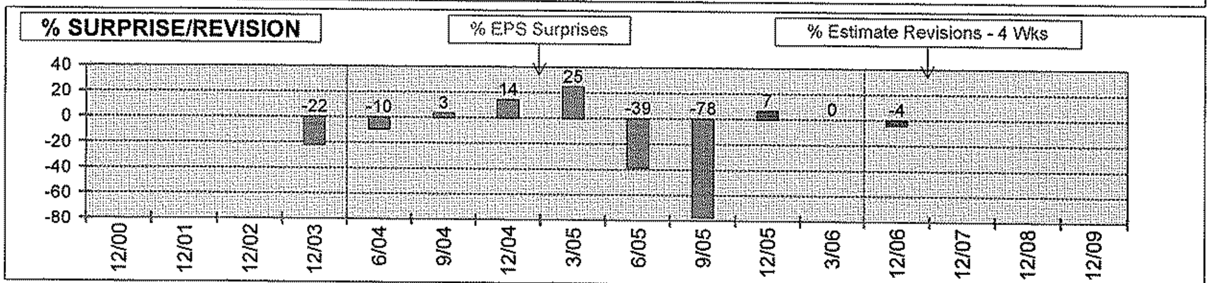
Ave Broker Rec	#Up	#Dn
BUY	1	0



Price/Volume Data	
52-Wk High	$21.79
Low	$17.61
PriceChg-YTD	4%
-YTD(Rel)	-0%
Avg Dly Vol	1543 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	11%
Beta	0.37
Shareholder Data	
Shares Out	130.1 MM
Institutions	66.87%
Insiders	1.17%

EPS,P/E and Growth Rates			**Yr/Yr**
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	1.36	13.9	10%
12/05 Est	1.10	17.8	-19%
12/06 Est	1.19	16.4	9%
Last 5Yr			-3%
Next 3-5Yr (Est)			8%
Other Key Measures			**5-Year**
	Current		**Avg**
P/E (12 Mo)	20.8		14.6
Rel P/E	119%		
Net Margin	-3%		1.4%
ROE	5.7%		7.6%
LT Debt/Cap	61%		57%





UTIL-ELEC PWR	*Industry Comparables*						Impl				
Industry # 193	Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
NORTHEAST UTIL	4%	20.8	8%	1.3	0.4	3.6	0.54	3.6%	-2.8%	6%	61%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	
* 104	Companies in industry group.										

Latest Splits: Ex-Div. Date: 11/29/05

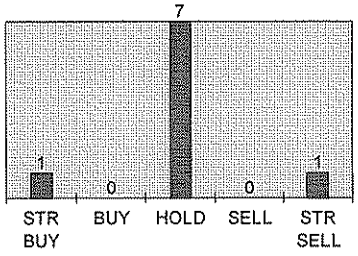
Zacks Company Report as of 12/09/05 Next EPS Report Date: 01/27/06

PINNACLE WEST PNW NYSE				Industry: *UTIL-ELEC PWR*			Type: *Large Value*		
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$42.28	12.5	$4186 MM	$2.00	4.7%	$3061 MM	-9%	-10%	6%	Hold

Pinnacle West Capital is engaged, through its subsidiaries, in the generation, transmission, and distribution of electricity and selling energy, products and services; in real estate development; and in venture capital investment. Its primary subsidiary is Arizona Public Service Company. The company's other subsidiaries include SunCor, El Dorado, APS Energy Services and Pinnacle West Energy.

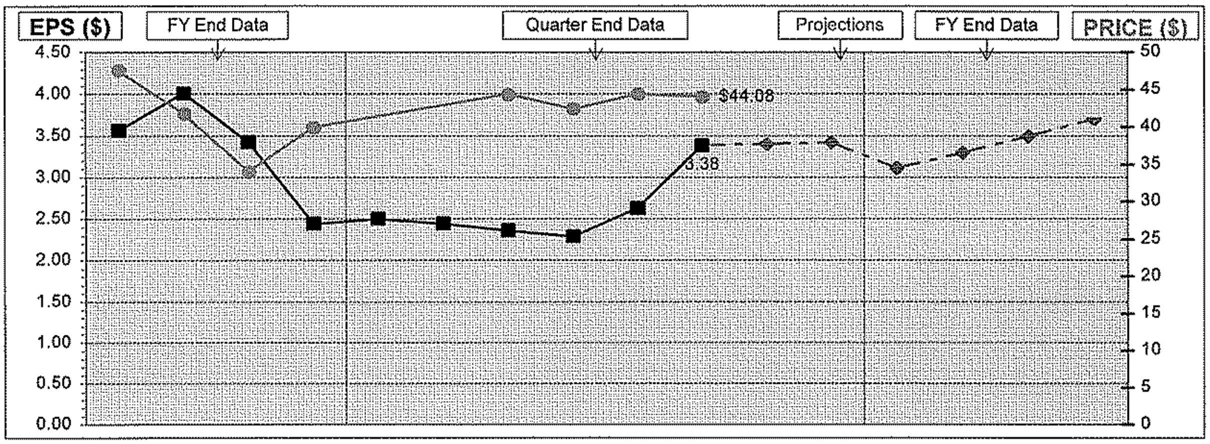
Ave Broker Rec	#Up	#Dn
HOLD	0	0

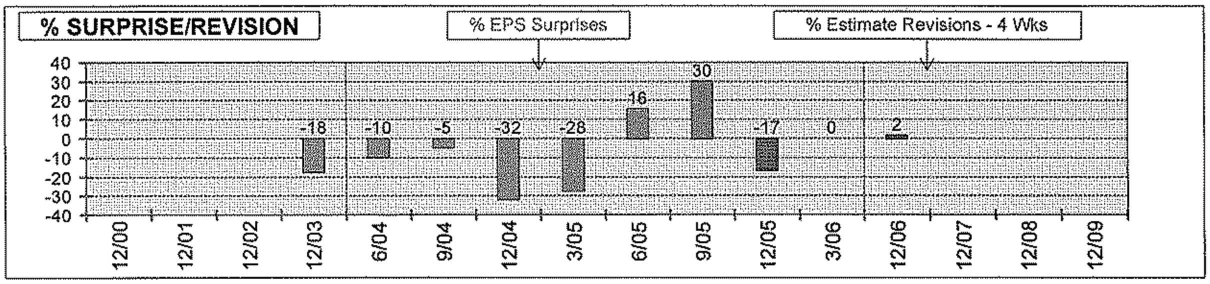
Broker Recommendations



Price/Volume Data	
52-Wk High	$46.39
Low	$39.85
PriceChg-YTD	-5%
-YTD(Rel)	-8%
Avg Dly Vol	380 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	11%
Beta	0.56
Shareholder Data	
Shares Out	99.0 MM
Institutions	72.50%
Insiders	1.10%

EPS,P/E and Growth Rates			Yr/Yr
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	2.39	18.6	-2%
12/05 Est	3.15	13.4	32%
12/06 Est	3.11	13.6	-1%
Last 5Yr			-10%
Next 3-5Yr (Est)			6%
Other Key Measures			**5-Year**
	Current		**Avg**
P/E (12 Mo)	12.5		13.5
Rel P/E	72%		
Net Margin	6%		7.3%
ROE	10.2%		10.3%
LT Debt/Cap	42%		49%





UTIL-ELEC PWR	*Industry Comparables*						Impl				
	Pr Chg	P/E	EPS Gr	Price/	Price/	Price/	Ret/	Div	Net		Debt/
Industry # 193	YTD	(12Mo)	5Yr Est	Book	Sales	CF	P/E	Yield	Margin	ROE	Cap
PINNACLE WEST	-5%	12.5	6%	1.2	1.4	6.2	0.86	4.7%	6.2%	10%	42%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	
* 104	Companies in industry group.										

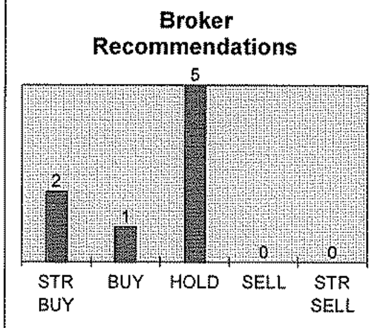
Latest Splits: Ex-Div. Date: 10/28/05

Zacks Company Report as of 12/09/05 — Next EPS Report Date: 02/21/06

PNM RESOURCES	PNM	NYSE	Industry: *UTIL-ELEC PWR*			Type: *Mid*	*Value*	
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$25.35	17.4	$1743 MM	$0.80	3.2%	$1842 MM	-5%	-12%	8%	Sell

PNM Resources is an energy holding company based in Albuquerque, New Mexico. Its principal subsidiary is Public Service Company of New Mexico, which provides electric power and natural gas utility services to more than 1.3 million people in New Mexico. The company also sells power on the wholesale market in the Western U.S.

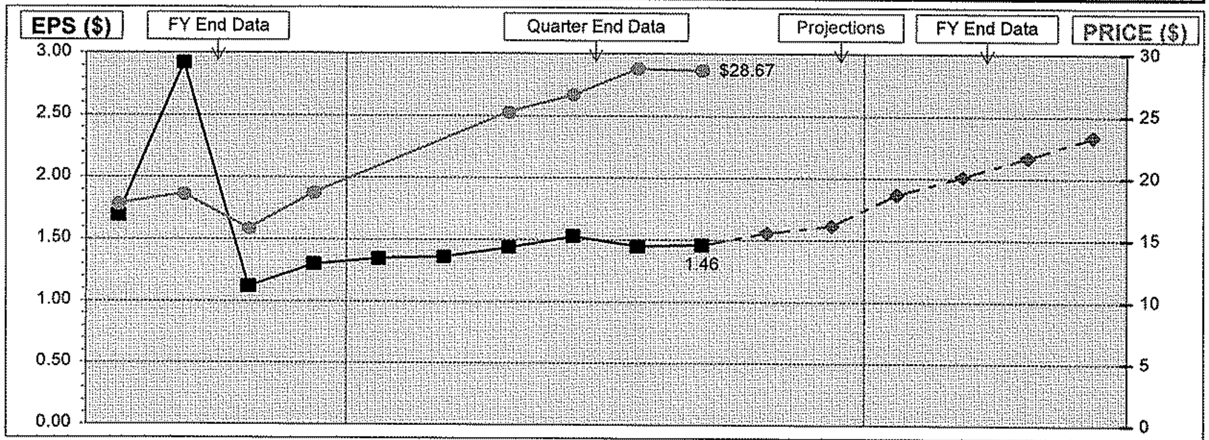
Ave Broker Rec	#Up	#Dn
HOLD	0	0

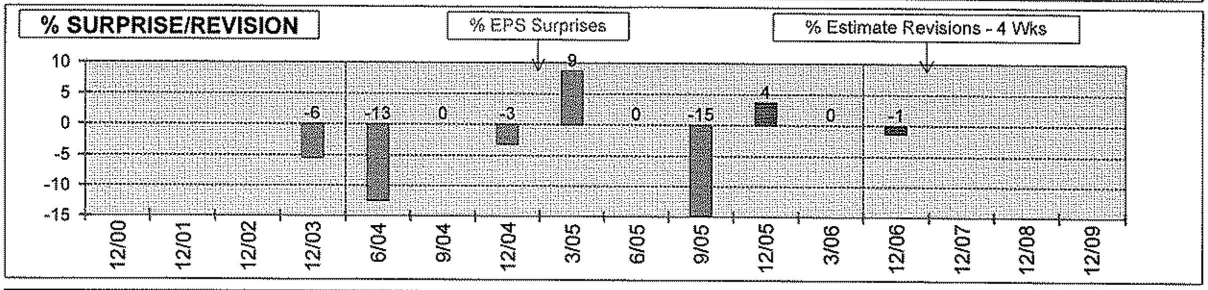


Price/Volume Data	
52-Wk High	$30.26
Low	$24.06
PriceChg-YTD	0%
-YTD(Rel)	-4%
Avg Dly Vol	331 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	11%
Beta	1.00
Shareholder Data	
Shares Out	68.8 MM
Institutions	81.52%
Insiders	1.00%

EPS,P/E and Growth Rates			Yr/Yr
FY	EPS	P/E	EPS Gr
12/04 Act	1.43	17.7	10%
12/05 Est	1.57	16.1	10%
12/06 Est	1.87	13.6	19%
Last 5Yr			-12%
Next 3-5Yr (Est)			8%

Other Key Measures	Current	5-Year Avg
P/E (12 Mo)	17.4	13.3
Rel P/E	100%	
Net Margin	4%	5.9%
ROE	7.7%	9.9%
LT Debt/Cap	56%	50%





UTIL-ELEC PWR Industry # 193	Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
PNM RESOURCES	0%	17.4	8%	1.3	0.9	7.0	0.62	3.2%	4.3%	8%	56%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

* 104 Companies in industry group.

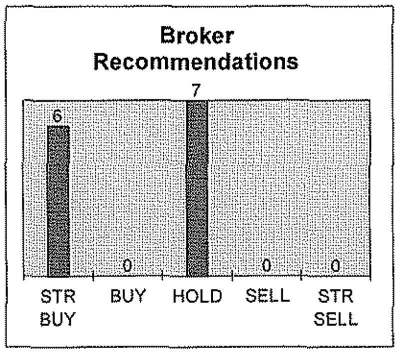
Latest Splits: 06/14/04 1.500 — Ex-Div. Date: 10/28/05

Zacks Company Report as of 12/09/05 | Next EPS Report Date: 02/08/06

PPL CORP	PPL	NYSE	Industry: *UTIL-ELEC PWR*		Type: *Large Blend*				
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$29.50	14.7	$11214 MM	$1.00	3.4%	$6186 MM	1%	1%	14%	Hold

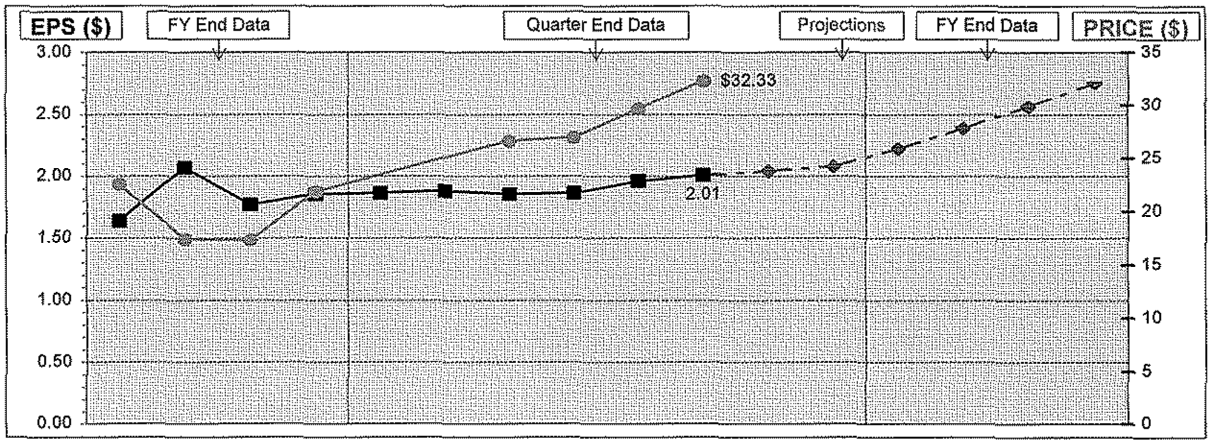
PPL Corporation is an energy and utility holding company. PPL controls about 11,500 megawatts of generating capacity in the United States, sells energy in key U.S. markets and delivers electricity to customers in Pennsylvania, the United Kingdom and Latin America.

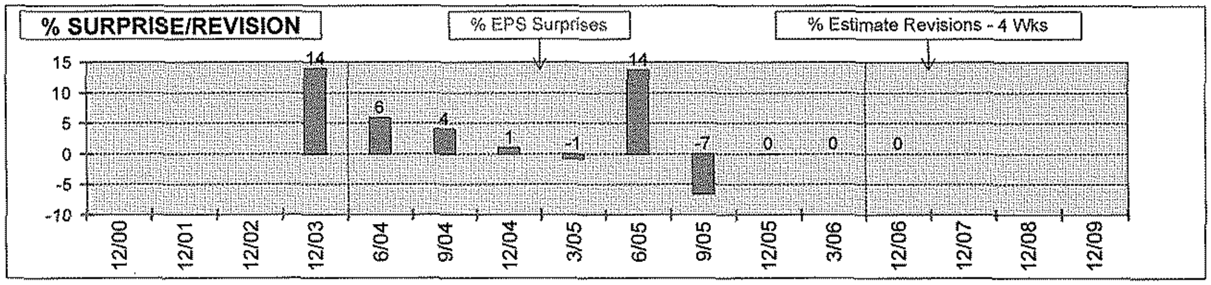
Ave Broker Rec	#Up	#Dn
BUY	0	0



Price/Volume Data	
52-Wk High	$33.31
Low	$25.10
PriceChg-YTD	11%
-YTD(Rel)	7%
Avg Dly Vol	1254 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	11%
Beta	0.76
Shareholder Data	
Shares Out	380.1 MM
Institutions	57.89%
Insiders	0.90%

EPS,P/E and Growth Rates			Yr/Yr
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	1.86	14.4	0%
12/05 Est	2.06	14.3	11%
12/06 Est	2.22	13.3	8%
Last 5Yr			1%
Next 3-5Yr (Est)			7%
Other Key Measures			**5-Year**
	Current		**Avg**
P/E (12 Mo)	14.7		12.0
Rel P/E	84%		
Net Margin	11%		8.6%
ROE	17.9%		25.0%
LT Debt/Cap	58%		68%





UTIL-ELEC PWR Industry # 193	Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
PPL CORP	11%	14.7	7%	2.6	1.8	8.3	0.74	3.4%	10.8%	18%	58%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

* 104 Companies in industry group.

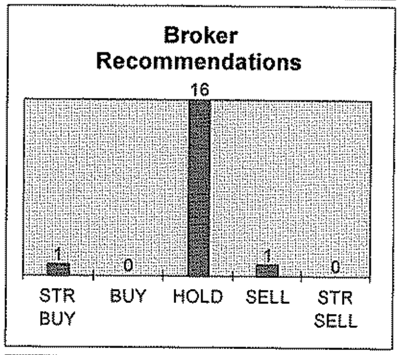
Latest Splits: 08/25/05 2.000 05/12/92 2.000 | Ex-Div. Date: 09/07/05

Zacks Company Report as of 12/09/05 | Next EPS Report Date: 03/09/06

PROGRESS ENERGY PGN NYSE				Industry: *UTIL-ELEC PWR*			Type: *Large Value*		
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$44.26	13.8	$11139 MM	$2.36	5.3%	$9986 MM	13%	-0%	3%	Hold

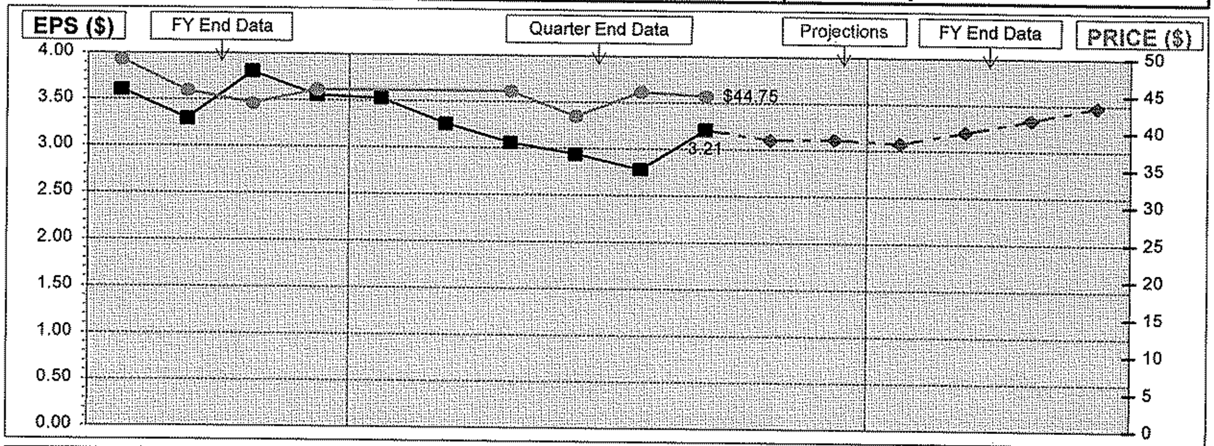
CP & L Energy, Inc. is primarily engaged in the generation, transmission, distribution and sale of electricity in portions of North and South Carolina and Florida and the transmission, distribution and sale of natural gas in portions of North Carolina. The company provides these and other services through its business segments: electric, natural gas and other.

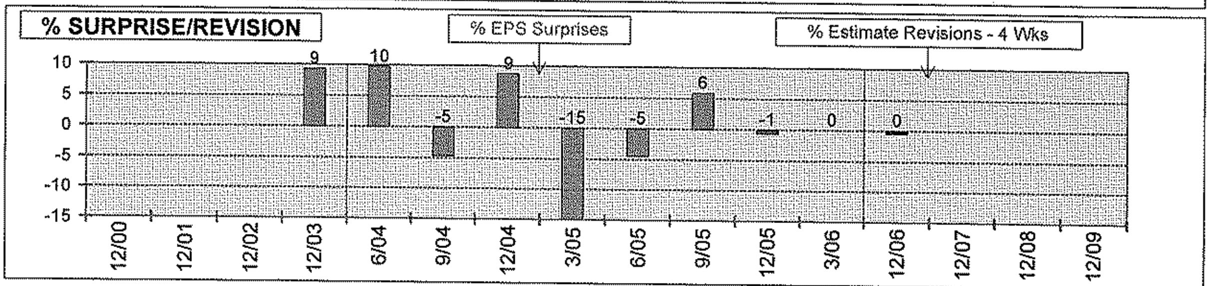
Ave Broker Rec	#Up	#Dn
HOLD	0	0



Price/Volume Data	
52-Wk High	$45.87
Low	$41.03
PriceChg-YTD	-2%
-YTD(Rel)	-6%
Avg Dly Vol	820 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	10%
Beta	0.26
Shareholder Data	
Shares Out	251.7 MM
Institutions	56.03%
Insiders	0.70%

EPS,P/E and Growth Rates			Yr/Yr
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	3.06	14.8	-14%
12/05 Est	3.06	14.4	0%
12/06 Est	3.08	14.4	0%
Last 5Yr			-0%
Next 3-5Yr (Est)			4%
Other Key Measures			**5-Year**
	Current		**Avg**
P/E (12 Mo)	13.8		13.4
Rel P/E	79%		
Net Margin	7%		7.6%
ROE	10.2%		11.3%
LT Debt/Cap	54%		59%





UTIL-ELEC PWR Industry # 193	Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
PROGRESS ENERGY	-2%	13.8	4%	1.4	1.1	5.7	0.69	5.3%	7.4%	10%	54%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

* 104 Companies in industry group.

Latest Splits: 02/01/93 2.000 | Ex-Div. Date: 10/05/05

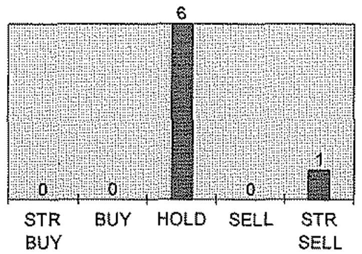
Zacks Company Report as of 12/09/05 | Next EPS Report Date: 02/08/06

PUGET ENERGY		PSD	NYSE	Industry: *UTIL-ELEC PWR*		Type: *Mid*	*Value*		
Rec Price	**P/E**	**Mkt Cap**	**Div Rate**	**Yield**	**Sales (12Mo)**	**Sls Gr**	**EPS Gr**	**Div Gr**	**Zacks Rank**
$20.79	13.8	$2401 MM	$1.00	4.8%	$2537 MM	-7%	-2%	-14%	Hold

Puget Sound Energy, Incorporated is an investor-owned public utility that furnishes electric and gas service. The company conducts its business principally in the Puget Sound region of Washington state. PSE is on the forefront of the future. Innovative programs such as the PSE EnergyTracker are helping to make them the best energy distribution company anywhere, bar none. It's part of an ongoing promise: to offer their customers, community and shareholders unparalleled value in the 21st century.

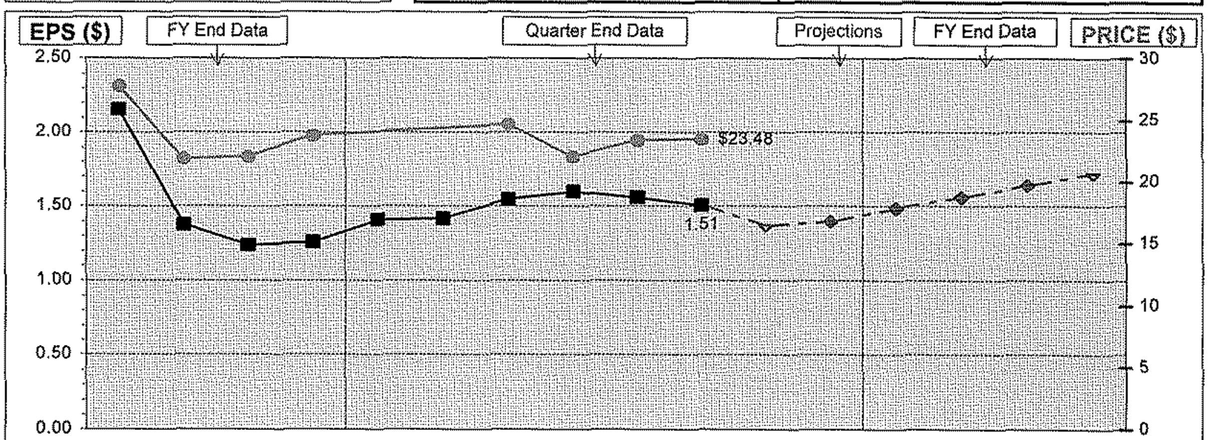
Ave Broker Rec	#Up	#Dn
HOLD	0	0

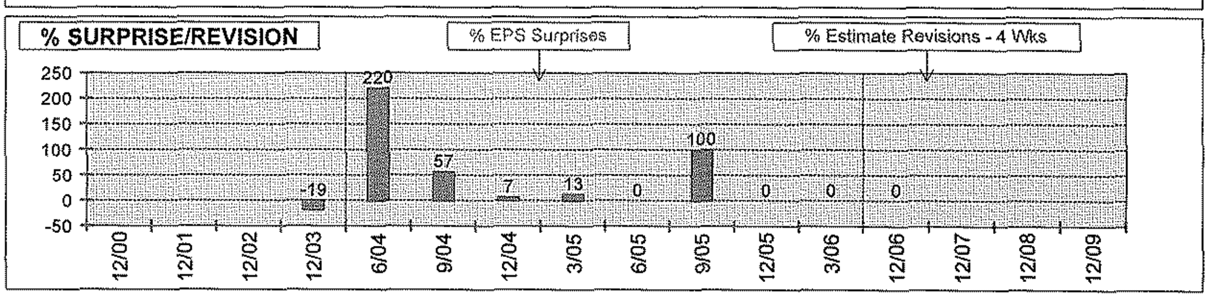
Broker Recommendations



Price/Volume Data	
52-Wk High	$24.73
Low	$20.50
PriceChg-YTD	-16%
-YTD(Rel)	-19%
Avg Dly Vol	355 000s
Exp Return/Risk	
Impl Ret=Yld+Gr	10%
Beta	0.29
Shareholder Data	
Shares Out	115.5 MM
Institutions	51.48%
Insiders	

EPS,P/E and Growth Rates			**Yr/Yr**
FY	**EPS**	**P/E**	**EPS Gr**
12/04 Act	1.55	15.9	23%
12/05 Est	1.38	15.1	-11%
12/06 Est	1.49	14.0	8%
Last 5Yr			-2%
Next 3-5Yr (Est)			5%
Other Key Measures	**Current**		**5-Year Avg**
P/E (12 Mo)	13.8		16.7
Rel P/E	79%		
Net Margin	3%		4.2%
ROE	9.1%		9.1%
LT Debt/Cap	58%		59%





UTIL-ELEC PWR Industry # 193	*Industry Comparables* Pr Chg YTD	P/E (12Mo)	EPS Gr 5Yr Est	Price/ Book	Price/ Sales	Price/ CF	Impl Ret/ P/E	Div Yield	Net Margin	ROE	Debt/ Cap
PUGET ENERGY	-16%	13.8	5%	1.2	0.9	5.2	0.71	4.8%	3.0%	9%	58%
INDUSTRY AVG*		16.4	6%	1.8		7.4	0.58	3.4%	5.8%	11%	
S&P 500	4%	17.4	6%	9.9				1.7%		32%	

* 104 Companies in industry group.

Latest Splits: | Ex-Div. Date: 10/14/05

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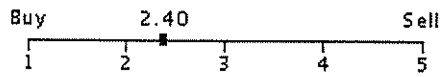
▸ Earnings Estimates
AVISTA CORP (AVA)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

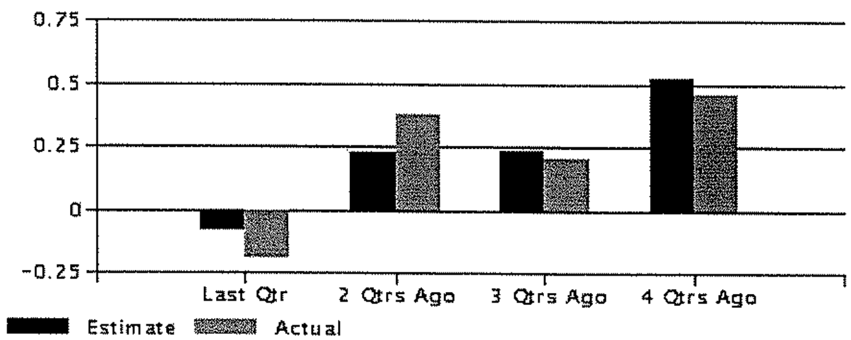


First Call Consensus Rec: Buy

The Analyst Company Sentiment is NEUTRAL
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	-18.90
52 Week Range	16.31 - 20.20	5 Year Stability	57.58
Current PE	22.67	Annual Dividend	0.56
Beta	0.91		*All prices displayed in local currency

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.40	-0.08	0.23	0.24	0.52
Actual	-	-0.19	0.38	0.21	0.46
Surprise%	-	137.50	65.22	-12.50	-11.54
Surprise $ Amt	-	-0.11	0.15	-0.03	-0.06

Consensus EPS Estimates

Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	3	0.40	0.47	0.34	0.39

FY1	Dec 05	2	0.79	0.88	0.70	0.79
FY2	Dec 06	4	1.47	1.60	1.35	1.47
LTG	-	2	5.50	6.00	5.00	5.50

Earnings Momentum				
	12/2005	/	/	/
# Estimates Up/Down - 1 Week	0/ 0	/	/	/
# Estimates Up/Down - 1 Month	0/ 0	/	/	/
Current Mean Estimate	0.40			
Mean 1 Month Ago	0.40			
Mean 3 Months Ago	0.54			

Data Provided by First Call/Thomson Financial

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Earnings Center > Company Earnings

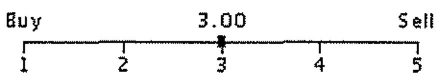
Earnings Estimates | Broker Recommendation | Forecasts | Earnings Snapshots | Performance Following a Surprise | Peer and Industry Comparisons

Earnings Estimates
CLECO CORPORATION (CNL)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

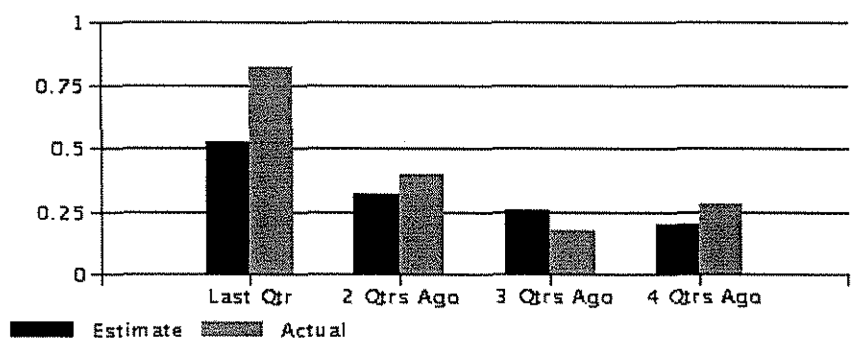


First Call Consensus Rec: Hold

The Analyst Company Sentiment is POSITIVE
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	1.69
52 Week Range	18.93 - 24.36	5 Year Stability	36.60
Current PE	13.25	Annual Dividend	0.90
Beta	0.99	*All prices displayed in local currency	

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.18	0.53	0.32	0.26	0.20
Actual	-	0.82	0.40	0.18	0.28
Surprise%	-	55.30	24.22	-29.41	38.61
Surprise $ Amt	-	0.29	0.08	-0.08	0.08

Consensus EPS Estimates

Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	6	0.18	0.21	0.13	0.18

Q2	Mar 06	2	0.25	0.26	0.23	0.25
Q3	Jun 06	2	0.31	0.31	0.31	0.31
Q4	Sep 06	2	0.60	0.71	0.50	0.60
FY1	Dec 05	5	1.56	1.61	1.50	1.56
FY2	Dec 06	6	1.31	1.49	1.10	1.35
LTG	-	3	4.65	5.00	4.00	4.93

Earnings Momentum

	12/2005	03/2006	06/2006	09/2006
# Estimates Up/Down - 1 Week	0/ 1	0/ 0	0/ 0	0/ 0
# Estimates Up/Down - 1 Month	0/ 2	0/ 0	0/ 0	0/ 0
Current Mean Estimate	0.18	0.25	0.31	0.60
Mean 1 Month Ago	0.21	0.26	0.31	0.71
Mean 3 Months Ago	0.26			

Data Provided by First Call/Thomson Financial

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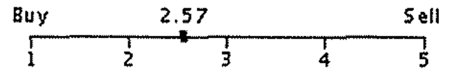
DPL INC (DPL)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005



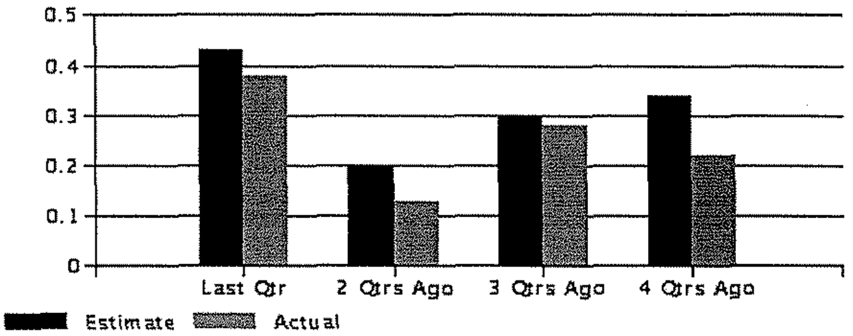
First Call Consensus Rec: Hold

The Analyst Company Sentiment is NEGATIVE
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	-9.22
52 Week Range	23.87 - 28.34	5 Year Stability	33.06
Current PE	24.02	Annual Dividend	0.96
Beta	0.93		

*All prices displayed in local currency

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.34	0.43	0.20	0.30	0.34
Actual	-	0.38	0.13	0.28	0.22
Surprise%	-	-11.01	-34.34	-5.08	-35.29
Surprise $ Amt	-	-0.05	-0.07	-0.02	-0.12

Consensus EPS Estimates

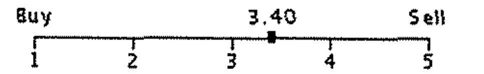
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	2	0.34	0.37	0.30	0.34
FY1	Dec 05	3	1.08	1.10	1.05	1.09
FY2	Dec 06	5	1.59	1.77	1.37	1.60
LTG	-	3	4.67	5.00	4.00	5.00

DUQUESNE LIGHT HOLDINGS INC (DQE)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

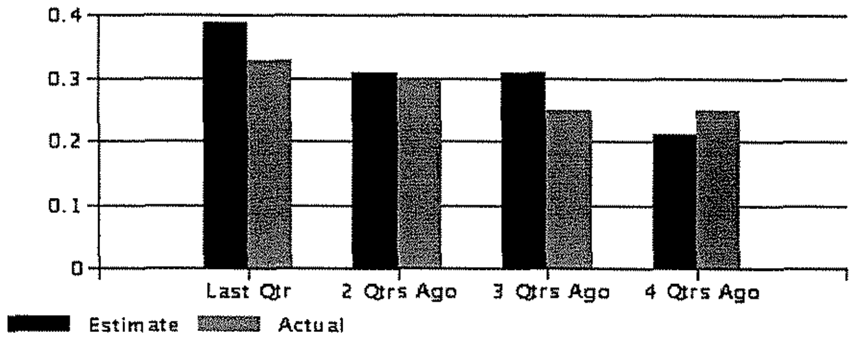


First Call Consensus Rec: Hold

The Analyst Company Sentiment is NEUTRAL
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	-6.96
52 Week Range	16.08 - 19.52	5 Year Stability	26.42
Current PE	14.34	Annual Dividend	1.00
Beta	0.60	*All prices displayed in local currency	

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.26	0.39	0.31	0.31	0.21
Actual	-	0.33	0.30	0.25	0.25
Surprise%	-	-14.95	-2.60	-18.83	21.95
Surprise $ Amt	-	-0.06	-0.01	-0.06	0.05

Consensus EPS Estimates

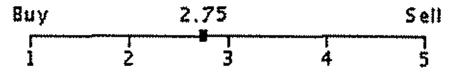
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	2	0.26	0.27	0.25	0.26
FY1	Dec 05	3	1.15	1.20	1.11	1.15
FY2	Dec 06	4	1.17	1.34	1.10	1.13
LTG	-	2	2.50	3.00	2.00	2.50

EMPIRE DIST ELEC CO (EDE)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

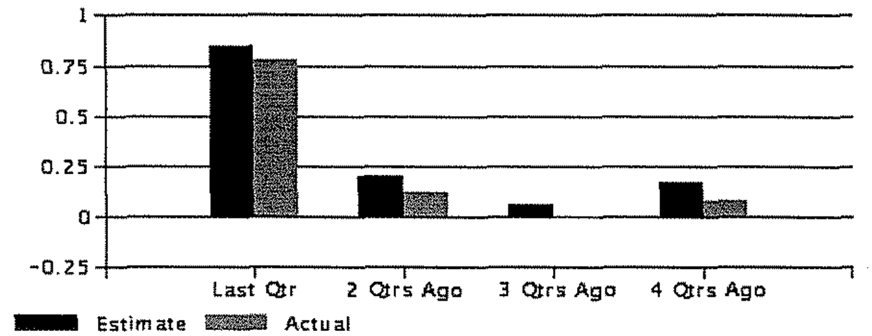


First Call Consensus Rec: Hold

The Analyst Company Sentiment is NO RATING
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	16.00
52 Week Range	19.25 - 25.01	5 Year Stability	171.69
Current PE	19.54	Annual Dividend	1.28
Beta	0.65		*All prices displayed in local currency

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.13	0.85	0.20	0.06	0.17
Actual	-	0.78	0.12	-0.01	0.08
Surprise%	-	-8.56	-40.00	-116.67	-52.38
Surprise $ Amt	-	-0.07	-0.08	-0.07	-0.09

Consensus EPS Estimates

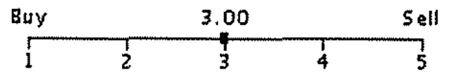
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	3	0.13	0.16	0.10	0.14
FY1	Dec 05	3	1.05	1.10	1.01	1.03
FY2	Dec 06	4	1.15	1.25	1.05	1.15
LTG	-	2	2.00	3.00	1.00	2.00

ENERGY EAST CORP (EAS)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

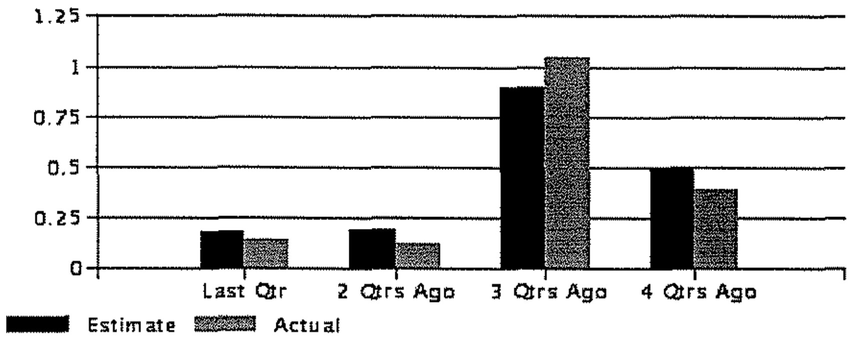


First Call Consensus Rec: Hold

The Analyst Company Sentiment is NEGATIVE
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	-14.28
52 Week Range	22.50 - 30.07	5 Year Stability	175.19
Current PE	12.69	Annual Dividend	1.16
Beta	0.54		*All prices displayed in local currency

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.48	0.18	0.19	0.90	0.50
Actual	-	0.14	0.12	1.05	0.39
Surprise%	-	-20.90	-37.82	16.41	-21.37
Surprise $ Amt	-	-0.04	-0.07	0.15	-0.11

Consensus EPS Estimates

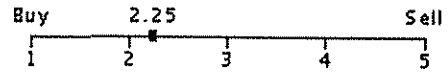
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	3	0.48	0.52	0.40	0.52
FY1	Dec 05	4	1.80	1.83	1.75	1.80
FY2	Dec 06	4	1.89	1.92	1.85	1.90
LTG	-	2	4.50	5.00	4.00	4.50

FIRSTENERGY CORP (FE)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005



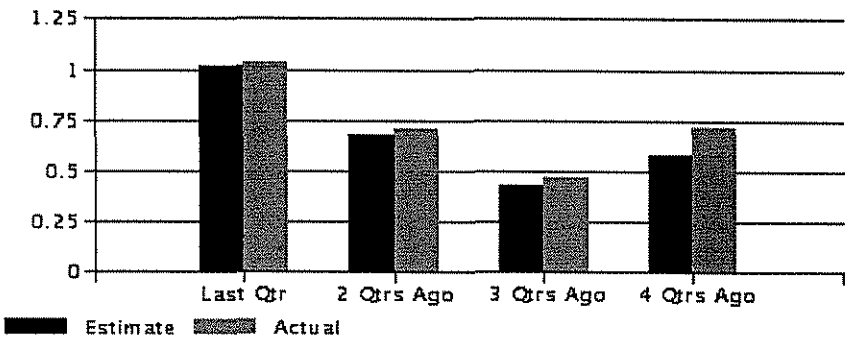
First Call Consensus Rec: Buy

The Analyst Company Sentiment is NO RATING
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	0.30
52 Week Range	37.70 - 53.36	5 Year Stability	32.32
Current PE	16.61	Annual Dividend	1.80
Beta	0.60		

*All prices displayed in local currency

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.75	1.02	0.68	0.43	0.58
Actual	-	1.04	0.71	0.47	0.72
Surprise%	-	1.96	4.87	8.80	23.29
Surprise $ Amt	-	0.02	0.03	0.04	0.14

Consensus EPS Estimates

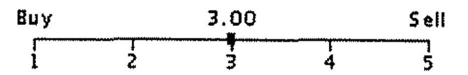
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	9	0.75	0.79	0.70	0.73
Q2	Mar 06	3	0.62	0.68	0.59	0.60
Q3	Jun 06	3	0.83	0.87	0.80	0.81
Q4	Sep 06	3	1.23	1.28	1.18	1.22
FY1	Dec 05	15	2.96	3.10	2.80	2.95
FY2	Dec 06	15	3.54	3.65	3.15	3.55
LTG	-	7	5.00	7.00	3.00	5.00

HAWAIIAN ELEC INDS INC (HE)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

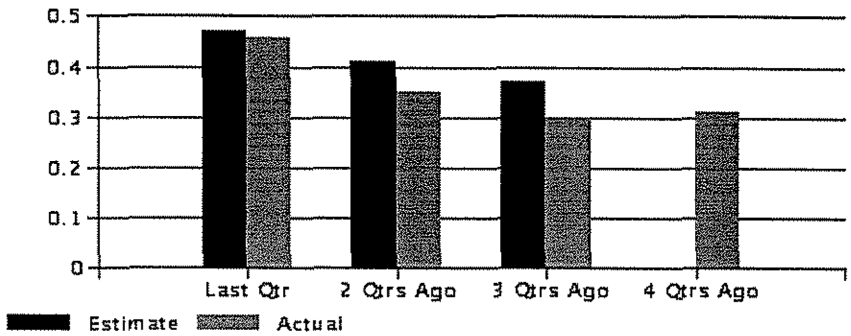


First Call Consensus Rec: Hold

The Analyst Company Sentiment is POSITIVE
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	3.83
52 Week Range	24.60 - 29.79	5 Year Stability	16.20
Current PE	16.97	Annual Dividend	1.24
Beta	0.55	*All prices displayed in local currency	

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.45	0.47	0.41	0.37	
Actual	-	0.46	0.35	0.30	0.31
Surprise%	-	-2.13	-14.63	-19.57	**
Surprise $ Amt	-	-0.01	-0.06	-0.07	**

Consensus EPS Estimates

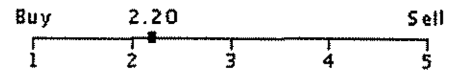
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	4	0.45	0.49	0.39	0.46
Q2	Mar 06	2	0.39	0.40	0.37	0.39
Q3	Jun 06	2	0.42	0.42	0.42	0.42
Q4	Sep 06	2	0.48	0.49	0.46	0.48
FY1	Dec 05	6	1.53	1.60	1.45	1.53
FY2	Dec 06	6	1.74	1.90	1.65	1.73
LTG	-	5	3.70	5.00	2.50	4.00

NORTHEAST UTILS (NU)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005



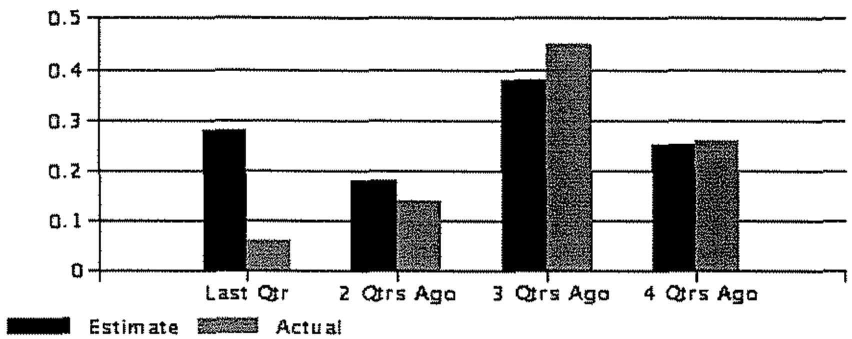
First Call Consensus Rec: Buy

The Analyst Company Sentiment is NEGATIVE
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview

Exchange	New York Stock Exchange	5 Year Growth	-13.16
52 Week Range	17.30 - 21.95	5 Year Stability	36.36
Current PE	17.49	Annual Dividend	0.70
Beta	0.52	*All prices displayed in local currency	

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.35	0.28	0.18	0.38	0.25
Actual	-	0.06	0.14	0.45	0.26
Surprise%	-	-78.57	-20.45	19.05	4.00
Surprise $ Amt	-	-0.22	-0.04	0.07	0.01

Consensus EPS Estimates

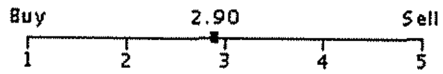
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	5	0.35	0.50	0.29	0.31
Q2	Mar 06	1	0.41	0.41	0.41	0.41
Q3	Jun 06	1	0.16	0.16	0.16	0.16
Q4	Sep 06	1	0.26	0.26	0.26	0.26
FY1	Dec 05	7	1.12	1.23	0.95	1.15
FY2	Dec 06	10	1.19	1.30	1.15	1.17
LTG	-	5	7.70	12.00	5.00	7.50

PINNACLE WEST CAPITAL CORP (PNW)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

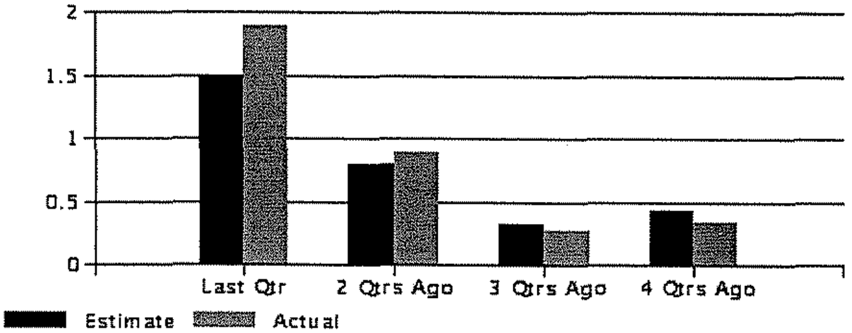


First Call Consensus Rec: Hold

The Analyst Company Sentiment is NEGATIVE
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	-6.47
52 Week Range	39.81 - 46.68	5 Year Stability	51.60
Current PE	13.14	Annual Dividend	2.00
Beta	0.64	*All prices displayed in local currency	

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.18	1.48	0.80	0.33	0.44
Actual	-	1.89	0.89	0.27	0.34
Surprise%	-	28.05	11.95	-18.92	-23.08
Surprise $ Amt	-	0.41	0.10	-0.06	-0.10

Consensus EPS Estimates

Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	6	0.18	0.49	0.05	0.12
Q2	Mar 06	2	0.31	0.38	0.24	0.31
Q3	Jun 06	2	0.84	0.92	0.76	0.84
Q4	Sep 06	2	1.60	1.66	1.53	1.60
FY1	Dec 05	9	3.17	3.30	3.05	3.15
FY2	Dec 06	10	3.08	3.25	2.96	3.05
LTG	-	5	6.00	12.00	3.00	5.00

Earnings Momentum

PNM RESOURCES INC (PNM)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

First Call Consensus Rec: Buy

The Analyst Company Sentiment is POSITIVE

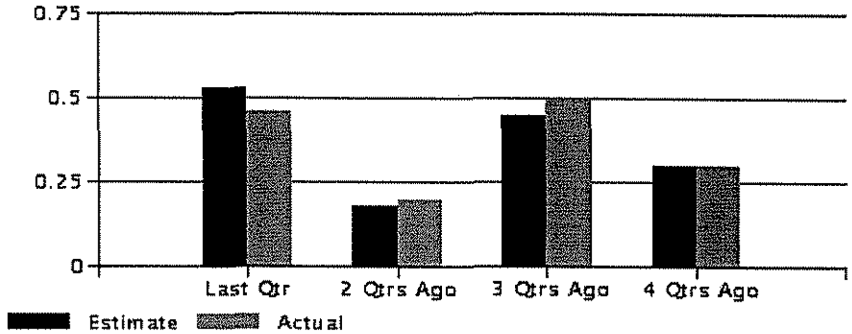
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview

Exchange	New York Stock Exchange	5 Year Growth	-10.72
52 Week Range	23.83 - 30.45	5 Year Stability	43.29
Current PE	15.57	Annual Dividend	0.80
Beta	0.79		

*All prices displayed in local currency

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.40	0.53	0.18	0.45	0.30
Actual	-	0.46	0.20	0.50	0.30
Surprise%	-	-13.21	12.99	11.11	-0.66
Surprise $ Amt	-	-0.07	0.02	0.05	0.00

Consensus EPS Estimates

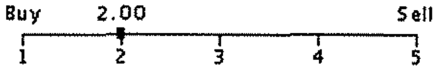
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	6	0.40	0.44	0.35	0.40
Q2	Mar 06	3	0.55	0.61	0.51	0.54
Q3	Jun 06	3	0.30	0.34	0.27	0.30
Q4	Sep 06	3	0.63	0.75	0.56	0.58
FY1	Dec 05	8	1.57	1.60	1.50	1.57
FY2	Dec 06	8	1.88	1.97	1.80	1.88
LTG	-	5	10.66	18.80	5.00	11.50

PPL CORPORATION (PPL)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005



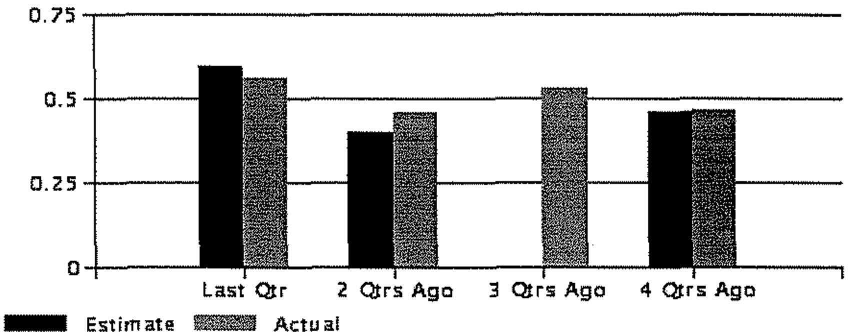
First Call Consensus Rec: Buy

The Analyst Company Sentiment is POSITIVE

Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	1.14
52 Week Range	25.52 - 33.68	5 Year Stability	13.84
Current PE	14.30	Annual Dividend	1.00
Beta	0.69	*All prices displayed in local currency	

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.50	0.60	0.40		0.46
Actual	-	0.56	0.46	0.53	0.47
Surprise%	-	-6.20	12.90	**	1.09
Surprise $ Amt	-	-0.04	0.05	**	0.01

Consensus EPS Estimates

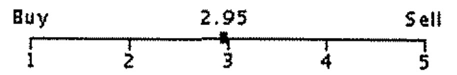
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	7	0.50	0.50	0.49	0.50
Q2	Mar 06	3	0.56	0.57	0.54	0.57
Q3	Jun 06	3	0.47	0.48	0.46	0.47
Q4	Sep 06	3	0.64	0.69	0.62	0.62
FY1	Dec 05	11	2.06	2.15	2.05	2.05
FY2	Dec 06	11	2.23	2.28	2.20	2.22
LTG	-	8	7.44	15.00	5.00	6.25

PROGRESS ENERGY (PGN)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005



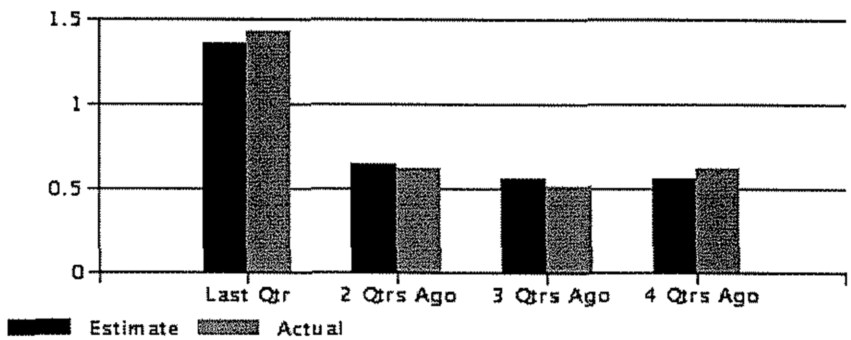
First Call Consensus Rec: Hold

The Analyst Company Sentiment is POSITIVE

Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	-3.82
52 Week Range	40.19 - 46.00	5 Year Stability	28.65
Current PE	14.23	Annual Dividend	2.42
Beta	0.53	*All prices displayed in local currency	

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.51	1.36	0.65	0.56	0.56
Actual	-	1.44	0.63	0.52	0.62
Surprise%	-	6.19	-2.63	-7.64	10.52
Surprise $ Amt	-	0.08	-0.02	-0.04	0.06

Consensus EPS Estimates

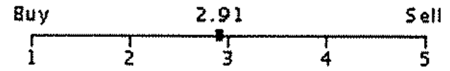
Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	13	0.51	0.56	0.46	0.51
Q2	Mar 06	3	0.53	0.54	0.51	0.54
Q3	Jun 06	3	0.59	0.64	0.54	0.60
Q4	Sep 06	3	1.33	1.51	1.13	1.36
FY1	Dec 05	16	3.10	3.15	3.00	3.10
FY2	Dec 06	16	3.09	3.40	2.65	3.18
LTG	-	6	3.92	5.00	3.00	3.75

PUGET ENERGY INC (PSD)

Sector: Public Utilities

Industry: Electrical Utilities

Last Updated: December 31, 2005

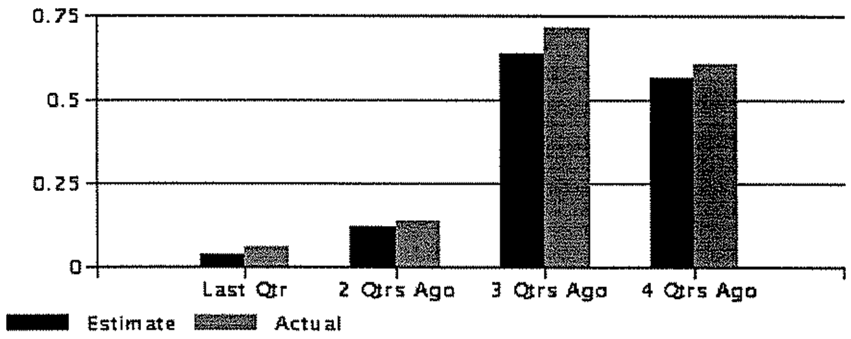


First Call Consensus Rec: Hold

The Analyst Company Sentiment is NEUTRAL
Analyst Sentiment is determined by a quantitative company scoring model that scores company level sentiment based on analyst earnings revisions. The scoring model considers the following factors: analyst experience, magnitude of the revision, proximity of the revision to the actual earnings report date, range of estimates, historic stock performance following a given analyst's prior revisions, and market capitalization of the company.

Overview			
Exchange	New York Stock Exchange	5 Year Growth	-4.80
52 Week Range	20.21 - 24.75	5 Year Stability	105.03
Current PE	14.95	Annual Dividend	1.00
Beta	0.54	*All prices displayed in local currency	

Reported Quarters



	Current	Last Quarters	2 Quarters Ago	3 Quarters Ago	4 Quarters Ago
Estimate	0.48	0.04	0.12	0.64	0.57
Actual	-	0.06	0.14	0.72	0.61
Surprise%	-	42.86	18.64	12.85	7.02
Surprise $ Amt	-	0.02	0.02	0.08	0.04

Consensus EPS Estimates

Period	Report Date	# of Estimates	Mean	High	Low	Median
Q1	Dec 05	5	0.48	0.52	0.45	0.48
Q2	Mar 06	1	0.75	0.75	0.75	0.75
Q3	Jun 06	1	0.17	0.17	0.17	0.17
Q4	Sep 06	1	0.09	0.09	0.09	0.09
FY1	Dec 05	7	1.37	1.40	1.35	1.36
FY2	Dec 06	10	1.46	1.55	1.40	1.47
LTG	-	3	4.00	5.00	3.00	4.00

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of: **GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY**	**CASE NO. 2005-00341**

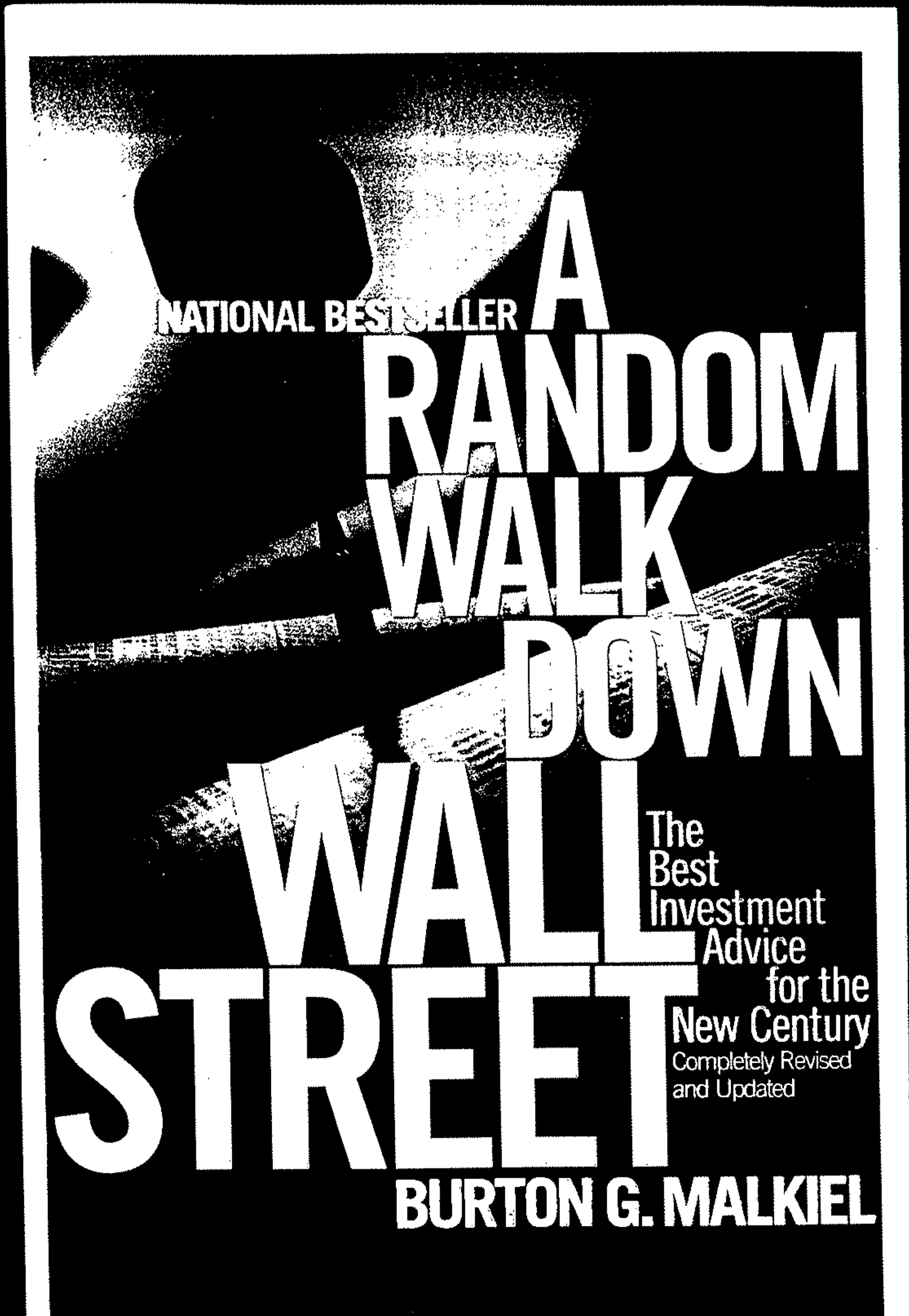
KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 33

6 6


NATIONAL BESTSELLER
A RANDOM WALK DOWN WALL STREET
The Best Investment Advice for the New Century
Completely Revised and Updated
BURTON G. MALKIEL

9
Reaping Reward by Increasing Risk

Theories that are right only 50 percent of the time are less economical than coin-flipping.

—George J. Stigler, *The Theory of Price*

As every reader should know by now, risk has its rewards. Thus, both within academia and on the Street, there has long been a scramble to exploit risk to reap greater riches. That's what this chapter covers: the creation of analytical tools to measure risk and, with such knowledge, reap greater rewards.

We begin with a refinement to modern portfolio theory. As I mentioned in the last chapter, diversification cannot eliminate all risk—as it did in my mythical island economy—because all stocks tend to move up and down together. Thus, diversification in practice reduces some but not all risk. Three academics—Stanford professor William Sharpe and the late finance specialists John Lintner and Fischer Black—focused their intellectual energies in determining what part of a security's risk can be eliminated by diversification and what part cannot. The result is called the *capital-asset pricing model.* Sharpe received a Nobel Prize for his contribution to this work at the same time Markowitz was honored in 1990.

The basic logic behind the capital-asset pricing model is that there is no premium for bearing risks that can be diversified away. Thus, to get a higher average long-run rate of return

in a portfolio, you need to increase the risk level of the portfolio that cannot be diversified away. According to this theory, savvy investors can outperform the overall market and win the profit race simply by adjusting their portfolios by a risk measure known as *beta*.

Beta and Systematic Risk

Beta? How did a Greek letter enter this discussion? Surely it didn't originate with a stock broker. Can you imagine any stockbroker saying, "We can reasonably describe the total risk in any security (or portfolio) as the total variability (variance or standard deviation) of the returns from the security"? But we who teach say such things often. We go on to say that part of total risk or variability may be called the security's *systematic risk* and that this arises from the basic variability of stock prices in general and the tendency for all stocks to go along with the general market, at least to some extent. The remaining variability in a stock's returns is called *unsystematic risk* and results from factors peculiar to that particular company; for example, a strike, the discovery of a new product, and so on.

Systematic risk, also called *market risk*, captures the reaction of individual stocks (or portfolios) to general market swings. Some stocks and portfolios tend to be very sensitive to market movements. Others are more stable. This relative volatility or sensitivity to market moves can be estimated on the basis of the past record, and is popularly known by—you guessed it—the Greek letter beta.

You are now about to learn all you ever wanted to know about beta but were afraid to ask. Basically, beta is the numerical description of systematic risk. Despite the mathematical manipulations involved, the basic idea behind the beta measurement is one of putting some precise numbers on the subjective feelings money managers have had for years. The beta calculation is essentially a comparison between the movements of an individual stock (or portfolio) and the movements of the market as a whole.

The calculation begins by assigning a beta of 1 to a broad market index, such as the S&P 500. If a stock has a beta of 2, then on average it swings twice as far as the market. If the market goes up 10 percent, the stock tends to rise 20 percent. If a stock has a beta of 0.5, it tends to be more stable than the market (it will go up or down 5 percent when the market rises or declines 10 percent). Professionals often call high-beta stocks aggressive investments and label low-beta stocks as defensive.

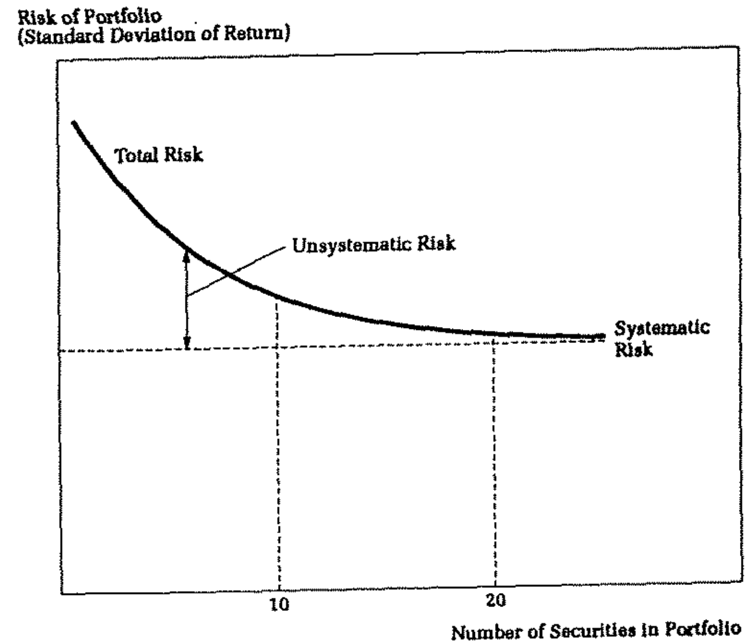
Now the important thing to realize is that *systematic risk cannot be eliminated by diversification.* It is precisely because all stocks move more or less in tandem (a large share of their variability is systematic) that even diversified stock portfolios are risky. Indeed, if you diversified perfectly by buying a share in the S&P index (which by definition has a beta of 1) you would still have quite variable (risky) returns because the market as a whole fluctuates widely.

Unsystematic risk is the variability in stock prices (and therefore, in returns from stocks) that results from factors peculiar to an individual company. Receipt of a large new contract, the finding of mineral resources on the company's property, labor difficulties, the discovery that the corporation's treasurer has had his hand in the company till—all can make a stock's price move independently of the market. The risk associated with such variability is precisely the kind that diversification can reduce. The whole point of portfolio theory is that, to the extent that stocks don't move in tandem all the time, variations in the returns from any one security tend to be washed away or smoothed out by complementary variation in the returns from other securities.

The following chart, similar to the one on page 211, illustrates the important relationship between diversification and total risk. Suppose we randomly select securities for our portfolio that tend on average to be just as volatile as the market (the average betas for the securities in our portfolio will always be equal to 1). The chart shows that as we add more and more securities, the total risk of our portfolio declines, especially at the start.

When ten securities are selected for our portfolio, a good deal of the unsystematic risk is eliminated, and additional diversification yields little further risk reduction. By the time twenty well-diversified securities are in the portfolio, the unsystematic risk is substantially eliminated and our portfolio

How Diversification Reduces Risk



Source: Modigliani and Pogue, "An Introduction to Risk and Return," *Financial Analysts Journal*, March–April 1974.

(with a beta of 1) will tend to move up and down essentially in tandem with the market. Of course, we could perform the same experiment with stocks whose average beta is 1½. Again, we would find that diversification quickly reduced unsystematic risk, but the remaining systematic risk would be larger. A portfolio of twenty or more stocks with an average beta of 1½ would tend to be 50 percent more volatile than the market.

Now comes the key step in the argument. Both financial theorists and practitioners agree that investors should be compensated for taking on more risk with a higher expected return. Stock prices must, therefore, adjust to offer higher returns where more risk is perceived, to ensure that all securities are held by someone. Obviously, risk-averse investors wouldn't buy securities with extra risk without the expectation of extra reward. But not all of the risk of individual securities is relevant in determining the premium for bearing risk. The unsystematic part of the total risk is easily eliminated by adequate diversification. So there is no reason to think that investors will receive extra compensation for bearing unsystematic risk. The only part of total risk that investors will get paid for bearing is systematic risk, the risk that diversification cannot help. Thus, the capital-asset pricing model says that returns (and, therefore, risk premiums) for any stock (or portfolio) will be related to beta, the systematic risk that cannot be diversified away.

The Capital-Asset Pricing Model (CAPM)

The proposition that risk and reward are related is not new. Finance specialists have agreed for years that investors do need to be compensated for taking on more risk. What is different about the new investment technology is the definition and measurement of risk. Before the advent of the capital-asset pricing model, it was believed that the return on each security was related to the total risk inherent in that security. It was believed that the return from a security varied with the instability of that security's particular performance, that is, with the variability or standard deviation of the returns it produced. The new theory says that the *total* risk of each individual security is irrelevant. It is only the systematic component that counts as far as extra rewards go.

Although the mathematical proof of this proposition is forbidding, the logic behind it is fairly simple. Consider a case in which there are two groups of securities—Group I and Group II—with twenty securities in each. Suppose that the systematic risk (beta) for each security is 1; that is, each of the securities in the two groups tends to move up and down in tandem with the general market. Now suppose that, because of factors peculiar to the individual securities in Group I, the total risk for each of them is substantially higher than the total risk for each security in Group II. Imagine, for example, that in addition to general market factors the securities in Group I are also particularly susceptible to climatic variations, to changes in exchange rates, and to natural disasters. The specific risk for each of the securities in Group I will, therefore, be very high. The specific risk for each of the securities in Group II, however, is assumed to be very low, and, hence, the total risk for each of them will be very low. Schematically, this situation appears as follows:

Group I (20 Securities)	*Group II (20 Securities)*
Systematic risk (beta) = 1 for each security	Systematic risk (beta) = 1 for each security
Specific risk is high for each security	Specific risk is low for each security
Total risk is high for each security	Total risk is low for each security

Now, according to the old theory, commonly accepted before the advent of the capital-asset pricing model, returns should be higher for a portfolio made up of Group I securities than for a portfolio made up of Group II securities, because each security in Group I has a higher total risk, and risk, as we know, has its reward. With a wave of their intellectual wands, the academics changed that sort of thinking. Under the capital-asset pricing model, returns from both portfolios should be equal. Why?

First, remember the preceding chart on page 223. (The forgetful can turn the page back to take another look.) There we saw that as the number of securities in the portfolio approached twenty, the total risk of the portfolio was reduced to its systematic level. All of the unsystematic risk had been eliminated. The conscientious readers will now note that in the schematic illustration, the number of securities in each portfolio is twenty. That means that the unsystematic risk has essentially been washed away: An unexpected weather calamity is balanced by a favorable exchange rate, and so forth. What remains is only the systematic risk of each stock in the portfolio, which is given by its beta. But in these two groups, each of the stocks has a beta of 1. Hence, a portfolio of Group I securities and a portfolio of Group II securities will perform exactly the same with respect to risk (standard deviation), even though the stocks in Group I display higher total risk than the stocks in Group II.

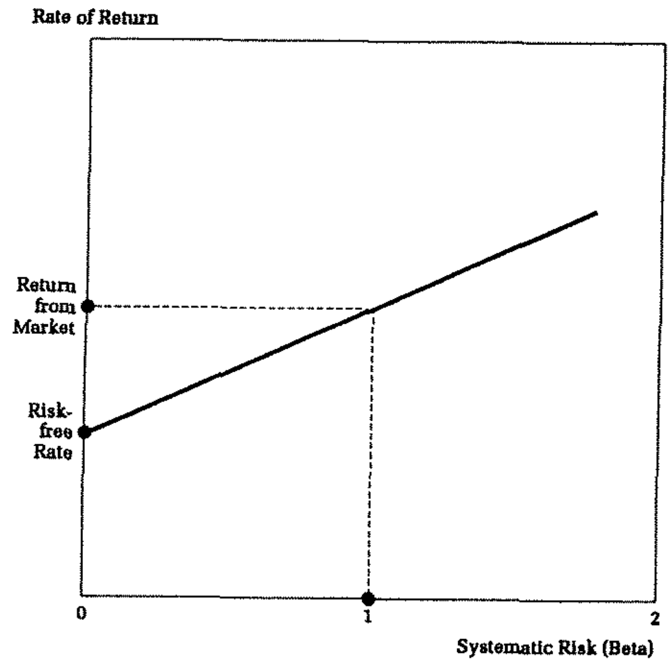
The old and the new views now meet head on. Under the old system of valuation, Group I securities were regarded as offering a higher return because of their greater risk. The capital-asset pricing model says there is no greater risk in holding Group I securities if they are in a diversified portfolio. Indeed, if the securities of Group I did offer higher returns, then all rational investors would prefer them over Group II securities and would attempt to rearrange their holdings to capture the higher returns from Group I. But by this very process, they would bid up the prices of Group I securities and push down the prices of Group II securities until, with the attainment of equilibrium (when investors no longer want to switch from security to security), the portfolio for each group had identical returns, related to the systematic component of their risk (beta) rather than to their total risk (including the unsystematic or specific portions). Because stocks can be combined in portfolios to eliminate specific risk, only the undiversifiable or systematic risk will command a risk premium. Investors will not get paid for bearing risks that can be diversified away. This is the basic logic behind the capital-asset pricing model.

In a big fat nutshell, the proof of the capital-asset pricing model (henceforth to be known as CAPM because we economists love to use letter abbreviations) can be stated as follows:

> If investors did get an extra return (a risk premium) for bearing unsystematic risk, it would turn out that diversified portfolios made up of stocks with large amounts of unsystematic risk would give larger returns than equally risky portfolios of stocks with less unsystematic risk. Investors would snap at the chance to have these higher returns, bidding up the prices of stocks with large unsystematic risk and selling stocks with equivalent betas but lower unsystematic risk. This process would continue until the prospective returns of stocks with the same betas were equalized and no risk premium could be obtained for bearing unsystematic risk. Any other result would be inconsistent with the existence of an efficient market.

The key relationship of the theory is shown in the following chart. As the systematic risk (beta) of an individual stock (or portfolio) increases, so does the return an investor can expect. If an investor's portfolio has a beta of zero, as might be

Risk and Return According to the Capital-Asset Pricing Model*



*Those who remember their high school algebra will recall that any straight line can be written as an equation. The equation for the straight line in the diagram is

Rate of Return = Risk-free Rate + Beta (Return from Market − Risk-free Rate).

Alternately, the equation can be written as an expression for the risk premium, that is, the rate of return on the portfolio of stock over and above the risk-free rate of interest:

Rate of Return − Risk-free Rate = Beta (Return from Market − Risk-free Rate).

The equation says that the risk premium you get on any stock or portfolio increases directly with the beta value you assume. Some readers may wonder what relationship beta has to the covariance concept that was so critical in our discussion of portfolio theory. The beta for any security is essentially the same thing as the covariance between that security and the market index as measured on the basis of past experience.

the case if all her funds were invested in a government-guaranteed bank savings certificate (beta would be zero because the returns from the certificate would not vary at all with swings in the stock market), the investor would receive some modest rate of return, which is generally called the *risk-free rate of interest*. As the individual takes on more risk, however, the return should increase. If the investor holds a portfolio with a beta of 1 (as, for example, holding a share in one of the broad stock-market averages) her return will equal the general return from common stocks. This return has over long periods of time exceeded the risk-free rate of interest, but the investment is a risky one. In certain periods, the return is much less than the risk-free rate and involves taking substantial losses. This, as we have said, is precisely what is meant by risk.

The diagram shows that a number of different expected returns are possible simply by adjusting the beta of the portfolio. For example, suppose the investor put half of her money in a savings certificate and half in a share of the market averages. In this case, she would receive a return midway between the risk-free return and the return from the market and her portfolio would have an average beta of 0.5.* The CAPM then asserts very simply that to get a higher average long-run rate of return you should just increase the beta of your portfolio. An investor can get a portfolio with a beta larger than 1 either by buying high-beta stocks or by purchasing a portfolio with average volatility on margin. (See the chart and following table.) One fund proposed by a West Coast bank would have allowed an investor to buy the S&P average on margin, thus increasing both his risk and potential reward. Of course, in times of rapidly declining stock prices, such a fund would have enabled an investor to lose his shirt in a hurry. This may explain why the fund found few customers in the 1970s.

Just as stocks had their fads, so beta came into high fashion by the early 1970s. *The Institutional Investor*, the glossy prestige magazine that spent most of its pages chronicling the accomplishments of professional money managers, put its imprimatur on the movement in 1971 by featuring on its cover the letters BETA on top of a temple and including as its lead story "The Beta Cult! The New Way to Measure Risk." The magazine noted that money men whose mathematics hardly went beyond long division were now "tossing betas around with the abandon of Ph.D.s in statistical theory." Even the Securities and Exchange Commission gave beta its approval as

*In general, the beta of a portfolio is simply the weighted average of the betas of its component parts.

Illustration of Portfolio Building[a]

Desired Beta	*Composition of Portfolio*	*Expected Return from Portfolio*
0	$1 in risk-free asset	10%
½	$ .50 in risk-free asset $ .50 in market portfolio	½ (0.10) + ½ (0.15) = 0.125, or 12½%[b]
1	$1 in market portfolio	15%
1½	$1.50 in market portfolio borrowing $.50 at an *assumed rate of 10 percent*	1½ (0.15) − ½ (0.10) = 0.175, or 17½%

[a] Assuming expected market return is 15 percent and risk-free rate is 10 percent.

[b] We can also derive the figure for expected return using directly the formula that accompanies the preceding chart:

Rate of Return = 0.10 + 1/2 (0.15 − 0.10) = 0.125 or 12½%.

a risk measure in its *Institutional Investors Study Report*.

On Wall Street, the early beta fans boasted that they could earn higher long-run rates of return simply by buying a few high-beta stocks. Those who thought they were able to time the market thought they had an even better idea. They would buy high-beta stocks when they thought the market was going up, switching to low-beta ones when they feared the market might decline. To accommodate the enthusiasm for this new investment idea, beta measurement services proliferated among brokers, and it was a symbol of progressiveness for an investment house to provide its own beta estimates. Today, you can obtain beta estimates from brokers such as Merrill Lynch and investment advisory services such as Value Line and Morningstar. The beta boosters on the Street oversold their product with an abandon that would have shocked even the most enthusiastic academic scribblers intent on spreading the beta gospel.

Let's Look at the Record

In Shakespeare's *Henry IV*, Glendower boasts to Hotspur, "I can call spirits from the vasty deep." "Why, so can I or so can any man," says Hotspur, unimpressed; "but will they come when you do call for them?" Anyone can theorize about how security markets work, and the capital-asset pricing model is just another theory. The really important question is: Does it work?

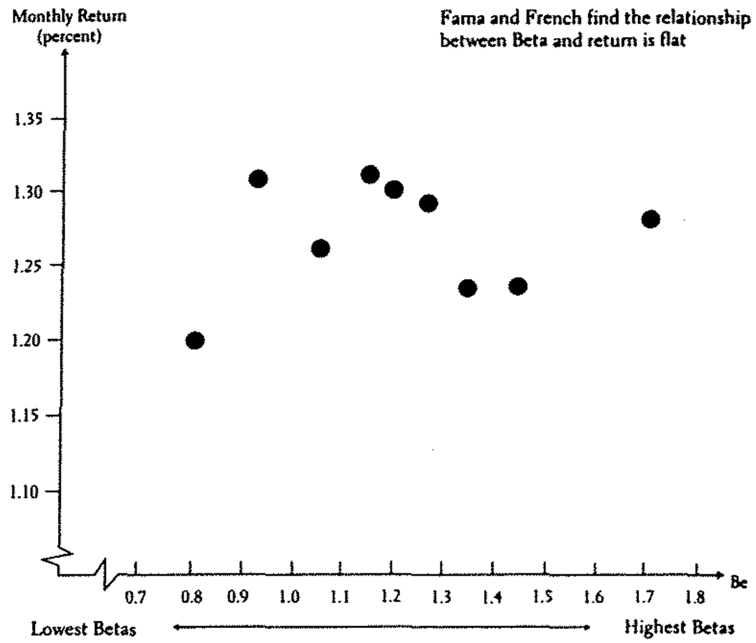
Certainly many institutional investors have embraced the beta concept, if only in an attempt to play down the flamboyant excesses of the past. Beta is, after all, an academic creation. What could be more staid? Simply created as a number that describes a stock's risk, it appears almost sterile in nature. True, it requires large investments in computer programs, but the closet chartists love it. Even if you don't believe in beta, you have to speak its language because, back on the nation's campuses, my colleagues and I have been producing a long line of Ph.D.s and M.B.A.s who spout its terminology. They have gone professional and now use beta as a method of evaluating a portfolio manager's performance. If the realized return is larger than that predicted by the overall portfolio beta, the manager is said to have produced a positive alpha. Lots of money in the market sought out the manager who could deliver the largest alpha.

But is beta a useful measure of risk? Is it true that high-beta portfolios will provide larger long-term returns than lower-beta ones, as the capital-asset pricing model suggests? Does beta alone summarize a security's total systematic risk, or do we need to consider other factors as well? In short, does beta really deserve an alpha? These are subjects of intense current debate among practitioners and academics.

In a study published in 1992, Eugene Fama and Kenneth French divided all traded stocks on the New York, American, and NASDAQ exchanges into deciles according to their beta measures over the 1963–90 period. Decile one contained the 10 percent of all stocks that had the lowest betas; decile ten contained the 10 percent that had the highest betas. The remarkable result, shown in the exhibit on page 231, is that there was essentially no relationship between the return of these decile portfolios and their beta measures. I have done a similar study showing the relationship between return and beta for mutual funds. The exhibit on page 232 presents the results for the 1980s; similar results were obtained for other periods. It appears that there is no relationship between returns for stocks or portfolios and their beta measures of risk, confirming the Fama-French results.

Because their comprehensive study covered a period of

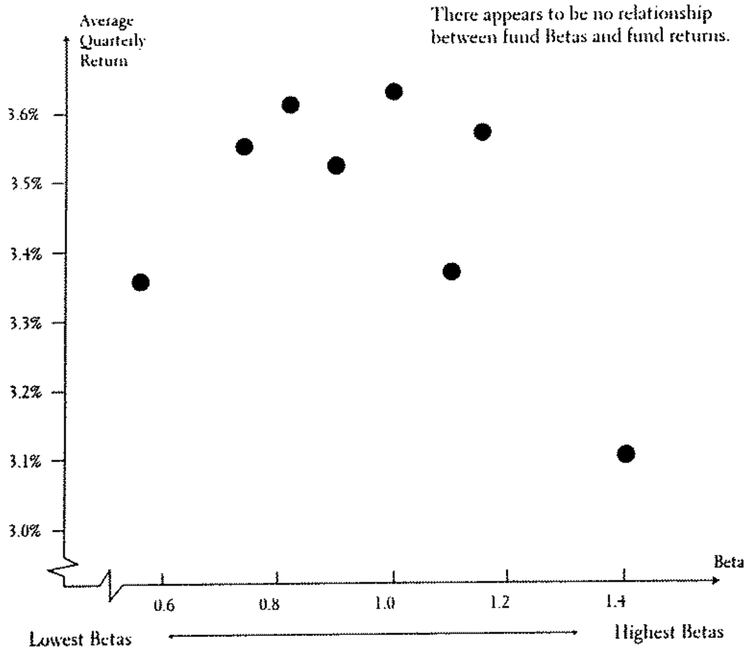
Average Monthly Return vs. Beta: 1963–90 (Fama and French Study)



almost 30 years, Fama and French concluded that the relationship between beta and return is essentially flat. Beta, the key analytical tool of the capital-asset pricing model, is not a useful measure to capture the relationship between risk and return. And so, by the mid-1990s, not only practitioners but even many academics as well, were ready to assign beta to the scrap heap. The financial press, which earlier had chronicled the ascendancy of beta, now ran feature stories with titles such as "The Death of Beta," "Bye, Bye Beta," and "Beta Beaten." Typical of the times was a letter quoted in the *Institutional Investor* from a writer known only as "Deep Quant."* The letter began, "There is a very big story breaking in money man-

*"Quant" is the Wall Street nickname for the quantitatively inclined financial analyst who devotes attention largely to the new investment technology.

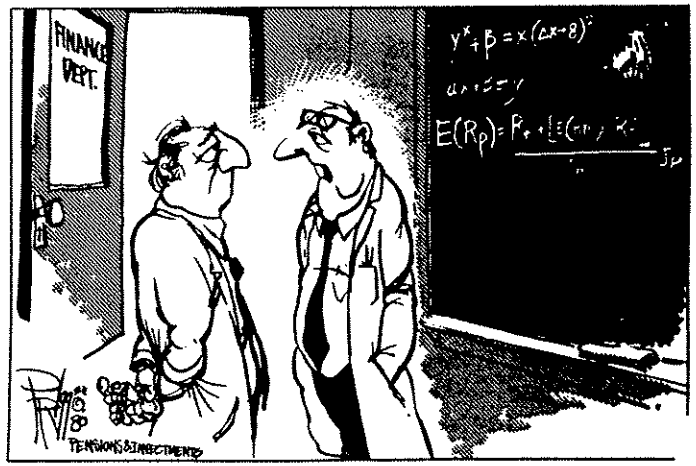
**Average Quarterly Returns vs. Beta:
271 Mutual Funds 1981–91
(Malkiel Study)**



agement. The Capital-Asset Pricing Model is dead." The magazine went on to quote one "turncoat quant" as follows: "Advanced mathematics will become to investors what the *Titanic* was to sailing." And so the whole set of tools making up the new investment technology—including even modern portfolio theory (MPT)—came under a cloud of suspicion.

An Appraisal of the Evidence

My own guess is that the "turncoat quant" is wrong. The unearthing of serious cracks in the CAPM will not lead to an abandonment of mathematical tools in financial analysis and a return to traditional security analysis. Moreover, I am not quite



"Does it bother you at all that when you say MPT quickly it comes out 'empty'?"

ready to write an obituary for beta at this time. There are many reasons, I believe, to avoid a rush to judgment.

First, it is important to remember that stable returns are preferable, that is, less risky than very volatile returns. Clearly, if one could earn only the same rate of return drilling for oil as could be obtained from a riskless government security, only those who loved gambling for gambling's sake alone would drill for oil. If investors really did not worry at all about volatility, the multi-trillion-dollar derivative-securities markets would not be thriving as they are. Thus, the beta measure of relative volatility does capture at least some aspects of what we normally think of as risk. And portfolio betas from the past do a reasonably good job of predicting relative volatility in the future.

Secondly, as Richard Roll has argued, we must keep in mind that it is very difficult (indeed probably impossible) to measure beta with any degree of precision. The S&P 500 index is not "the market." The total stock market contains many thousands of additional stocks in the United States and thousands more in foreign countries. Moreover, the total market includes bonds, real estate, precious metals, and other commodities and assets of all sorts, including one of the most important assets any of us has—the human capital built up by education, work, and life experiences. Depending on exactly how you measure the "market," you can obtain very different beta values. One's conclusions about the capital-asset pricing model and the usefulness of beta as a measure of risk depend very much on how you measure beta. Two economists from the University of Minnesota, Ravi Jagannathan and Zhenyu Wang, find that when the market index (against which we measure beta) is redefined to include human capital and when betas are allowed to vary with cyclical fluctuations in the economy, the support for the CAPM and beta as a predictor of returns is quite strong. Third, there is some evidence that returns are positively related to beta when measured over a much longer period, such as 1927 to the present.

Finally, investors should be aware that even if the long-run relationship between beta and return is flat, beta can still be a useful investment management tool. Were it in fact the case that low-beta stocks will *dependably* earn rates of return at least as large as high-beta stocks (a very big "if" indeed), then beta as an investment tool is even more valuable than it would be if the capital-asset pricing model held. Investors should scoop up *low*-beta stocks and earn returns as attractive as for the market as a whole but with much less risk. And investors who do wish to seek higher returns by assuming greater risk should buy and hold low-beta stocks on margin, thereby increasing their risk and returns. Moreover, beta may be a useful risk measure during sharp market swings. High-beta stocks did tend to fall more than low-beta stocks in all of the bear market periods during the past fifty years. What is clear, however, is that beta, as it is usually measured, is not a substitute for brains and cannot be relied on as a simple predictor of long-run future returns. Nevertheless, reports of beta's total demise are, in my judgment, premature.

The Quant Quest for Better Measures of Risk: Arbitrage Pricing Theory

If beta is badly damaged as an effective quantitative measure of risk, is there anything to take its place? One of the pioneers in the field of risk measurement is Stephen Ross. Ross has developed a theory of pricing in the capital markets called *arbitrage pricing theory* (APT). APT has had wide influence both in the academic community and in the practical world of portfolio management. To understand the logic of the newest APT work on risk measurement, one must remember the correct insight underlying the CAPM: The only risk that investors should be compensated for bearing is the risk that cannot be diversified away. Only systematic risk will command a risk premium in the market. But the systematic elements of risk in particular stocks and portfolios may be too complicated to be capturable by a measure of beta—the tendency of the stocks to move more or less than the market. This is especially so because any particular stock index is a very imperfect representative of the general market. Hence, many quants now feel that beta fails to capture a number of important systematic elements of risk.

Let's take a look at several of these other systematic risk elements. Changes in national income, for one, may affect returns from individual stocks in a systematic way. This was shown in our illustration of a simple island economy in Chapter Eight. Also, changes in national income mirror changes in the personal income of individuals, and the systematic relationship between security returns and salary income can be expected to have a significant effect on individual behavior. For example, the laborer in a GM plant will find a holding of GM common stock particularly risky, because job layoffs and poor returns from GM stock are likely to occur at the same time. Changes in national income may also reflect changes in other forms of property income and may, therefore, be relevant for institutional portfolio managers as well.

Changes in interest rates also systematically affect the returns from individual stocks and are important nondiversifiable risk elements. To the extent that stocks tend to suffer as interest rates go up, equities are a risky investment, and those stocks that are particularly vulnerable to increases in the general level of interest rates are especially risky. Thus, some stocks and fixed-income investments tend to move in parallel, and these stocks will not be helpful in reducing the risk of a bond portfolio. Because fixed-income securities are a major part of the portfolios of many institutional investors, this systematic risk factor is particularly important for some of the largest investors in the market. Clearly, then, investors who think of risk in its broadest and most meaningful sense will be sensitive to the tendency of certain stocks to be particularly affected by changes in interest rates.

Changes in the rate of inflation will similarly tend to have a systematic influence on the returns from common stocks. This is so for at least two reasons. First, an increase in the rate of inflation tends to increase interest rates and thus tends to lower the prices of some equities, as just discussed. Second, the increase in inflation may squeeze profit margins for certain groups of companies—public utilities, for example, which often find that rate increases lag behind increases in costs. On the other hand, inflation may benefit the prices of common stocks in the natural-resource industries. Thus, again there are important systematic relationships between stock returns and economic variables that may not be captured adequately by a simple beta measure of risk.

Statistical tests of the influence on security returns of several systematic risk variables have shown somewhat promising results. Better explanations than those given by the CAPM can be obtained for the variation in returns among different securities by using, in addition to the traditional beta measure of risk, a number of systematic risk variables, such as sensitivity to changes in national income, in interest rates, and in the rate of inflation. Of course, the evidence supporting multiple-risk-factor models of security pricing has only begun to accumulate, and the APT measures of risk are beset by some of the same problems faced by the CAPM beta measure. It is not yet certain how these new theories will stand up to more extensive examination.

If, however, one wanted for simplicity to select the one risk measure most closely related to expected returns, the traditional beta measure would not be most analysts' first choice. In my own work with John Cragg, the best single risk proxy turned out to be the extent of disagreement among security analysts' forecasts for each individual company. Companies for which there is a broad consensus with respect to the growth of future earnings in dividends seem to be considered less risky (and, hence, have lower expected returns) than companies for which there is little agreement among security analysts. It is possible to interpret this result as contradicting modern asset pricing theory, which suggests that individual security variability *per se* will not be relevant for valuation. The dispersion of analysts'

forecasts, however, may actually serve as a particularly useful proxy for a variety of systematic risks.

Although we still have much to learn about the market's evaluation of risk, I believe it is fair to conclude that risk is unlikely to be captured adequately by a single beta statistic (the risk measure of the CAPM). It appears that several other systematic risk measures affect the valuation of securities. In addition, as will be indicated in the next chapter, there is some evidence that security returns are related to size (smaller firms tend to have higher rates of return) and also to price-earnings multiples (firms with low P/Es tend to produce higher returns) and price-book value ratios (stocks that are cheap relative to their book values tend to earn higher total returns). All three of these measures may be effective proxies for systematic risk. Whether individual risk plays any role at all in the valuation process is still, however, an open question.

My results with Cragg can be interpreted as showing that individual security variability does play a role in the valuation process. This would not be hard to explain. Because of transactions and information costs, a large number of individual portfolios may not be diversified. Individuals own a significant fraction of all NYSE stocks and an even larger fraction of stocks traded on other exchanges. Thus, these security holders might well be concerned with the variability of individual stocks. Even well-diversified institutional investors may worry about the behavior of individual stocks when they must report to finance committees the breakdown of their performance results over the preceding period. Still, there is a powerful argument on the other side. Any role in the valuation process that may consistently be provided by individual security variability will create an arbitrage opportunity for investors able to diversify widely. It is difficult to believe that these arbitrage opportunities will not eventually be exploited. Returning to the theme we played earlier, eventually "true value will out."

A Summing Up

Chapters Eight and Nine have been an academic exercise in the modern theory of capital markets. The stock market appears to be an efficient mechanism that adjusts quite quickly to new information. Neither technical analysis, which analyzes the past price movements of stocks, nor fundamental analysis, which analyzes more basic information about the prospects for individual companies and the economy, seems to yield consistent benefits. It appears that the only way to obtain higher long-run investment returns is to accept greater risks.

Unfortunately, a perfect risk measure does not exist. Beta, the risk measure from the capital-asset pricing model, looks nice on the surface. It is a simple, easy-to-understand measure of market sensitivity. Unfortunately, beta also has its warts. The actual relationship between beta and rate of return has not corresponded to the relationship predicted in theory during the last third of the twentieth century. Moreover, betas are not stable from period to period, and they are very sensitive to the particular market proxy against which they are measured.

I have argued here that no single measure is likely to capture adequately the variety of systematic risk influences on individual stocks and portfolios. Returns are probably sensitive to general market swings, to changes in interest and inflation rates, to changes in national income, and, undoubtedly, to other economic factors such as exchange rates. And if the best single risk estimate were to be chosen, the traditional beta measure is unlikely to be everyone's first choice. The mystical perfect risk measure is still beyond our grasp.

To the great relief of assistant professors who must publish or perish, there is still much debate within the academic community on risk measurement, and much more empirical testing needs to be done. Undoubtedly, there will yet be many improvements in the techniques of risk analysis, and the quantitative analysis of risk measurement is far from dead. My own guess is that future risk measures will be even more sophisticated—not less so. Nevertheless, we must be careful not to accept beta or any other measure as an easy way to assess risk and to predict future returns with any certainty. You should know about the best of the modern techniques of the new investment technology—they can be useful aids. But there is never going to be a handsome genie who will appear and solve all our investment problems. And even if he did, we would

probably foul it up—as did the little old lady in the following favorite story of Robert Kirby of Capital Guardian Trust:

> She was sitting in her rocking chair on the porch of the retirement home when a little genie appeared and said, "I've decided to grant you three wishes."
>
> The little old lady answered, "Buzz off, you little twerp, I've seen all the wise guys I need to in my life."
>
> The genie answered, "Look, I'm not kidding. This is for real. Just try me."
>
> She shrugged and said, "Okay, turn my rocking chair into solid gold."
>
> When, in a puff of smoke, he did it, her interest picked up noticeably. She said, "Turn me into a beautiful young maiden."
>
> Again, in a puff of smoke, he did it. Finally, she said, "Okay, for my third wish turn my cat into a handsome young prince."
>
> In an instant, there stood the young prince, who then turned to her and asked, "Now aren't you sorry you had me fixed?"

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of: GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY	CASE NO. 2005-00341

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 34

Full Database

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	Variable Name	High	Low	Sample	Median	Average
1	Timeliness Rank	5.00	1.00	1561	3.00	2.99
2	Performance Rank	NA	NA	0	NA	NA
3	Safety Rank	5.00	1.00	1664	3.00	2.95
4	Technical Rank	5.00	1.00	1561	3.00	3.00
5	Beta	2.60	0.35	1624	1.05	1.11
6	Stock Price	90350.00	0.57	1775	30.17	99.53
7	Change	10.00	-300.00	1757	0.03	-0.12
8	% Change	13.05	-20.23	1757	0.13	0.07
9	Volume	28941619.0	230.00	1759	214429.00	708403.01
10	Current EPS	3639.00	-5.63	1638	1.65	4.27
11	EPS Trail 12 Mo	3579.00	-5.21	1623	1.50	4.08
12	Current P/E Ratio	935.00	2.27	1528	18.25	24.45
13	Relative P/E Ratio	5.28	0.09	1445	1.03	1.22
14	Median P/E	60.00	6.50	1068	18.00	20.12
15	P/E Trailing 12 Mo	99.28	1.69	1445	19.41	22.96
16	Earnings Yield Trail 12 Mo	59.14	0.04	1480	5.11	5.41
17	High Price 52-Week	92000.00	2.23	1660	36.36	97.34
18	Low Price 52-Week	78800.00	0.87	1660	24.60	75.25
19	Indicated Annual Dividend	8.00	0.00	1780	0.16	0.43
20	Div'd Yield	21.30	0.00	1780	0.52	1.21
21	Market Cap $ (Mil)	1364811.50	17.55	1731	2924.56	21254.06
22	Reported Annual Sales	1558270.13	3.73	1586	1890.33	14643.65
23	Sales Trail 12 Mo	325891.00	3.80	1482	1784.00	7742.01
24	Gross Income	283270.47	-925.00	1646	727.27	4568.75
25	Gross Margin	100.00	-5067.58	1577	37.99	36.33
26	SG & A Expenses	118054.08	2.00	1563	333.92	2375.40
27	Operating Income	186342.11	0.68	1604	347.13	2469.83
28	Operating Margin	100.00	-6000.18	1577	14.84	10.20
29	Depreciation	65232.88	0.00	1780	58.86	609.92
30	Other Income	23570.00	-35.00	1780	4.22	152.60
31	Income Before Taxes	136379.36	0.01	1560	212.80	1346.82
32	Net Income	77327.08	-13996.00	1693	116.15	805.58
33	Net Income Trail 12 Mo	25330.00	-2640.00	1492	106.70	580.97
34	Profit Margin	81.20	-6001.64	1577	5.81	-1.81
35	Net Profit Margin Trail 12 Mo	5570.77	0.09	1261	6.17	13.68
36	Cash	122152.00	0.00	1780	198.17	1696.86
37	Accounts Receivable	415502.31	0.00	1780	169.78	2297.11
38	Inventories	222792.00	0.00	1780	96.08	1460.54
39	Other Current Assets	405980.00	0.00	1780	52.56	1424.22
40	Total Current Assets	758158.00	0.00	1780	622.80	6697.82
41	Intangibles	266178.81	0.00	1780	179.57	2589.54
42	Gross Plant	685877.94	0.00	1780	671.00	7842.49
43	Accumulated Depreciation	375552.19	0.00	1780	290.30	3508.18
44	Net Plant	579230.19	0.00	1780	336.72	4563.50
45	Total Assets	1484101.00	0.00	1780	2320.18	24472.00
46	Short-Term Debt	391829.19	0.00	1780	8.57	1123.98
47	Accounts Payable	161221.00	0.00	1780	96.30	1498.42
48	Other Current Liabilities	447234.00	0.00	1780	142.10	2171.83
49	Total Current Liabilities	650966.00	0.00	1780	320.13	4794.23
50	Working Capital	287826.00	-15271.00	1780	200.37	1903.59

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	Variable Name	High	Low	Sample	Median	Average
51	Deferred Taxes	7673.23	-1683.00	1780	0.12	55.56
52	Long-Term Debt	478539.00	0.00	1780	379.91	4584.59
53	Preferred Equity	12178.36	-33.01	1718	0.00	66.91
54	Common Equity	512275.06	-2630.33	1693	1021.15	6063.37
55	Shareholders Equity	512620.97	-2630.33	1693	1032.97	6131.27
56	Total Capital	621113.00	6.57	1693	1615.79	10951.45
57	Common Shares Outstanding	43801.30	1.53	1718	96.92	584.54
58	Capital Spending	76650.02	0.00	1780	60.70	638.11
59	Cash Flow	75338.61	-2252.00	1780	150.03	1203.94
60	Free Cash Flow	32194.54	-2902.69	1780	53.21	429.72
61	% SG & A to Gross Income	286.57	-64.38	1460	58.63	56.98
62	% SG & A to Sales	286.57	0.00	1465	22.11	26.30
63	Income Tax Rate	6331.75	0.00	1780	32.22	34.04
64	Return on Sales	0.81	-60.02	1577	0.06	-0.02
65	Return on Common Equity	217.93	-95.86	1676	12.34	13.37
66	Return on Shareholders Equity	217.93	-95.86	1677	12.34	13.31
67	Return on Total Assets	42.28	-68.36	1691	4.83	5.17
68	Return on Total Assets Latest Qtr	14.71	-47.78	1485	1.33	1.24
69	Return on Total Capital	145.88	-79.77	1690	9.14	9.64
70	% Retained to Common Equity	217.93	-249.37	1686	9.45	9.28
71	Dividend Payout	268.75	-220.00	1780	4.08	17.37
72	% All Divs/Net Inc Trail 12 mo	908.90	0.00	1780	0.00	19.14
73	Current Ratio Latest Qtr	243.72	0.14	1383	1.87	2.61
74	Quick Ratio Latest Qtr	243.72	0.12	1383	1.35	2.09
75	% LTD/Capital	277.37	0.00	1452	32.70	35.23
76	% LTD/Capital Latest Qtr	216.41	0.00	1150	32.65	35.01
77	% Debt/Capital Latest Qtr	569.90	0.00	1152	32.60	35.72
78	% Shr Equity to Total Assets	96.63	-122.92	1693	44.65	44.56
79	% Common Equity/Capital	1.00	-39.81	1693	0.71	0.67
80	ROE Latest Qtr	500.00	-531.43	1484	3.31	3.57
81	Sales per share	646.10	0.03	1577	20.19	31.42
82	Cash Flow per share	80.93	-4.82	1578	2.30	2.85
83	Avg Basic Shares	36807.45	5.08	1693	96.91	570.63
84	Avg Diluted Shares	37986.92	5.25	1693	99.23	584.50
85	Basic Earn P/Sh	16.12	-5.68	1603	1.44	1.67
86	Diluted Earn P/Sh	15.83	-5.68	1603	1.41	1.63
87	Div'ds Declared per share	13.60	0.00	1780	0.13	0.38
88	Book Value per share	251.93	-9.14	1693	10.75	13.35
89	Capl Spending per share	21.37	0.00	1592	0.79	1.42
90	Price/Sales Ratio	106.42	0.01	1477	1.31	2.32
91	% FCF/Price Latest Qtr	297.45	-98.71	992	48.08	65.22
92	Avg Annual P/E Ratio	8282.84	-1807.10	1687	18.13	22.53
93	Avg Annual Dividend Yield	35.28	0.00	1780	0.58	1.19
94	Price to Book Value Qtr	2853.84	0.11	1464	2.49	5.56
95	Price To Book Value	141.00	0.00	1672	2.00	3.19
96	Est Annual Sales	343125.00	0.10	1538	1865.00	7997.28
97	Est Operating Margin	4400.00	0.50	1365	15.00	22.33
98	Est Depreciation	31000.00	1.00	1253	67.00	350.16
99	Est Net Before Taxes	50573.77	-9500.00	1608	198.53	970.10
100	Est Tax Rate	1620.00	1.00	1463	35.00	33.63

Full Database

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	Variable Name	High	Low	Sample	Median	Average
101	Est Net After Taxes	30850.00	-9500.00	1664	130.00	631.01
102	Est Profit Margin	52.90	0.10	1342	7.20	9.40
103	Est Sales/Share	881.35	0.10	1482	21.65	35.11
104	Est Cash Flow/Share	113.75	-3.85	1480	2.60	3.25
105	Est EPS Current Fiscal Year	3600.00	-5.00	1632	1.60	4.23
106	Est EPS Next Fiscal Year	4150.00	-3.00	1451	1.90	5.24
107	Est Dividends/Share	9.10	0.00	1780	0.16	0.43
108	Est Book Value/Share	59360.00	-9.80	1634	12.20	51.39
109	Est Long-Term Debt	485000.00	0.00	1780	185.00	2688.15
110	Est Shareholders Equity	190000.00	-2935.00	1527	1005.00	4190.07
111	Est Return on Total Capital	73.50	0.20	1395	10.00	11.77
112	Est Return on Shareholders Equity	130.00	0.20	1478	13.50	15.02
113	Sales Growth 1-Year	335.94	-73.75	1573	11.33	13.84
114	Sales Growth 5-Year	95.00	-42.50	1286	6.50	7.70
115	Sales Growth 10-Year	65.00	-32.50	958	7.50	8.41
116	Cash Flow Growth 1-Year	445.69	-74.33	1429	14.74	23.47
117	Cash Flow Growth 5-Year	72.50	-44.00	1186	5.50	6.22
118	Cash Flow Growth 10-Year	80.50	-26.00	890	8.00	8.73
119	EPS Growth 1-Year	491.07	-74.46	1376	18.35	35.80
120	EPS Growth 5-Year	95.00	-45.00	1156	7.00	7.90
121	EPS Growth 10-Year	62.00	-28.50	892	9.50	9.74
122	Dividend Growth 1-Year	433.33	-72.17	958	8.82	24.76
123	Dividend Growth 5-Year	75.00	-47.00	690	5.50	6.18
124	Dividend Growth 10-Year	38.50	-25.00	640	6.00	6.45
125	Book Value Growth 1-Year	440.44	-73.57	1648	11.13	14.59
126	Book Value Growth 5-Year	88.50	-47.00	1360	9.00	9.83
127	Book Value Growth 10-Year	72.50	-37.50	1030	9.00	9.67
128	Sales Latest Qtr	86622.00	1.42	1381	424.76	1627.39
129	Depreciation Latest Qtr	3496.00	0.01	1362	16.92	68.10
130	Net Income Latest Qtr	7640.00	-288.71	1485	26.59	138.34
131	EPS 10Q Latest Qtr	26.31	-6.63	1478	0.38	0.49
132	Dividend Latest Qtr	3082.20	0.00	1780	0.00	31.74
133	Inventories Latest Qtr	114458.96	0.16	1132	177.04	721.35
134	Current Assets Latest Qtr	730388.00	1.83	1383	677.42	4823.82
135	Curr Assets/Share Latest Qtr	1672.03	0.13	1383	8.32	17.48
136	Current Liabilities Latest Qtr	528207.00	2.79	1383	352.60	3156.95
137	Long-Term Debt Latest Qtr	478539.00	0.00	1780	200.03	2677.89
138	Preferred Equity Latest Qtr	4108.00	0.00	1780	0.00	19.50
139	Common Equity Latest Qtr	112981.00	-2663.00	1485	857.52	3211.08
140	Shareholders Equity Latest Qtr	113037.00	-2663.00	1485	868.27	3234.44
141	Common Shares Outstg Latest Qtr	10645.00	5.17	1485	83.09	259.76
142	Working Capital Latest Qtr	227839.00	-11104.00	1383	247.87	1666.87
143	Gross Billings Latest Qtr	NA	NA	0	NA	NA
144	Total Deposits Latest Qtr	173658.00	4127.47	13	10030.05	26916.58
145	Bank SL Loans Latest Qtr	546519.00	2820.02	47	26700.13	72447.65
146	Bank SL Deposits Latest Qtr	184317.00	3991.18	13	11289.82	28971.59
147	Insurance Premiums Latest Qtr	17541.00	72.58	41	806.30	1732.13
148	Loans	537560.00	2707.88	54	29178.66	74369.09
149	Loan Loss Provisions	10034.00	-386.00	51	59.53	507.62
150	Benefits and Reserves	58313.00	264.71	20	4804.00	8589.20

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	Variable Name	High	Low	Sample	Median	Average
151	FHLB Advances	70074.00	100.00	13	3449.67	10681.51
152	Net Interest Income	44623.00	169.50	54	1299.30	3931.45
153	Non-interest Income	44623.00	169.50	54	1299.30	3931.45
154	Mortgage Loans per share	480.71	66.56	13	147.37	177.04
155	Savings Deposits per share	346.74	39.22	13	109.97	121.11
156	% Interest Income	51.91	4.76	10	34.72	29.13
157	% Interest Cost to Gross Income	200.10	16.17	17	59.08	70.74
158	% Loans to Total Assets	92.40	4.90	54	61.51	57.65
159	Premiums	79118.00	298.90	46	3634.10	7838.53
160	Insurance in Force	1458.80	0.10	12	177.09	352.88
161	Investment Income	18434.00	54.09	46	577.00	2125.01
162	Total Premiums per share	208.57	1.71	46	28.40	33.88
163	Underwriting Inc per share	15.65	-4.05	27	1.44	2.55
164	Investment Inc per share	20.72	0.41	46	6.22	6.74
165	% Expense to Premiums Written	78.95	19.33	25	30.35	32.04
166	% Loss to Premiums Earned	81.09	4.68	26	65.71	63.30
167	% Commissions	70.51	3.73	10	14.39	20.25
168	% Investment Banking	40.70	5.51	9	10.16	12.76
169	% Principal Transactions	41.97	1.28	10	10.46	16.12
170	% Other Revenue	68.83	2.87	9	21.38	25.55
171	Number of Stores	67772.00	61.00	104	716.00	2583.34
172	Inventory Turnover	1972.82	0.05	1336	6.31	18.65
173	% Price Change Last Trading Day	18.26	-20.42	1773	-0.54	-0.67
174	Total Return 1-Week	25.91	-34.46	1773	2.55	2.61
175	Total Return 4-Week	50.31	-36.73	1772	1.04	1.10
176	Total Return 13-Week	79.93	-70.16	1770	-2.71	-2.69
177	Total Return 26-Week	160.48	-78.90	1762	7.07	10.34
178	Total Return YTD	190.16	-85.35	1753	1.51	4.94
179	Total Return 1-Year	4417.28	-81.97	1749	10.66	18.01
180	Total Return 3-Year	220.19	-52.23	1704	17.63	20.75
181	Total Return 5-Year	91.44	-59.95	1620	8.35	6.98
182	Total Return 10-Year	65.47	-26.42	1284	10.20	10.47
183	Total Return 2004	607.61	-77.46	1759	15.72	19.28
184	Total Return 2003	877.32	-54.38	1742	36.20	50.04
185	Total Return 2002	279.52	-95.32	1718	-10.44	-12.59
186	Total Return 2001	735.86	-88.51	1666	4.92	15.34
187	Total Return 2000	489.76	-96.99	1624	8.97	17.62
188	Total Return 1999	2619.40	-88.26	1567	5.24	44.16
189	Total Return 1998	966.39	-96.46	1494	6.97	19.20
190	Total Return 1997	511.03	-72.63	1437	30.53	33.66
191	Total Return 1996	329.17	-70.39	1389	20.81	25.48
192	Total Return 1995	856.64	-74.19	1309	30.65	40.86
193	Relative Strength 1 Week	99.00	1.00	1757	58.00	54.08
194	Relative Strength 1 Month	100.00	1.00	1759	61.00	56.85
195	Relative Strength 3 Months	99.00	1.00	1757	53.00	53.24
196	Volume Last Trading Day	2079577869	300.00	1763	509323.50	2723964.82
197	Avg Trading Volume Last 2 Weeks	2079577869	487.00	1764	650450.00	3092149.26
198	Avg Trading Volume Last Month	2027910633	490.00	1763	625105.00	2992371.14
199	Avg Trading Volume Last 3 Months	1873863467	456.00	1761	571686.00	2717401.94
200	Avg Trading Volume Last 6 Months	1902499466	361.00	1757	573269.00	2688190.83

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	Variable Name	High	Low	Sample	Median	Average
201	Avg Trading Volume Last Year	1902499466	392.00	1751	588463.00	2766631.70
202	Liquidity Ratio	NA	NA	0	NA	NA
203	Short Interest	NA	NA	0	NA	NA
204	Short Interest Ratio	NA	NA	0	NA	NA
205	Beta 3-Year	7.48	-1.28	1687	0.97	1.16
206	Beta 5-Year	6.12	-0.60	1598	0.88	1.11
207	Beta 10-Year	3.99	-0.22	1272	0.81	0.90
208	Std Dev 3-Year	137.71	7.49	1687	28.69	33.82
209	Std Dev 5-Year	137.68	7.98	1599	33.76	39.81
210	Std Dev 10-Year	158.43	8.08	1272	34.55	38.49
211	1 Day Money Flow	13459.49	-99299840.	1763	-42.30	-61925.97
212	1 Week Money Flow	7984857.50	-97831.77	1760	24.74	4682.40
213	1 Month Money Flow	3593516.75	-21962.09	1760	3.92	2084.41
214	EPS Latest Qtr	1045.00	-8.01	1622	0.38	1.13
215	EPS 1 Qtr Ago	935.00	-1.98	1608	0.38	1.08
216	EPS 2 Qtrs Ago	1197.00	-2.89	1623	0.36	1.20
217	EPS 3 Qtrs Ago	402.00	-6.56	1599	0.37	0.70
218	Est % EPS Chg Fiscal Year	300.00	-98.52	1419	14.92	21.66
219	Est % EPS Chg 1 Qtr Out	300.00	-96.29	1331	13.66	19.62
220	Est % EPS Chg 2 Qtrs Out	300.00	-90.00	1378	14.14	22.31
221	% EPS Chg from Last Qtr	300.00	-96.55	1299	15.38	21.23
222	% EPS 12-Month Chg Latest Qtr	300.00	-99.56	1385	15.46	23.65
223	Est EPS 1st Qtr Out	575.00	-2.90	1618	0.43	0.88
224	Est EPS 2nd Qtr Out	1044.00	-2.30	1629	0.43	1.18
225	Est EPS 3rd Qtr Out	975.00	-1.90	1618	0.43	1.17
226	Est EPS 4th Qtr Out	1050.00	-0.85	1540	0.45	1.28
227	Proj 3-5 Yr EPS	152.00	-1.35	1654	2.50	3.11
228	Proj 3-5 Yr % Price Change	782.00	-55.00	1658	45.00	57.82
229	Proj 3-5 Yr % Annual Total Return	57.00	-100.00	1628	11.00	11.96
230	Proj Sales Growth Rate	80.00	-41.50	1461	8.50	9.17
231	Proj Cash Flow Growth Rate	83.50	-15.00	1363	11.00	12.65
232	Proj EPS Growth Rate	86.00	-13.00	1384	13.50	15.84
233	Proj Dividend Growth Rate	96.00	-26.00	876	9.00	11.51
234	Proj Book Value Growth Rate	86.50	-46.00	1552	10.50	11.18
235	Proj 3-5 Yr P/E	60.00	6.50	1599	17.00	18.28
236	Proj 3-5 Yr Relative P/E	5.52	0.13	1504	1.03	1.21
237	Proj 3-5 Yr Dividend Yield	10.00	0.10	1026	1.50	1.93
238	Current Dividend	7.40	0.00	1780	0.20	0.44
239	% Current Yield	33.65	0.00	1780	0.59	1.24
240	Earnings Predictability	100.00	5.00	1536	55.00	52.76
241	Growth Persistence	100.00	5.00	1561	52.50	52.37
242	Price Stability Rank	100.00	5.00	1624	55.00	52.63
243	Industry Rank	98.00	1.00	1761	46.50	49.20
244	% Insider Holdings	100.00	0.03	1519	4.70	9.68
245	% Institutional Holdings	99.90	0.00	1660	70.41	62.73
246	User-Defined 1	NA	NA	0	NA	NA
247	User-Defined 2	NA	NA	0	NA	NA
248	User-Defined 3	NA	NA	0	NA	NA
249	User-Defined 4	NA	NA	0	NA	NA
250	User-Defined 5	NA	NA	0	NA	NA

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY

CASE NO. 2005-00341

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 36

Decision No. C04-0999

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF COLORADO

DOCKET NO. 04S-035E

RE: THE INVESTIGATION AND SUSPENSION OF TARIFF SHEETS FILED BY AQUILA, INC., DOING BUSINESS AS AQUILA NETWORKS-WPC, WITH ADVICE NO. 588.

ORDER GRANTING SETTLEMENT

Mailed Date: August 25, 2004
Adopted Date: August 17, 2004

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I. BY THE COMMISSION

A. Procedural History

1. On December 29, 2003, Aquila, Inc., doing business as Aquila Networks–WPC (Aquila or Company), filed Advice Letter No. 588. This filing was accompanied by the direct testimony and exhibits of the following Aquila witnesses: W. Scott Keith, Lisa M. Sterba,

Michael R. Apprill, Richard O. Clayburn, Rhonda J. Schmidtlein, Randall D. Erickson, and Daniel K. Tyrrell.

2. The subject filing was made pursuant to a settlement agreement reached in Aquila's last rate case (*see* Decision No. C03-0697, Docket No. 02S-594E). The purpose of the filing was to implement a General Rate Schedule Adjustment (GRSA) rider of 9.60 percent to all base rates for all customers receiving electric power and energy under the Company's tariff. The proposed GRSA rider would generate an annual revenue increase of $11,358,847. Aquila requested that the tariffs accompanying Advice Letter No. 588 become effective on 30 days' statutory notice or, in this instance, on January 29, 2004.

3. By Decision No. C04-0082, the Commission set the tariffs for hearing and suspended their effective date for 120 days or until May 28, 2004.

4. By Decision No. R04-0207-I, a prehearing conference was scheduled for March 3, 2004.

5. Timely Notices of Intervention were filed in this proceeding by the Staff of the Commission (Staff) and the Colorado Office of Consumer Counsel (OCC). Timely Petitions for Leave to Intervene were also filed by the Fountain Valley Authority, the Board of Water Works of Pueblo, Colorado, the City of Canon City, (collectively, Public Intervenors); Cripple Creek & Victor Gold Mining Company, Holcim (U.S.) Inc. (Holcim), and the Trane Company (collectively, CCHT).

6. At the March 3, 2004 prehearing conference, interventions were granted and a procedural schedule proposed by the parties was considered. Decision No. R04-0227-I adopted the following procedural schedule: Answer testimony filed on April 12, 2004, Rebuttal and

Cross-Answer testimony filed on May 3, 2004, hearing dates of May 24 through 28, 2004, and Statements of Position filed within ten days after the last hearing date.

7. On March 9, 2004, Staff filed its Unopposed Motion to Vacate Hearing Dates, Adopt Proposed Procedural Schedule, Waive Response Time, and Request for Initial Commission Decision. Under the parties' proposed procedural schedule, the dates for filing Answer testimony would change from April 12, 2004, to April 30, 2004, and the dates for the filing of Rebuttal and Cross Answer testimony would change from May 3, 2004, to June 21, 2004. It would also change the hearing dates from May 24 through 28, 2004, to July 26 through 30, 2004. Finally, it would change the date for Statements of Position from ten days after the last hearing date to August 10, 2004.

8. By Decision No. C04-0291, the Commission agreed to issue an initial Commission decision and, except with regard to a change in the deadline for filing Statements of Position, adopted the parties' proposed procedural schedule.

9. Decision No. R04-0341-I adopted the procedural schedule approved by the Commission in Decision No. C04-0291 and modified certain other procedures consistent with the initial decision process. It also reaffirmed that the Commission would hold a public comment hearing in Pueblo, Colorado, and that a technical conference on the financial models submitted in the case might be necessary. The interim decision established July 14, 2004, is the date for the technical conference.

10. On April 30, 2004, Answer testimony and exhibits were filed by Sandra-Johnson Jones, Bridget McGee-Stiles, Randy Garroutte, Karlton Kunzie, Larry Y. Shiao, and John P. Trogonoski on behalf of Staff; Basil L. Copeland, Jr. and P.B. Schechter on behalf of the OCC;

Richard A. Baudino and Stephen J. Baron on behalf of CCHT; and Martin J. Blake on behalf of the Public Intervenors.[1]

11. By Decision No. C04-0497, the Commission further suspended the effective date of the tariffs filed with Advice Letter No. 588 an additional 90 days or until August 26, 2004.

12. On June 9, 2004, Decision No. R04-0618-I was issued which set a public hearing in Pueblo, Colorado for July 20, 2004. A public hearing was held on that date.

13. On June 16, 2004, Decision No. R04-0642-I was issued which set a technical conference in Denver, Colorado for July 14, 2004. This decision also provided a series of questions regarding the parties' financial models. On July 7, 2004, Aquila informally requested that its witness be allowed to participate in the technical conference by telephone. Aquila also advised that it had revised its financial model to more clearly demonstrate its responses to the questions posed in Decision No. R04-0642-I. The Administrative Law Judge granted the request on the condition that Aquila would electronically send a copy to the Advisory Staff and all other parties for their review. Aquila timely submitted the electronic copy to Advisory Staff and counsel for the parties. The technical conference was held as scheduled.

14. On June 21, 2004, the following Aquila witnesses filed Rebuttal testimony and exhibits: W. Scott Keith, Michael R. Apprill, Ronald A. Klote, Beth A. Armstrong, Daniel K. Tyrrell, Ronald D. Adkins, and Donald A. Murry, Ph.D.[2] Cross-Answer testimony was also filed by Public Intervenors' witness Martin J. Blake on that date.

[1] Corrections to Ms. Jones' and Mr. Blakes's Answer testimony and exhibits were filed on June 14 and 21, 2004, respectively. On June 3, 2004, Dr. Schechter filed Appendix B to his Answer testimony.

[2] Mr. Keith filed Revised Rebuttal testimony on July 19, 2004. Portions of Dr. Murry's Rebuttal testimony were stricken by Decision No. R04-0834-I.

15. On June 22, 2004, Aquila filed a Motion in Limine to exclude certain pre-filed Answer testimony and exhibits. Aquila contended that such testimony/exhibits exceeded and/or conflicted with the regulatory principles established in Decision No. C03-0697. Responses to the motion were filed by: Staff, the Public Intervenors, CCHT, and the OCC. The OCC also filed a Motion to Strike the Aquila Motion in Limine. On July 9, 2004, Aquila filed a motion for leave to reply to responses and a reply to OCC's Motion to Strike.

16. On July 12, 2004, Staff filed a Motion in Limine to exclude certain pre-filed Rebuttal testimony and exhibits. Staff contended that such testimony/exhibits exceeded and/or conflicted with the regulatory principles established in Decision No. C03-0697.

17. On July 21, 2004, Decision No R04-0831-I was issued denying Aquila's Motion in Limine. On the same date, Decision No. R04-0834-I was issued granting Staff's Motion in Limine.

18. On July 27, 2004, the parties submitted a Settlement Agreement and Motion for Approval of Settlement Agreement (Settlement). According to the parties, the Settlement resolves all disputed issues that have arisen or could have arisen in this docket. The parties indicate in the Settlement that the agreed upon revenue increase is just and reasonable.

19. A hearing was held in connection with the Settlement on July 30, 2004. Aquila, Staff, and OCC witnesses presented testimony in support of the Settlement. The parties' Settlement Agreement, as well as all pre-filed testimony submitted by the parties, was admitted

into evidence. *See* Exhibits 1 and 4 through 35. In addition, the Aquila witness sponsored Exhibits 2 and 3, which also were admitted into evidence.[3]

B. Findings of Fact

20. The genesis of this case can be traced back to the Settlement Agreement approved by the Commission in Aquila's last rate case (*see* Decision No. C03-0697, Docket No. 02S-594E). Under that agreement, Aquila agreed to file a "limited" rate case on or before December 31, 2003, using a test year ending August 31, 2003. As part of the settlement, Aquila also agreed to be bound to certain regulatory principles adopted in the settlement, namely: 1) a return on equity of 10.75 percent; 2) a divisional capital structure of 47.5 percent equity and 52.5 percent debt; 3) a cost of debt at 7.55 percent; 4) use of an average rate base; 5) the disallowance of the Centel acquisition adjustment; 6) annualization of Holcim's revenue; 7) disallowance of St. Joseph Light & Power acquisition savings adjustment; 8) a 60-year depreciation life for the Canon West substation; 9) no changes in depreciation rates; 10) no annualization of property taxes; and 11) only actual expenditures for homeland security measures.

21. As explained in the Direct testimony of Mr. Scott Keith, there have been certain major changes in the Company's electric operations since the last rate case. These include a nearly $20 million increase in rate base and $6.5 million increase in annual capacity charges from

[3] Exhibit 2 shows the monthly customer impact for both a typical residential and commercial customer for both the original $11,358,847 rate increase and the $8,200,000 rate increase proposed under the Settlement. Exhibit 3 contains the proposed tariff sheets for the new Energy Cost Adjustment (ECA) mechanism. Those tariff sheets include the cost figures, test period, filing dates, recovery periods, and calculation method for developing the ECA factor of $0.00125.

power suppliers. When taken together, in conjunction with the August 31, 2004 test year, this results in an increase in Aquila's annual revenue requirement of $11,358,847.

22. Prior to settlement, the OCC asserted in its case that the amount of the increase in Aquila's annual revenue requirement should be $6,981,641. This results from the use of a 9.50 percent return on equity; debt at a cost of 7.66 percent; a $250,000 disallowance of expenditures associated with ten megawatts (MW) of summer peaking capacity; disallowance of $643,442 of increased transmission expense; removal of $8,988,947 of prepayments from rate base; disallowance of the 14.78-day increase in revenue lag days for the effect of the Incentive Cost Adjustment (ICA) on Cash Working Capital (CWC); a $133,000 disallowance of rate case expenses; a disallowance of $325,182 of incentive compensation for plan year 2002; disallowance of $143,120 of pension expense; and a disallowance of $174,602 of severance costs.

23. The Public Intervenors contended that the amount of the increase in Aquila's annual revenue requirement should be $5,244,249. This is based on a $6,000,537 increase in revenues in order to properly reflect the increased level of transmission costs, and a disallowance of $114,117 of transmission expense relating to the Basin power contract.

24. Based on its analysis, Staff argued that the amount of the increase in Aquila's annual revenue requirement should be $4,961,667. This results from the use of a 9.75 percent return on equity; debt at a cost of 7.42 percent; a $2,742,487 disallowance of expenditures associated with excess capacity; disallowance of $114,117 of transmission expense relating to the Basin power contract; an increase in deferred taxes of $2,780,465 to include all deferred account balances; disallowance of the 14.78-day increase in revenue lag days for the effect of the ICA on

CWC; a $216,000 disallowance of rate case expenses; restoration of a credit balance of $259,546 for corporate aircraft; disallowance of $15,987 of payroll expense; and a disallowance of $1,830,609 of cost allocations for nonregulated operations.

25. Finally, CCHT contended that the amount of the increase in Aquila's annual revenue requirement should be $3,458,286. This is based on the use of a 9.00 percent return on equity, debt at a cost of 7.55 percent; a $6,501,084 increase in revenue in order to properly reflect the increased level of transmission costs; and disallowance of $114,117 of transmission expense relating to the Basin power contract.

1. The Settlement's Regulatory Principles

26. Under the Settlement agreed upon by the parties, base rates would increase by $8.2 million while energy costs collected through a new Energy Cost Adjustment (ECA) mechanism would decrease by $5.424 million.[4] The net effect on ratepayers of these two changes would be an increase of $2.776 million. The parties intend for this change in rates to take effect on or about September 1, 2004.

27. The Settlement lists the regulatory principles agreed to by the parties in this case. They include the following: a return on equity of 10.25 percent; a divisional capital structure consisting of 47.50 percent equity and 52.50 percent debt; a cost of debt of 7.42 percent (this produces an overall cost of capital, or rate of return on rate base, of 8.76 percent); an increase in income taxes of $142,127 as a result of the effect of the interest deduction associated with the embedded cost of debt; the elimination of $250,000 of capacity charges associated with a 2004 peaking contract; the exclusion of $1,204,903 of the new Public Service Company of Colorado

[4] The new ECA mechanism is intended to replace the existing ICA.

(Public Service) capacity costs and $200,487 of the new Public Service transmission costs; the elimination of other transmission expense of $114,167 associated with an expired Basin power contract; the reduction of Aquila's payroll annualization by $15,987 to reflect the actual percentage wage increase granted; an increase in administrative and general expense of $19,467 to reflect the reconciliation adjustment; the elimination from the CWC calculation of the amortization of prepayments that resides in operating and maintenance expense in this docket and in the next revenue requirement proceeding; and an increase of income taxes by $686,075 resulting from the effect of these various adjustments.

28. The parties agree that the overall $8.2 million annual revenue requirement increase will be collected from all customers through a new, uniform GRSA rider in such a manner that the overall percentage increase in base rates will be 6.93 percent.

2. Incentive Cost Adjustment/Electric Cost Adjustments

29. Aquila currently has an ICA mechanism which allows it to recover fuel and purchased energy costs on an expedited basis. The ICA contains an incentive aspect for Aquila to reduce energy costs below its base level. When actual energy costs are below its base energy cost level, it retains 25% of the cost reductions.[5] The ICA rider is based upon a historical test year of September 1 through August 31. The updated ICA rider is filed each year on October 1, and the approved costs are recovered during the next year during the November 1 through October 31 time period.

[5] Conversely, the sharing aspect of the ICA also puts Aquila at risk for absorbing 25 percent of any energy costs above its base energy levels.

30. Under the Settlement, the parties have agreed to terminate the ICA and replace it with an ECA. It proposes that the ECA become effective with the $8.2 million rate increase that is scheduled to go into effect on or about September 1, 2004. Unlike the ICA, the ECA will allow Aquila to recover or to credit 100 percent of the fuel and purchased energy cost changes above or below its base energy cost. In contrast to the current ICA, Aquila will file for ECA changes at least twice each year, in accordance with the schedule set forth in Paragraph 3(d) of the Settlement. The ECA base cost will be set at $22.39 per MWh effective with the new GRSA rider. The initial ECA charge is $0.00125 per kWh. This represents a decline of $0.00303 per kWh from the ICA charge currently in effect, and an annual decline in revenue of $5.424 million.

31. As further justification for this change in energy cost recovery mechanisms, the Settlement states that Aquila's new purchase power contract with Public Service should result in significant energy cost savings that would not be fully realized by customers under the current sharing mechanism.

32. The Settlement also provides that, by July 1, 2006, Aquila will file an application to continue the ECA beyond 2006 or for implementation of a new ECA clause. The Parties agree that the target date for the extension of the ECA or for the implementation of a new ECA clause is April 1, 2007. During the Settlement hearing, Company witness Keith acknowledged

that Aquila has some exposure for energy costs incurred after August 2006 and the start of an "extended" ECA.[6]

3. Compliance with Cost Allocations Rules

33. Through the testimony and exhibits of Mr. Dan Tyrrell, Aquila filed a new Fully Distributed Cost (FDC) study. It also presented a Cost Allocation Manual (CAM) updated with data from the test year ending August 31, 2003, using the same methods approved in Aquila's last Phase I Rate Case. Aquila believes that its FDC and CAM comply with the requirements of the Cost Allocation Rules, 4 *Code of Colorado Regulations.* 723-47, and § 40-3-114, C.R.S.

34. In its Answer testimony, Staff stated that it was unable to verify that the Aquila accounting system applies what is in the CAM because of a lack of an audit trail. Consequently, Staff argued that Aquila had not met its burden of proof[7] and, therefore, the Commission should not issue a finding that the CAM complies with § 40-3-114, C.R.S.

35. As part of the Settlement, the parties agree that Aquila will discuss in a cooperative process with Staff and any other parties that may be interested (the participants) how Aquila's CAM and its general ledger accounting system interact. Through this process, the participants will analyze cost allocation/assignments to and between Aquila's regulated and non-regulated business activities. These discussions will occur through scheduled workshops that will utilize the new Cost Allocation Rules expected to be promulgated in Docket No. 04R-003EG

[6] Examination of the ECA filing schedule table on pages 7 and 8 reveals that the last test period for energy costs ends in August 2006. To the extent the "extended" ECA, which is to be filed on July 1, 2006, does not take effect on August 1, 2006, the Company may not be able to recover some energy costs above its base cost of energy of $22.39/MWH. Likewise, to the extent energy costs are lower than the base energy costs in the August 2006 time period, customers would not see any corresponding reductions.

[7] *See* Answer Testimony of Sandra Johnson-Jones page 24.

(the new rules). The scheduling of the workshops will commence within 90 days of the effective date of the new rules.

36. In the workshops, the participants will start with an evaluation of the CAM and the FDC study filed in this case. The participants will then discuss the development of a new CAM and will discuss it on a department-by-department basis. The workshops will address the correlation between Aquila's accounting system and the new CAM. The parties believe that this evaluation will result in fair and reasonable cost assignments and allocations of costs to and between the Company's regulated and non-regulated business activities consistent with the requirements of § 40-3-114, C.R.S., and the new rules.

37. The Settlement provides that the participants shall have reasonable access to relevant information, subject to an appropriate non-disclosure agreement, concerning the Company's costs that could be assigned between and among regulated and non-regulated services. In the event the participants do not receive such information in a timely fashion, the participants may formally seek assistance from the Commission including, as necessary, a request to employ formal discovery processes. Finally, if the participants in the workshop process are not able to agree on an approach to accomplish a fair and reasonable allocation of costs to and between the Company's regulated and non-regulated business activities, the participants agree to notify all participants in writing, and the unresolved issue(s) shall be submitted to the Commission no later than 60 days after receipt of the written notification.

38. Once a new CAM is developed that is consistent with the new rules, Aquila will file the new CAM and a new FDC study. The target date for such filing will be 18 months after

the effective date of the new rules, which date may be extended by mutual agreement of the participants.

C. Conclusions

39. We conclude that the Settlement Agreement should be approved. We find that the regulatory principles used to develop the $8.2 million base rate increase in conjunction with the energy cost decrease of $5.424 million for an overall increase in customer rates of $2.776 million or 2.23 percent are just and reasonable. Additionally, changing to a 100 percent pass-through mechanism for energy costs under an ECA, instead of the current sharing incentive contained in the ICA, is in the public interest given Aquila's current purchased power situation. Finally, the establishment of workshops to allow interested parties to better understand the interaction between Aquila's accounting systems and its CAM and FDC is reasonable given the pending cost allocation rulemaking.

II. ORDER

A. The Commission Orders That:

1. The Settlement Agreement and Motion for Approval of the Settlement Agreement filed on July 27, 2004, by Aquila, Inc., the Staff of the Colorado Public Utilities Commission, the Colorado Office of Consumer Counsel, the Fountain Valley Authority, the Board of Water Works of Pueblo, the City of Canon City, the Cripple Creek & Victor Gold Mining Company, Holcim (U.S.) Inc., and the Trane Company, is approved.

2. The tariff sheets filed by Aquila, Inc., pursuant to Advice Letter No. 588 are permanently suspended.

3. Aquila, Inc., shall file on not less than one day's notice to the Commission tariffs consistent with this Decision. Such tariffs shall become effective on September 1, 2004.

4. The 20-day period provided for in § 40-6-114, C.R.S., within which to file applications for rehearing, reargument, or reconsideration begins on the first day following the Mailed Date of this Decision.

5. This Order is effective upon its Mailed Date.

B. ADOPTED IN COMMISSIONERS' DELIBERATIONS MEETING August 17, 2004.

THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

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____

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Commissioners

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Decision No. C04-0999-A

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF COLORADO

DOCKET NO. 04S-035E

RE: THE INVESTIGATION AND SUSPENSION OF TARIFF SHEETS FILED BY AQUILA, INC., DOING BUSINESS AS AQUILA NETWORKS-WPC, WITH ADVICE NO. 588.

ADDENDUM

ORDER GRANTING SETTLEMENT

Mailed Date: August 25, 2004
Adopted Date: August 17, 2004
Addendum Mailed Date: August 31, 2004

Add to Decision No. C04-0999, Order Granting Settlement, the attached:

SETTLEMENT AGREEMENT AND MOTION FOR APPROVAL OF SETTLEMENT AGREEMENT;

and,

SETTLEMENT AGREEMENT ATTACHMENT A -- spreadsheet containing:

- Schedule 1. AQUILA NETWORKS-WPC -- CALCULATION OF SETTLEMENT REVENUE REQUIREMENT, 12 MONTHS ENDING AUGUST 31, 2003
- Schedule 2. AQUILA NETWORKS-WPC -- STATEMENT OF OPERATIONS PER SETTLEMENT
- Schedule 3. AQUILA NETWORKS-WPC -- JURISDICTIONAL RATE BASE PER SETTLEMENT AGREEMENT, TEST YEAR ENDED AUGUST 31, 2003
- Schedule 4. AQUILA NETWORKS-WPC -- COST OF CAPITAL PER SETTLEMENT

SEAL

THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

Bruce N. Smith

BRUCE N. SMITH
Director
Dated at Denver, Colorado this
31st day of August, 2004.

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BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF COLORADO

DOCKET NO. 04S-035E

RE: THE INVESTIGATION AND SUSPENSION OF TARIFF SHEETS FILED BY AQUILA, INC., DOING BUSINESS AS AQUILA NETWORKS-WPC, WITH ADVICE NO. 588.

SETTLEMENT AGREEMENT
AND MOTION FOR APPROVAL OF SETTLEMENT AGREEMENT

Aquila, Inc., doing business as Aquila Networks-WPC ("Aquila" or the "Company"), the Trial Staff of the Colorado Public Utilities Commission ("Staff"), the Colorado Office of Consumer Counsel ("OCC"), the Fountain Valley Authority, the Board of Water Works of Pueblo, the City of Canon City (collectively the latter three are referred to as "Public Intervenors"), and the Cripple Creek & Victor Gold Mining Company, Holcim (U.S.) Inc. and the Trane Company (collectively the latter three are referred to as "CHT") (together cumulatively referred to as the "Parties"), by and through their respective undersigned counsel, and for good and valuable consideration, herewith enter into this Settlement Agreement ("Settlement Agreement") to settle all disputed issues that have arisen or could have arisen in this docket regarding Advice Letter No. 588 and accompanying tariffs. The Parties respectfully submit that this Settlement Agreement results in a fair disposition of all disputed issues in this docket, that the revenue requirement and revenue increase that result from this Settlement Agreement are just and reasonable, and therefore, the Parties request that the Commission approve this Settlement Agreement.

I. PROCEDURAL HISTORY

1. This proceeding in Docket No. 04S-035E was commenced on December 29, 2003, when Aquila filed with the Commission Advice Letter No. 588 and accompanying tariff sheets, direct testimony and exhibits. Advice Letter No. 588 sought Commission approval for a revenue increase of $11,358,847, based upon revenue requirements for the test year ending August 31, 2003, which would be implemented by a General Rate Schedule Adjustment ("GRSA") rider of 9.60 percent applied to all base rates for all customers receiving electric power and energy under Aquila's Colorado tariff (PUC No. 6). Aquila filed Advice Letter No. 588 and the accompanying tariff, direct testimony and exhibits, pursuant to the settlement agreement entered into between the parties in the Company's last Phase I general rate case, Docket No. 02S-594E, and Decision No. C03-0697 in which the Commission approved that settlement agreement.

2. On January 8 and 16, 2004, Aquila caused a Notice concerning the filing of Advice Letter No. 588 and these tariffs to be published in *The Pueblo Chieftain*, a newspaper of general circulation in Aquila's electric service area. On January 7 and 13, 2004, Aquila caused the Notice concerning the filing of these tariffs to be published in *The Rocky Ford Daily*, and on January 8 and 15, 2004, in *The Canon City Daily Record,* newspapers of local circulation in Aquila's electric service area.

3. On January 21, 2004, the Commission entered Decision No. C04-0082, the effect of which was to suspend the effective date of Advice Letter No. 588 until May 28, 2004, and to direct that the matter be set for hearing. By subsequent order the suspension period was extended to August 26, 2004. (*See,* Decision No. C04-0497.)

4. Timely Notices of Intervention were filed by Staff and the OCC. Timely Petitions for Leave to Intervene were filed by the Public Intervenors and by CHT, whose interventions were granted by Decision No. C04-0207-I.

5. A prehearing conference was held on March 3, 2004. As a result, an order was entered scheduling hearings and certain testimony filing dates, as well as other procedural requirements and deadlines. (*See,* Decision No. R04-0227-I.) At the request of Staff and supported by the other Parties, a new procedural schedule was adopted, including an initial decision by the Commission, evidentiary hearings on July 26-30, 2004, and related dates for filing answer, cross-answer, and rebuttal testimony and exhibits, and statements of position. (*See,* Decision Nos. C04-0291 and R03-0341-I.)

6. On April 30, 2004, answer testimony and exhibits were filed by Staff, OCC, CHT and the Public Intervenors, whose witnesses recommended revenue requirement increases of varying amounts lower than the revenue requirement increase requested by Aquila. On June 21, 2004, Aquila filed rebuttal testimony and exhibits. On June 21, 2004, the Public Intervenors filed cross-answer testimony and a revised exhibit of one witness.

7. On July 20, 2004, the Commission held a hearing in Pueblo, Colorado, for the purpose of taking public comment from Aquila's electric customers.

8. During the prehearing phase of this docket, the Parties have actively engaged in prehearing investigation, including through audit requests, formal data requests, informal exchanges of information, informal discussions, and settlement negotiations. Over the past several weeks, Aquila and the other parties have spent substantial time and efforts in negotiations to settle this rate case.

9. An agreement in principle to settle all disputed issues in this docket was reached by the parties on July 23, 2004. At the request of the Parties, ALJ Dale Isley vacated the hearings set for July 26-29, 2004 to allow the Parties time to prepare and to file a written Settlement Agreement by Tuesday, July 27, 2004. A hearing on the settlement is scheduled for Friday, July 30, 2004.

10. This Settlement Agreement memorializes the negotiated settlement and stipulations among the Parties. As a result of the settlement negotiations, all Parties agree, as set forth below, that all disputed issues in this docket have been resolved to the satisfaction of the Parties and that the revenue requirement and rate increase for all customers to which the Parties agree in this Settlement Agreement are just and reasonable.

II. THE SETTLEMENT

1. **Revenue Requirement Increase.** Aquila requested approximately $11.4 million in additional annual revenues in this rate case filing. As a result of this settlement, the Parties agree that the annual revenue requirement increase in this docket will be $8.2 million.

2. **Components of the Settlement.** For purposes of settlement, the $8.2 million annual revenue requirement increase consists of the following specific components. (Attachment A to this Settlement Agreement consists of spreadsheets that provide for the Commission's review of the details of the derivation of the $8.2 million annual revenue requirement increase.)

a) The settled rate of return on equity for Aquila in this docket is 10.25%.

b) Aquila's WPC divisional capital structure is adopted, consisting of 47.50% equity and 52.50% debt, along with Staff's cost of debt of 7.42%, producing an overall cost of capital, or rate of return on rate base, of 8.76%.

c) The Parties agree that $250,000 of capacity charges associated with a 2004 peaking contract should be eliminated.

d) The Parties agree that $1,204,903 of the new Public Service Company of Colorado ("Public Service") Capacity costs and $200,487 of the new Public Service Transmission costs will be excluded from the settlement revenue requirement.

e) The Parties agree that other transmission expense of $114,167 associated with an expired Basin Electric contract should be eliminated.

f) The Parties agree that the Company's payroll annualization should be reduced by $15,987 to reflect the actual percentage wage increase granted by the Company.

g) The Parties agree that the effect of the interest deduction associated with the embedded cost of debt will increase income taxes by $142,127 in order to reflect the settled cost of debt.

h) The Parties agree that administrative and general expense will be increased by $19,467 to reflect the reconciliation adjustment.

i) The Parties agree that the effect of these various adjustments will increase income taxes by $686,075.

j) The Parties agree that the overall $8.2 million annual revenue requirement increase will be collected from all customers through a new, uniform

GRSA rider in such a manner that the overall percentage increase in base rates will be 6.93 percent.

k) Aquila agrees to eliminate from the Cash Working Capital calculation the amortization of prepayments that resides in operating and maintenance expense in this docket and in the next revenue requirement proceeding.

3. **Incentive Cost Adjustment ("ICA").** Currently, the ICA tariff contains a 75%/25% sharing mechanism that permits Aquila to recover from or credit to customers 75% of fuel and purchased energy cost changes above or below its base energy cost, based upon a historical test year of September 1st through August 31st. A revised ICA rider, to adjust rates to recover fuel and purchased energy costs, is filed each year on October 1st, and the approved costs are recovered during the next year from November 1st through October 31st. (*See,* Aquila's Colorado Electric Tariff, Sheets 89-91.)

a) The ICA will be modified to an Energy Cost Adjustment ("ECA") effective with the $8.2 million rate increase to allow Aquila to recover or to credit 100% of the fuel and purchased energy cost changes above or below its base energy cost. In addition, Aquila will file for ECA changes at least twice each year, in accordance with the schedule set forth in Paragraph 3(d). The ECA base cost will be increased to $22.39 per Mwh effective with the new GRSA rider that is scheduled to go into effect on or about September 1, 2004.

b) With the new Public Service power purchase contract effective on January 1, 2004, Aquila's cost to serve electricity became more predictable. As a result of entering into the new Public Service power purchase contract, Aquila is even more reliant upon power and energy supplied by Public Service than under the previous power purchase contract. Aquila's cost to serve is more predictable because the new Public Service power purchase contract is tied to Public Service's average system (coal and gas-fired generation) cost and not tied to the production cost of a single gas-fired generation plant or the spot market for energy. Moreover, the Public Service power purchase contract is expected to result in significant energy cost savings, which under the existing ICA clause would not be fully shared with Aquila's Colorado customers. The vast majority of Aquila's energy is purchased from third-party suppliers (e.g., Public Service). These fuel purchase decisions are made by the supplier's management, not Aquila's management, and are beyond Aquila's control. Therefore, given these circumstances, the 100% ECA makes better sense for Aquila's customers and Aquila than the existing ICA.

c) The ECA test period will consist of a historical test period that contains two of the summer months, either June-July or August-September. The goal of the Parties is that this design of the six-month ECA test periods will better moderate the amount of deferred balances that would need to be recovered through the ECA in any one six-month period.

d) The Parties contemplate the following ECA filing schedule:

File Date	Effective Date	Recovery Period	Test Period
On approval	1 September 2004	Sept. 2004 – Feb. 2005	Sept. 2003 – June 2004
1 February 2005	1 March 2005	March 2005 – Sept. 2005	July 2004 – Dec. 2004
1 September 2005	1 October 2005	Oct. 2005 – March 2006	Jan. 2005 – July 2005

1 March 2006	1 April 2006	April 2006 – Sept. 2006	August 2005 – Jan. 2006
1 September 2006	1 October 2006	Oct. 2006 – March 2007	Feb. 2006 – Aug. 2006

e) An ECA charge of $.00125 per kWh will be implemented simultaneously with the implementation of the new GRSA rider in September 2004. This ECA charge represents a decline of $.00303 per kWh from the ICA charge currently in effect, and an annual decline in revenue of $5.424 million. As a result of the combination of the rate increase and ICA decrease, the customers will see a net annual increase of $2.776 million or 2.23% when the new GRSA rider is implemented on or about September 1, 2004.

f) Aquila will sponsor the proposed new ECA tariff, incorporating the features agreed to above, as an exhibit in the July 30, 2004 hearing on this Settlement Agreement. Aquila will provide the proposed ECA tariff to the Parties prior to the hearing.

g) The Parties agree that the revision of the ICA to a 100% ECA will be effective prospectively upon the effective date of the Commission's decision approving the rate changes stipulated in this Settlement Agreement; the effective date of the ECA is anticipated to be on or about September 1, 2004. The Parties further agree that the ICA fuel and purchased energy costs incurred by Aquila up to the effective date of the rate changes proposed in this Settlement Agreement shall continue to be shared on a 75%/25% basis with Aquila's customers. In order to transition to the ECA, in its February 1, 2005 ECA filing, Aquila will account for July and August 2004 in accordance with the ICA's 75%/25%

cost sharing and will account for September through December 2004 in accordance with the ECA's 100% cost recovery.

h) By July 1, 2006, Aquila will file an application to continue the ECA beyond 2006, or for implementation of a new ECA clause. The Parties agree that the target date for the extension of the ECA or for the implementation of a new ECA clause is April 1, 2007.

4. **Compliance with Cost Allocation Rules.** Currently, within a revenue requirements rate case proceeding, the Commission must determine whether the utility has complied with certain Commission rules regarding cost allocations as between regulated and nonregulated activities (*see,* 4 *Colo. Code Regs.* 723-47), and whether the utility has complied with the statutory requirement that no ratepayer funds have been used to subsidize a utility's nonregulated activities. Colo. Rev. Stat. § 40-3-114.

a) In Decision No. C03-0697 in Docket No. 02S-0594E, the Commission approved, pursuant to 4 *Colo. Code Regs.* 723-47-6.3, Aquila's Fully Distributed Cost ("FDC") Study and changes to Aquila's Cost Allocation Manual ("CAM"), which were contained in the testimony and exhibits of Mr. Dan Tyrrell (*see,* 4 *Colo. Code Regs.* 723-47-3.1.1.). The Commission also found, in accordance with Colo. Rev. Stat. § 40-3-114, that no ratepayer funds were used to subsidize Aquila's nonregulated activities. (Decision No. C03-0697, Paragraphs III.I.60-73, pages 20-23.)

b) In the instant docket, through the testimony and exhibits of Mr. Dan Tyrrell, Aquila filed a new FDC and presented a CAM updated with data from the test year ending August 31, 2003, using the same methods approved in Decision No. C03-0697. Aquila believes that its FDC and CAM in this docket comply with the requirements of the Cost Allocation Rules, 4 *Colo. Code Regs.* 723-47, and Colo. Rev. Stat. § 40-3-114.

c) The Commission is currently engaged in a rule-making proceeding to repeal and reenact the Cost Allocation Rules found in 4 *Colo. Code Regs.* 723-47. (*See,* Decision No. C04-0008 in Docket No. 04R-003EG.)

d) The Parties agree that Aquila will discuss in a cooperative process with Staff, and any other Parties that may be interested (the "participants"), how Aquila's CAM and its general ledger accounting system interact. Through this process, the participants will analyze cost allocation/assignments to and between Aquila's regulated and non-regulated business activities. These discussions will occur through scheduled workshops, and they will utilize the new Cost Allocation Rules expected to be promulgated in Docket No. 04R-003EG (the "new rules"). The scheduling of the workshops would commence within 90 days of the effective date of the new rules. In the workshops, the participants will start with an evaluation of the CAM and the FDC study filed in Docket No. 04S-035E. The participants will then discuss the development of a new CAM and will discuss the new CAM on a department by department basis. The workshops will address the correlation between Aquila's accounting system and the new CAM. This evaluation will result in fair and reasonable cost assignments and allocations of costs to and between the Company's regulated and non-regulated business activities consistent with the requirements of Colo. Rev. Stat. § 40-3-114 and the Commission's expected new rules. The participants shall have reasonable access to relevant information, subject to an appropriate non-disclosure agreement, concerning the Company's costs that could be assigned between and among regulated and non-regulated services. In the event the participants do not receive such information in a timely fashion, the participants may formally seek assistance from the Commission including, as necessary, a request to employ formal discovery processes. Finally, if the participants in the workshop process are not able to agree on an approach to accomplish a fair and reasonable allocation of costs to and between the Company's regulated and non-regulated business activities, the participants agree to notify all participants in writing that the unresolved issue(s) shall be submitted to the Commission no later than sixty (60) days after receipt of the written notification.

e) Once a new CAM is developed that is consistent with the new rules, Aquila will file the new CAM and a new FDC study. The target date for such filing will be 18 months after the effective date of the new rules, which date may be extended by mutual agreement of the participants.

5. **The New GRSA Rider.** The Parties agree that the $8.2 million revenue increase will be collected through the new GRSA rider of 6.93% for all customers. The new GRSA rider is intended to be in effect only until the Commission authorizes its revision and/or termination by entry of a lawful final decision in another docket. By agreeing to this Paragraph 5, the Parties, who are also parties in Aquila's currently pending Phase II (Docket No. 03S-539E), do

not waive any of their rights to make any arguments in that docket. Should a Party argue in an application for rehearing, reargument or reconsideration in Phase II any issue impacted by the 6.93% rider, the Parties to this Agreement will not oppose the filing of a reply to the application for rehearing, reargument or reconsideration on that issue.

6. If the Commission approves this Settlement Agreement, tariffs conforming to this Settlement Agreement and implementing the agreed upon rate revisions may be filed on one-day's notice.

III. GENERAL TERMS AND CONDITIONS

1. Through active prehearing investigation and negotiation, the Parties have reached the agreement set forth herein resolving all contested and disputed issues in this docket in a manner which the Parties agree is just and reasonable and in the public interest. The Parties further agree that reaching agreement by means of negotiation and settlement rather than through litigation is in the public interest.

2. The Parties agree to present, to support, and to defend this Settlement Agreement before the Commission and, except for Staff, the courts. The Parties further agree, if necessary, to present testimony and exhibits to the Commission to secure the approval of this Settlement Agreement.

3. The Parties hereby agree that all pre-filed testimony and exhibits shall be admitted into evidence in this docket without cross-examination. This Settlement Agreement reflects compromise and settlement of all issues raised or that could have been raised in this docket.

4. This Settlement Agreement shall not become effective until the issuance of a final Commission Order approving the Settlement Agreement, which Order does not contain any modification of the terms and conditions of this Settlement Agreement that is unacceptable to any of the Parties. In the event the Commission modifies this Settlement Agreement in a manner unacceptable to any Party, that Party shall have the right to withdraw from this Settlement Agreement and proceed to hearing on the issues that may be appropriately raised by that Party in this docket. The withdrawing Party shall notify the Commission and the Parties to this Settlement Agreement by e-mail and facsimile within five (5) business days of the Commission Order that the Party is withdrawing from the Settlement Agreement and that the Party is ready to proceed to hearing; the e-mail and facsimile notice shall designate the precise issue or issues on which the Party desires to proceed to hearing (the "Hearing Notice").

5. The withdrawal of a Party shall not automatically terminate this Settlement Agreement as to any other Party. However, within three (3) business days of the date of the Hearing Notice from the first withdrawing Party, all Parties shall confer to arrive at a comprehensive list of issues that shall proceed to hearing and a list of issues that remain settled as a result of the first Party's withdrawal from this Settlement Agreement. Within five (5) business days of the date of the Hearing Notice, the Parties shall file with the Commission a formal notice containing the list of issues that shall proceed to hearing and those issues that remain settled. The Parties who proceed to hearing shall have and be entitled to exercise all rights with respect to the issues that are heard that they would have had in the absence of this Settlement Agreement.

6. Hearing shall be scheduled on all of the issues designated in the formal notice filed with the Commission as soon as practicable. In the event that this Settlement Agreement is

not approved, or is approved with conditions that are unacceptable to any Party who subsequently withdraws, the negotiations or discussions undertaken in conjunction with the Settlement Agreement shall not be admissible into evidence in this or any other proceeding, except as may be necessary in any proceeding to enforce this Settlement Agreement.

7. Approval by the Commission of this Settlement Agreement shall constitute a determination that the Settlement Agreement represents a just, equitable and reasonable resolution of all issues that were or could have been contested among the Parties in this proceeding.

8. All Parties specifically agree and understand that this Settlement Agreement represents a negotiated settlement in the public interest with respect to the various Aquila rate matters and terms and conditions of service for the sole purpose of the settlement of the matters agreed to in this Settlement Agreement. No Party or person shall be deemed to have approved, accepted, agreed to, or consented to any concept, theory or principle underlying or supposed to underlie any of the matters provided for in this Settlement Agreement, other than as specifically provided for herein. Notwithstanding the resolution of the issues set forth in this Settlement Agreement, none of the methods or ratemaking principles herein contained shall be deemed by the Parties to constitute a settled practice or precedent in any future proceeding. Nothing in this Settlement Agreement shall preclude Aquila from seeking prospective changes in its electric rates by an appropriate filing with the Commission. Nothing in this Settlement Agreement shall preclude any other party from filing a Complaint or seeking an Order to Show Cause to obtain prospective changes in Aquila's electric rates.

9. This Settlement Agreement may be executed in counterparts and by facsimile copies of signatures, all of which when taken together shall constitute the entire Settlement Agreement with respect to the issues addressed by this Settlement Agreement.

CONCLUSION

For the reasons stated above, the Parties respectfully request that the Commission enter an order approving this Settlement Agreement with the finding that the Commission's approval of this Settlement Agreement represents a fair, just, and reasonable resolution of all disputed issues that have arisen, or which could have arisen, in this docket.

DATED this 27th day of July 2004.

Accepted on behalf of
AQUILA, INC., d/b/a AQUILA NETWORKS--WPC:

By: ______________________________
W. Scott Keith
10700 E. 350 Highway
Kansas City, MO 64138

Approved as to form:

ABEL, BAND, RUSSELL, COLLIER, PITCHFORD & GORDON, CHARTERED

By: ________________________
Steven H. Denman, Reg. No. 7857
240 South Pineapple Avenue
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Sarasota, FL 34230-6948
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(303) 623-6660 Denver number

Attorneys for Aquila, Inc., doing business as Aquila Networks-WPC

Accepted on behalf of
TRIAL STAFF OF THE COMMISSION:

By: ______________________________
Sandra Johnson Jones
1580 Logan Street, Office Level 2
Denver, CO 80203

Approved as to form:

OFFICE OF THE ATTORNEY GENERAL

By: ________________________
David A. Beckett, Reg. No. 23098
Michael J. Santisi, Reg. No. 29673
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Attorneys for the Trial Staff of the Commission

Accepted on behalf of
COLORADO OFFICE OF CONSUMER COUNSEL:

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Accepted as to form
COLORADO OFFICE OF CONSUMER COUNSEL:

OFFICE OF THE ATTORNEY GENERAL

KEN SALAZAR
Attorney General

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ATTORNEYS FOR THE COLORADO OFFICE OF CONSUMER COUNSEL

Accepted on behalf of:
CRIPPLE CREEK & VICTOR GOLD MINING COMPANY, HOLCIM (U.S.) INC. AND THE TRANE COMPANY:

DUFFORD & BROWN, P.C.

By: ______________________________
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Attorneys for the Cripple Creek & Victor Gold Mining Company, Holcim (U.S.) Inc. and the Trane Company

Accepted on behalf of
FOUNTAIN VALLEY AUTHORITY
BOARD OF WATER WORKS OF PUEBLO, COLORADO
CITY OF CANON CITY, COLORADO:

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Fax: (303) 850-7022

Attorney for the Fountain Valley Authority, Board of Water Works of Pueblo, CO, City of Canon City, CO

CERTIFICATE OF SERVICE

I hereby certify that on this 27th day of July 2004, a true and correct copy of the foregoing SETTLEMENT AGREEMENT AND MOTION FOR APPROVAL OF SETTLEMENT AGREEMENT was served via facsimile transmission, hand delivery, or placed in the United States mail, first class postage prepaid, addressed to the following:

Mr. W. Scott Keith
Aquila Networks
Post Office Box 11739
Kansas City, MO 64138

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Mark A. Davidson, Esquire
Dufford & Brown, P.C.
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Denver, CO 80203

Wendell Winger
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Denver, CO 80203

Settlement Agreement
Attachment A
Schedule 1

AQUILA NETWORKS-WPC
CALCULATION OF SETTLEMENT REVENUE REQUIREMENT
12 MONTHS ENDING AUGUST 31, 2003
DOCKET NO. 04S-035E

LINE NO.	Description		Amount
1	Net CPUC Jurisdictional Rate Base	$	122,489,252
2	Return On Rate Base		8.76%
3	Required Net Operating Income	$	10,735,264
4	Net CPUC Jurisdictional Operating Income	$	5,652,043
5	Deficiency	$	5,083,221
6	Income Tax Factor		1.613150402
7	Required Revenue Change	$	8,200,000
8	As Adjusted Base Revenue	$	118,340,819
9	Proposed Base Rate Increase (Surcharge)		6.93%
10	Effect on Average Residential Customer Before ICA-Monthly	$	3.57
11	Effect on Average Small Business Customer Before ICA-Monthly	$	12.06
12	Effect on Average Residential Customer After ICA-Monthly	$	1.76
13	Effect on Average Small Business Customer After ICA-Monthly	$	4.96
14	Residential Average Usage per Month		596
15	Small Business Average Usage per Month		2,342

AQUILA NETWORKS-WPC
STATEMENT OF OPERATIONS PER SETTLEMENT
DOCKET NO. 04S-035E

Settlement Agreement
Attachment A
Schedule 2

NO	DESCRIPTION	AQUILA AS ADJUSTED	2004 Peaking Capacity	Public Service Capacity	Public Service Transmission	Other Transmission	Payroll Annualization	Reconciliation Adjustment	Interest Deduct	Income Taxes	Total Settlement Adjustments	SETTLEMENT AS ADJUSTED
1	OPERATING REVENUE											
2	SALES OF ELECTRICITY	$ 123,506,364									$ -	$ 123,506,364
4	OTHER	924,062									-	924,062
5	TOTAL OPERATING REVENUE	124,430,426	-	-	-	-	-			-	-	124,430,426
6	OPERATING EXPENSES											
7	Total Cost of Sales	76,719,928	(250,000)	(1,204,903)							(1,454,903)	75,265,025
8	Production O & M	3,983,267			(200,487)	(114,167)					(314,654)	3,668,613
9	Transmission O & M	6,358,737									-	6,358,737
10	Distribution O & M	6,030,311									-	6,030,311
11	Customer O & M	3,206,184									-	3,206,184
12	Administrative & General O & M	11,218,400					(15,987)	19,467			3,480	11,221,880
14	DEPRECIATION & AMORTIZATION (403-407.2)	9,590,460									-	9,590,460
15	TAXES OTHER THAN INCOME (408.1)	2,873,438									-	2,873,438
16	INCOME TAXES:										-	-
17	CURRENT (409)	1,145,966							142,127	686,075	828,203	1,974,169
18	DEFERRED (410)	(1,410,433)									-	(1,410,433)
20	TOTAL OPERATING EXPENSES	119,716,257	(250,000)	(1,204,903)	(200,487)	(114,167)	(15,987)	19,467	142,127	686,075	(937,875)	118,778,383
21	NET UTILITY OPERATING INCOME	$ 4,714,169										$ 5,652,043

AQUILA NETWORKS-WPC
JURISDICTIONAL RATE BASE PER SETTLEMENT AGREEMENT
DOCKET NO. 04S-035E
TEST YEAR ENDED AUGUST 31, 2003

Settlement Agreement
Attachment A
Schedule 3

LINE NO.	DESCRIPTION	REFERENCE	AQUILA AS ADJUSTED	Prepayments	CWC Staff	ADIT	PER SETTLEMENT
1	PLANT IN SERVICE						
2	INTANGIBLE	SEC 4 SCH 1	$ 200,900				$ 200,900
3	PRODUCTION	SEC 4 SCH 1	30,275,139				30,275,139
4	TRANSMISSION	SEC 4 SCH 1	39,337,093				39,337,093
5	DISTRIBUTION	SEC 4 SCH 1	144,376,374				144,376,374
6	GENERAL	SEC 4 SCH 1	14,401,712				14,401,712
7	GENERAL - COMMON	SEC 4 SCH 1	16,493,847				16,493,847
8	TOTAL PLANT IN SERVICE		245,085,065				245,085,065
9	CONSTRUCTION WORK IN PROGRESS	SEC 4 SCH 1	0				0
10	ACQUISITION ADJUSTMENT	SEC 4 SCH 1	0				0
11	TOTAL UTILITY PLANT		245,085,065				245,085,065
							0
12	LESS:						0
13	ACCUM. PROV. FOR DEPR & AMORT	SEC 5 SCH 1	120,186,859				120,186,859
14	ACCUM AMORTIZATION & DEPLETION	SEC 5 SCH 1	93,710				93,710
15	ACCUM. PROV. FOR AMORT OF ACQ ADJ	SEC 5 SCH 1	0				0
16	TOTAL ACCUM. PROV. FOR DEPR & AMORT		120,280,569				120,280,569
17	NET PLANT IN SERVICE		124,804,496				124,804,496
							0
18	OTHER RATE BASE ITEMS						0
19	MATERIALS & SUPPLIES-FUEL	SEC 6 SCH 1	662,571				662,571
20	MATERIALS & SUPPLIES-PLANT	SEC 6 SCH 1	861,015				861,015
21	PREPAYMENTS - OTHER	SEC 6 SCH 1	8,988,947	(271,277)			8,717,670
22	CUSTOMER ADVANCES FOR CONSTRUCTION	SEC 6 SCH 1	(5,115,657)				(5,115,657)
23	CASH WORKING CAPITAL	SEC 6 SCH 1	3,742,094		(4,068,427)		(326,333)
24	ACCUMULATED DEFERRED INCOME TAXES	SEC 6 SCH 1	(3,971,208)			(2,780,465)	(6,751,673)
25	CUSTOMER DEPOSITS	SEC 6 SCH 1	(362,838)				(362,838)
26	TOTAL OTHER RATE BASE ITEMS		4,804,925	(271,277)	(4,068,427)	(2,780,465)	(2,315,244)
27	TOTAL RATE BASE		$ 129,609,421	$ (271,277)	$ (4,068,427)	$ (2,780,465)	$ 122,489,252

AQUILA NETWORKS-WPC
COST OF CAPITAL PER SETTLEMENT
DOCKET NO. 04S-035E

Settlement Agreement
Attachment A
Schedule 4

Line No.	Description	Ratio	Cost Embedded	Cost Weighted
1	Common Equity	47.50%	10.25%	4.87%
2	Long-term Debt	52.50%	7.42%	3.90%
3	Total	100.00%		8.76%
4	Annualized Interest-Staff			$ 4,771,569
5	Annualized Interest-WPC		3.970%	5,145,494
6	Decrease in Interest Deduction			$ (373,925)
7	Increase in Income Taxes			142,127

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF COLORADO

RE:	**THE TARIFF SHEETS FILED BY AQUILA NETWORKS – WPC WITH ADVICE LETTER NO. 588 - ELECTRIC**	**) Docket No. 04S-035E**

DIRECT TESTIMONY

OF

RICHARD A. BAUDINO

ON BEHALF OF

CRIPPLE CREEK & VICTOR GOLD MINING COMPANY
GOODRICH CORPORATION, HOLCIM (U. S.) INC. AND
THE TRANE COMPANY

J. KENNEDY AND ASSOCIATES, INC.
ROSWELL, GEORGIA

APRIL 2004

006806

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF COLORADO

RE:	THE TARIFF SHEETS FILED BY AQUILA NETWORKS – WPC WITH ADVICE LETTER NO. 588 - ELECTRIC	) Docket No. 04S-035E

DIRECT TESTIMONY OF RICHARD A. BAUDINO

I. QUALIFICATIONS AND SUMMARY

Q. Please state your name and business address.

A. Richard A. Baudino, J. Kennedy and Associates, Inc. ("Kennedy and Associates"), 570 Colonial Park Drive, Suite 305, Roswell, Georgia 30075.

Q. What is your occupation and who employs you?

A. I am a utility rate and economic consultant holding the position of Director of Consulting with the firm of Kennedy and Associates.

Q. Please describe your education and professional background.

A. I received my Master of Arts degree with a major in Economics and a minor in Statistics from New Mexico State University in 1982. I also received my Bachelor of Arts degree with majors in Economics and English from New Mexico State in 1979.

I began my professional career with the New Mexico Public Service Commission Staff in October of 1982 and was employed there as a Utility Economist. During my employment with the Staff, my responsibilities included the analysis of a broad range of issues in the ratemaking field. Areas in which I testified included cost of service, rate of return, rate design, revenue requirements, analysis of sale/leasebacks of generating plants, utility finance issues, and generating plant phase-ins.

In October 1989 I joined the utility consulting firm of Kennedy and Associates as a Senior Consultant where my duties and responsibilities covered substantially the same areas as those during my tenure with the New Mexico Public Service Commission Staff. I became Manager in July 1992 and was named to my current position in January 1995.

Exhibit____(RAB-1) summarizes my expert testimony experience.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of Cripple Creek & Victor Gold Mining Company, Goodrich Corporation, Holcim (U.S.), Inc. and The Trane Company (collectively referred to as "CGHT"), a group of large industrial customers of Aquila Networks-WPC ("Aquila").

Q. What is the purpose of your Direct Testimony?

A. The purpose of testimony is to address the investor required return on equity for Aquila.

Q. Please summarize your recommendation.

A. I conclude that the investor required return on equity for Aquila is in the range of 8.80% - 9.00%. I recommend that the Commission adopt an 8.80% return on equity for the Company in this proceeding.

Q. How is your testimony organized?

A. Section II provides a summary of past and current economic conditions, which sets the backdrop for my rate of return analysis. Section III contains a discussion of my approach to estimating the cost of equity and the results of the methodologies that I utilize.

II. REVIEW OF ECONOMIC AND FINANCIAL CONDITIONS

Q. Please describe the general economic trends that have affected utilities in the last few years.

A. The trend for the stock and bond markets was quite positive through the '90s. Although there was a recession in late 1990 through early 1991, the markets continued to post strong, above average gains through 1999. During the period from 1990 - 1999, the S&P 500 posted an average annual gain of 18.2%, still well above the long-term average stock market return of 12.2%[1]. Long-term government bonds also provided excellent returns during the '90s, averaging 8.8% per year compared to the long-run average of 5.8%. During the 1990s, inflation remained moderate, averaging 2.9%.

In 2000, the stock and bond markets substantially diverged. The total return for the S&P 500 was –9.11%, while the return for small company stocks was –3.59%. Bonds prices, however, staged a strong rally despite two interest rate increases by the Federal Reserve. The total return for long-term government bonds for the year was 21.48%, with the yield falling from 6.82% at the end of 1999 to 5.58% at the end of December 2000. The inflation rate rose to 3.39% for the year.

During 2001, the economy slowed considerably and was affected drastically by the terrorist attacks of September 11. The unemployment rate rose to 5.8% and GDP growth slowed to only 1.1% for the year. Stock and bond markets again showed divergent returns. The Standard and Poor's 500 returned –11.88% for the year,

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[1] *Stocks, Bonds Bills, and Inflation 2003 Yearbook*, Ibbotson Associates, pages 18 and 112.

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while small company stocks actually did quite well, posting a total return of 22.77%. Long-term government bonds returned 3.70% during 2001.

For 2002, Ibbotson Associates reported that the unemployment rate rose to 6.0% and GDP grew at an inflation-adjusted rate of 2.4%. This compares the 0.3% growth rate for GDP in 2001. The S&P 500 returned –22.10% for the year, the third straight yearly loss for large-company stocks. However, long-term government bond returned 17.84%, well above the long-run average yearly return.

2003 was a much better year for the stock market in general as the U.S. economy staged a recovery. According to the Value Line Investment Survey's *Selection and Opinion*, January 9, 2004, the S&P 500 rose 26.2% during the year. Interest rates remained low, with the Prime Rate at 4.0%, the discount rate at 2.0%, and the Federal Funds rate at 1.0%. The Bureau of Labor Statistics reported that the U.S. unemployment rate stood at 5.7% at the end of December 2003, a decline from 2002. The inflation rate remained low at 2.0% for the year. Utility stocks also did well during 2003, with prices staging a significant rally during the year. The Dow Jones Utility Average began the year at 215.16 and closed the year at 266.9, an increase of 24%.

Q. What has the trend in capital costs been over the last few years?

A. Exhibit____(RAB-2) presents a graphic depiction of the trend in interest rates from January 1994 through February 2004. The interest rates shown are for the 20-year U.S. Treasury Bond and the average public utility bond from the Mergent Bond

Record. Exhibit____(RAB-2) shows that the yields on long-term treasury bonds have declined significantly since early 1995, although rates have been quite volatile. Increased bond market volatility actually began in the early 1970s, when inflation became more of a sustained long-term concern. Interest rate volatility remains higher now than it has been historically.

Yields have trended downward from 2002 through 2004, with the 20-year bond yield ending the month of February 2004 at 4.94%. The yield on the average public utility bond has also decreased significantly in 2002 and 2003, falling from 7.83% in March 2002 to 6.17% in February 2004. As of April 5, 2004, the Moody's average public utility bond yield stood at 6.29%. A-rated utility bonds yielded 6.26%, while Baa bonds yielded 6.37%.

Over the last six months, bonds have reached their lowest levels in recent history. Exhibit____(RAB-2) shows that since 1994 public utility bond yields are at their lowest level over that ten-year historical period. I also reviewed the Mergent *Public Utility Manual* and found that average public utility bond yields have not been as low as they are now since the 1968 – 1969 time period, almost 35 years ago.

Q. Mr. Baudino, in your opinion what effect does the current interest rate environment have on utility stocks?

A. In my view, the currently low bond yields strongly suggest lower return on equity requirements on the part on the investing public. The results of my return on equity

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analysis in the subsequent section of my Direct Testimony are consistent with these historically low bond yields.

Q. How does the investment community regard the electric utility industry as a whole?

A. The Value Line Investment Survey reported the following in its March 5, 2004 report on the electric utility industry (east):

> **"The bankruptcy of Enron and the California energy crisis prompted a majority of utilities to adopt a "back-to-basics" strategy in recent years. *Duquesne Light Holdings* is one noteworthy example. This means that most power companies are once again largely reliant on traditional distribution businesses for net-profit growth. Nearly half of all the states in the U.S. have adopted some form of retail open-market rules since deregulation began in the mid-1990s. Nevertheless, many more years will likely pass before the rest of the country completely embraces retail competition."**

Value Line also noted that most electric utilities have stepped back from risky financial energy trading ventures, enhancing future earnings predictability. Net profit prospects for the industry through 2007 are generally favorable, but growth prospects will not be exceptional, according to Value Line's report.

Q. What is your view of Value Line's comments regarding the state of the electric industry today?

A. In my opinion, Value Line's comments indicate that utilities have ventured into higher risk unregulated operations that can increase risk and, in certain cases, harm their overall financial performance. These unregulated operations have increased risk for electric utilities. Now that many utilities have backed away from such ventures, their overall risk should decline and their financial situations should stabilize. Further, I believe that utility stocks have become much more attractive to investors over the last 12 to 15 months. Much of the uncertainty brought about by the California energy crisis and the Enron debacle has subsided, reducing the perceived risk of utility companies in general.

Q. How does the investment community view Aquila, Inc?

A. Aquila Networks is part of Aquila, Inc. and is thus affected by the situation of the entire company, not just the regulated utility operations.

In it's April 2, 2004 report, the Value Line Investment Survey noted the following:

> **"Ever since the power markets collapsed two ears ago, thereby weakening the company considerably, Aquila has been divesting assets and exiting as much of the energy-marketing business as possible. In the first quarter of 2004, sales of the company's British utility and the bulk of its domestic independent power projects brought in $300 million. The sale of Aquila's Canadian utilities should raise over $600 million. Some of the proceeds (along with cash on hand) will be used to retire $400 million of debt that comes due in the second half of 2004. The rest could be used for additional debt reduction or to buy out some unattractive power-marketing agreements and gas prepay**

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> **contracts that are a legacy of Aquila's participation in energy marketing.**
>
> ********
>
> **We expect Aquila's losses to decline gradually, but the company will still be in the red for a while. Rate relief, the effects of a cost-cutting program, and reduced energy-marketing losses should produce bottom-line improvement in 2004 and 2005."**

Aquila's management suspended the common stock dividend in 2002.

During my research on Aquila, I visited the Company's web site and obtain a news release from the Company dated March 10, 2004. In this release, the Company reported a fully diluted loss of $0.18 per share for the fourth quarter of 2003, or a net loss of $34 million for the quarter. The Company also reported a fully diluted loss of $1.73 per share for the full year of 2003, or a net loss of $336.4 million. Aquila, Inc. noted that most of the charges and margin losses were related to "the execution of Aquila's ongoing plan to refocus on its core utility operations." This news release also included the following quote:

> **" 'Our core domestic utility business remains sound,' said Richard C. Green, Aquila chairman and chief executive officer. 'We're concentrating now of taking it to the next level in terms of customer service, efficiency and effectiveness.' "**

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Q. What are the bond ratings for Aquila?

A. The regulated utility operations do not have their own bond ratings, as Aquila, Inc. issues debt and is the entity that is rated by such agencies as Moody's and Standard and Poor's ("S&P").

In November 2002, S&P relegated Aquila Inc.'s bond to a BB rating. This rating is below investment grade and is now considered "junk bond" status. In a report dated April 8, 2004, Standard and Poor's lowered Aquila, Inc.'s corporate credit rating to B- from B with a negative outlook. Standard and Poor's noted that the downgrade "reflects continued uncertainty regarding Aquila's ability to restructure its gas prepay contracts and the expectation that credit measures will remain pressured despite management's efforts to stem its deteriorating credit profile".

Q. What impact does Aquila, Inc.'s current bond rating have on determining a fair return on equity for Aquila Networks in this proceeding?

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A. It is clear that Aquila, Inc. is significantly more risky as a total company than its regulated utility operations, which are profitable and carry much lower risk. A higher cost of capital from risky unregulated operations should not be passed on to Colorado ratepayers in this proceeding. It will be necessary to screen out higher risk from the Company's assets sales, debt leverage, and its restructuring of its gas prepay contracts in order to determine a fair regulated return on equity for Aquila's regulated electric utility operations in Colorado. I will recommend how this may be accomplished in the next section of my direct testimony.

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III. DETERMINATION OF FAIR RATE OF RETURN

Q. Please describe the methods you employed in estimating a fair rate of return for Entergy.

A. I employed a Discounted Cash Flow ("DCF") analysis for a group of comparison electric companies to estimate the cost of equity for Aquila's electric operations. I also employed a Capital Asset Pricing Model ("CAPM") analysis, although I did not incorporate its results into my recommendation.

Q. What are the main guidelines to which you adhere in estimating the cost of equity for a firm?

A. Generally speaking, the estimated cost of equity should be comparable to the returns of other firms with similar risk structures and should be sufficient for the firm to attract capital. These are the basic standards set out in <u>Federal Power Comm'n v. Hope Natural Gas Co.</u>, 320 U.S. 591 (1944) and <u>Bluefield W.W. & Improv. Co. v. Public Service Comm'n.</u>, 262 U.S. 679 (1922).

From an economist's perspective, the notion of "opportunity cost" plays a vital role in estimating the cost of equity. One measures the opportunity cost of an investment equal to what one would have obtained in the next best alternative. For example, let us suppose that an investor decides to purchase the stock of a publicly traded electric utility. That investor made the decision based on the expectation of dividend payments and perhaps some appreciation in the stock's value over time. However, that investor's opportunity cost is measured by what she or he could have invested in as the next best alternative. That alternative could have been another utility stock, a utility bond, a mutual fund, a money market fund, or any other number of investment vehicles.

The key determinant in deciding whether to invest, however, is based on comparative levels of risk. Our hypothetical investor would not invest in a particular electric company stock if it offered a return lower than other investments of similar risk. The opportunity cost simply would not justify such an investment. Thus, the task for the rate of return analyst is to estimate a return that is equal to the return being offered by other risk-comparable firms. Failing this, the subject firm will be impaired in its ability to attract capital.

Q. What are the major types of risk faced by utility companies?

A. In general, risk associated with the holding of common stock can be separated into three major categories: business risk, financial risk, and liquidity risk. Business risk refers to risks inherent in the operation of the business. Volatility of the firm's sales, long-term demand for its product(s), the amount of operating leverage, and quality of management are all factors that affect business risk. The quality of regulation at the state and federal levels also plays an important role in business risk for regulated utility companies.

Financial risk refers to the impact on a firm's future cash flows from the use of debt in the capital structure. Interest payments to bondholders represent a prior call on the firm's cash flows and must be met before income is available to the common shareholders. Additional debt means additional variability in the firm's earnings, leading to additional risk.

Liquidity risk refers to the ability of an investor to quickly sell an investment without a substantial price concession. The easier it is for an investor to sell an investment for cash, the lower the liquidity risk will be. Stock markets, such as the New York and American Stock Exchanges, help ease liquidity risk substantially. Investors who own stocks that are traded in these markets know on a daily basis what the market prices of their investments are and that they can sell these investments fairly quickly. Many electric utility stocks are traded on the New York Stock Exchange and are considered liquid investments.

Q. Are there any indices available to investors that quantify the total risk of a company?

A. Yes. Published measures exist that categorize companies based on various measures of risk. One of the best-known and most widely available sources is from Value Line. Each company on which Value Line reports is assigned a Safety Rank. The Safety Rank consists of a number from 1 to 5, with 1 being the highest - meaning least risky - and 5 being the lowest - meaning most risky. The Safety Rank measures the total risk of a stock and encompasses just about all factors that affect financial and business risk. These factors include:

- Stock price volatility
- Fixed charge coverage ratio
- Quality of earnings

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- Capitalization ratio
- Earnings on common stock
- Payout ratio
- Regulatory risk

By selecting companies with the same Safety Rank, investors can be relatively confident that the market views them as similarly risky investments.

Bond ratings are another good tool that investors may utilize to determine the risk comparability of firms. Bond rating agencies such as Moody's and Standard and Poor's perform detailed analyses of all the factors that contribute to the business and financial risk of a particular investment. The end result of their analyses is a bond rating that reflects these risks.

Discounted Cash Flow Method

Q. Please describe the basic DCF approach.

A. The basic DCF approach is rooted in valuation theory. It is based on the premise that the value of a financial asset is determined by its ability to generate future net cash flows. In the case of a common stock, those future cash flows take the form of dividends and appreciation in price. The value of the stock to investors is the discounted present value of future cash flows. The general equation then is:

$$V = \frac{R}{(1+r)} + \frac{R}{(1+r)^2} + \frac{R}{(1+r)^3} + \ldots \frac{R}{(1+r)^n}$$

Where: V = *asset value*
R = *yearly cash flows*
r = *discount rate*

This is no different from determining the value of any asset from an economic point of view. However, the DCF model that I employ does make certain simplifying assumptions. One is that the stream of income from the equity share is assumed to be perpetual; that is, there is no salvage or residual value at the end of some maturity date (as is the case with a bond). Another important assumption is that financial markets are efficient; that is, they correctly evaluate the cash flows relative to the appropriate discount rate, thus rendering the stock price efficient relative to other alternatives. Finally, the model I employ also assumes a constant growth rate in dividends. The fundamental relationship employed in the DCF method is described by the formula:

$$k = \frac{D_1}{P_0} + g$$

Where: D_1 = *the next period dividend*
P_0 = *current stock price*
g = *expected growth rate*
k = *investor-required return*

It is apparent that the "k" so determined must relate to the investors' expected return. Use of the discounted cash flow method to determine an investor-required return is complicated by the need to express investors' expectations relative to dividends, earnings, and book value over an infinite time horizon. Financial theory suggests that stockholders purchase common stock on the assumption that there will be some change in the rate of dividend payments over time. We assume that the rate of growth in dividends is constant over the assumed time horizon, but the model could easily handle varying growth rates if we knew what they were. Finally, the relevant time frame is prospective rather than retrospective.

Q. **What was your first step in conducting your DCF analysis for Aquila?**

A. My first step was to construct a comparison group of companies that has a risk profile that is reasonably similar to that of the Company. This is necessary because the Company is a part of Aquila, Inc. and, as such, does not have publicly traded common stock. Thus, a DCF analysis cannot be performed directly on Aquila Networks - WPC. Using a comparison group of utilities that do have publicly traded common stock is both a necessary and appropriate step in estimating the cost of equity for Aquila in this proceeding.

Q. **Please describe your criteria for selecting the comparison group of electric companies.**

A. I used several criteria to select a comparison group. First, using the March 2004 issue of the *C. A. Turner Utility Reports,* I selected electric companies that were rated either A or Baa/BBB by Moody's and Standard and Poor's. From that group I selected companies that had at least 50% of their revenues from electric operations. This resulted in a group of electric and/or electric and gas companies that have operational and risk profiles similar to Entergy.

From this group, I then eliminated companies that had recently cut or eliminated dividends, were recently or currently involved in merger or restructuring activities, and had recent experience with significant earnings fluctuations. These criteria are important because utilities that are undergoing those types of changes are not good candidates for the DCF model.

The resulting group of comparison electric companies I used in my analysis is:

1. Central Vermont Public Service
2. CINergy Corp.
3. Cleco Corporation
4. Consolidation Edison
5. Dominion Resources
6. Empire District Electric
7. Energy East Corporation
8. Entergy
9. Exelon
10. Green Mountain Power
11. Hawaiian Electric Industries
12. Northeast Utilities
13. NSTAR
14. Pinnacle West Capital Corp.
15. PPL Corporation
16. Progress Energy
17. Public Service Enterprise Group
18. SEMPRA Energy
19. Southern Company

Q. You mentioned that one of your selection criteria was a bond rating of A/BBB. Please explain why this is an appropriate criterion to use in the selection of a comparison group in this proceeding.

A. It was my goal to construct a comparison group of electric utilities that was roughly similar in risk to Aquila. Please refer to Exhibit___(RAB-3), which lists the bond ratings for each of these companies. As a group, the average bond rating is around a low A, high BBB/Baa rating. In my view, these risk measures indicate that the group is a slightly above average risk electric utility group.

It is appropriate to use an average risk group to estimate the investor required return for the Company in this proceeding. Aquila Networks – WPC is a regulated utility that is part of a larger, more risky company (Aquila, Inc.). Given that the Company's regulated operations are much less risky than the Aquila, Inc.'s unregulated operations, I recommend that the Colorado Public Utilities Commission ("CPUC") treat the Company as an average risk electric utility in this proceeding. In my view, such an approach will result in a fair rate of return that balances the interests of both shareholders and ratepayers.

Q. What was your first step in determining the DCF return on equity for the comparison group?

A. I first determined the current dividend yield, D_0/P_0, from the basic equation. My general practice is to use six months as being the most reasonable period over which

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to estimate the dividend yield. The six-month period I used covered the period from October 2003 through March 2004. I then obtained the indicated annualized dividend as reported in the Standard and Poor's Stock Guide over the same six-month period. The annualized dividend divided by the average monthly price represents the average dividend yield for each month in the period.

Using this approach results in an average dividend yield for the group of 4.35%. These calculations are shown in Exhibit____(RAB-4).

Q. Having established the average dividend yield, how did you determine the expected growth rate for the electric comparison group?

A. "Expected" refers to the investor's expected growth rate. The task, in theory, is to use a growth rate that will correctly forecast the constant rate of growth in dividends. We refer to a perpetual growth rate since the DCF model has no cut-off point. The obvious fact is that there is no way to know with absolute certainty what investors expect the growth rate to be in the short term, much less in perpetuity. The dividend growth rate is a function of earnings growth and the payout ratio, neither of which is known precisely for the future.

In this analysis, I relied on two major sources of analysts' forecasts for growth. These sources are Value Line and Zacks Investment Research ("Zacks").

Q. Please briefly describe Value Line and Zacks.

A. Value Line is an investment survey that is published for approximately 1,700 companies, both regulated and unregulated. It is updated quarterly and probably represents the most comprehensive and widely used of all investment information services. It provides both historical and forecasted information on a number of important data elements. Value Line neither participates in financial markets as a broker nor works for the utility industry in any capacity of which I am aware.

According to Zacks' website, Zacks "was formed in 1978 to compile, analyze, and distribute investment research to both institutional and individual investors." Zacks gathers opinions from a variety of analysts on earnings growth forecasts for numerous firms including regulated electric utilities. The estimates of the analysts responding are combined to produce consensus average and median estimates of earnings growth.

Q. Why did you rely on analysts' forecasts in your analysis?

A. The finance literature has shown that analysts' forecasts provide better predictions of future growth than do estimates based on historical growth alone[2].

Q. How did you utilize your data sources to estimate growth rates for the comparison group?

[2] See Rozeff (*Journal of Forecasting*, Volume 2, Issue No. 4, 1983), Brown and Rozeff (*Journal of Finance*, March 1978), Moyer, Chatfield and Kelley (*International Journal of Forecasting*, 1985), and a study by Vander Weide and Carleton that was incorporated as part of the Edison Electric Institute's comments in the Federal Energy Regulatory Commission's generic cost of capital proceedings.

A. Exhibit___(RAB-5), pages 1 through 4, presents the details of the calculations for the Value Line and Zacks forecasted growth estimates. The Value Line growth estimates are based on five-year forecasts for dividend growth and six-year forecasts for earnings growth. The Zacks earnings growth estimates are forecasts for the next five years. These earnings and dividend growth estimates for the comparison group are summarized on Columns (1) through (3) of page 1 of Exhibit___(RAB-5).

I also utilized the sustainable growth formula in estimating the expected growth rate. The sustainable growth method, also known as the retention ratio method, recognizes that the firm's retaining a portion of its earnings fuels growth in dividends. These retained earnings, which are plowed back into the firm's asset base, are expected to earn a rate of return. This, in turn, generates growth in the firm's book value, market value, and dividends.

The sustainable growth method is calculated using the following formula:

$$G = B \times R$$

Where: *G = expected retention growth rate*
B = the firm's expected retention ratio
R = the expected return

In its proper form, this calculation is forward-looking. That is, the investors' expected retention ratio and return must be used in order to measure what investors anticipate will happen in the future. Data on expected retention ratios and returns may be obtained from Value Line.

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The expected sustainable growth estimates for the comparison group are presented in Column (4) on page 1 of Exhibit____(RAB-5). The data came from the Value Line forecasts for the comparison group.

Q. How did you proceed to determine the DCF cost of equity for the electric comparison group?

A. To estimate the expected dividend yield (D_1) for the group, the current dividend yield must be moved forward in time to account for dividend increases over the next twelve months. I estimated the expected dividend yield by multiplying the current dividend yield by one plus one-half the expected growth rate.

I then added the expected growth rate ranges to the expected dividend yield for the comparison group. The calculation of the resulting DCF returns on equity is presented on page 5 of Exhibit____(RAB-5). The expected growth rates range from 3.46% to 5.00%.

Q. Please explain how you calculated your DCF cost of equity estimates.

A. Page 5 of Exhibit____(RAB-5) shows four alternative DCF cost of equity calculations using the four growth estimates shown on page 1. In calculating the average growth rates for the group, I eliminated negative earnings growth rates for one company in the group because negative growth rates are not appropriate proxies for long-term growth expectations.

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The DCF returns range from 7.88% to 9.45%. The DCF return on equity utilizing the average of all the growth rates is 8.77%.

<u>Capital Asset Pricing Model</u>

Q. Briefly summarize the Capital Asset Pricing Model ("CAPM") approach.

A. The theory underlying the CAPM approach is that investors, through diversified portfolios, may combine assets to minimize the total risk of the portfolio. Diversification allows investors to diversify away all risks specific to a particular company and be left only with market risk that affects all companies. Thus, CAPM theory identifies two types of risks for a security: company-specific risk and market risk. Company-specific risk includes such events as strikes, management errors, marketing failures, lawsuits, and other events that are unique to a particular firm. Market risk includes inflation, business cycles, war, variations in interest rates, and changes in consumer confidence. Market risk tends to affect all stocks and cannot be diversified away. The idea behind the CAPM is that diversified investors are rewarded with returns based on market risk.

Within the CAPM framework, the expected return on a security is equal to the risk-free rate of return plus a risk premium that is proportional to the security's market, or nondiversifiable risk. Beta is the factor that reflects the inherent market risk of a security. It measures the volatility of a particular security relative to overall market for securities. For example, a stock with a beta of 1.0 indicates that if the market rises by 15.00%, that stock will also rise by 15.00%. This stock moves in tandem

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with movements in the overall market. A stock with a beta of 0.5 will only rise or fall 50.00% as much as the overall market. So with an increase in the market of 15.00%, this stock will only rise 7.50%. Stocks with betas greater than 1.0 will rise and fall more than the overall market. Thus, beta is the relevant measure of the risk of individual securities vis-à-vis the market.

Based on the foregoing discussion, the equation for determining the return for a security in the CAPM framework is:

$$K = Rf + \beta(MRP)$$

Where: K = *Required Return on equity*
Rf = *Risk-free rate*
MRP = *Market risk premium*
β = *Beta*

This equation tells us about the risk/return relationship posited by the CAPM. Investors are risk averse and will only accept higher risk if they receive higher returns. These returns can be determined in relation to a stock's beta and the market risk premium. The general level of risk aversion in the economy determines the market risk premium. If the risk-free rate of return is 3.00% and the required return on the total market is 15.00%, then the risk premium is 12.00%. Any stock's required return can be determined by multiplying its beta by the market risk premium. Stocks with betas greater than 1.0 are considered riskier than the overall market and will have higher required returns. Conversely, stocks with betas less than 1.0 will have required returns lower than the market as a whole.

Q. In general, are there concerns regarding the use of the CAPM in estimating the return on equity?

A. Yes. There is considerable controversy surrounding the use of the CAPM[3]. There is strong evidence that beta is not the primary factor in determining the risk of a security. For example, Value Line states that its Safety Rank is a measure of total risk, not its calculated beta coefficient. Beta coefficients usually describe only a small amount of total investment risk. Also, recent finance literature has questioned the usefulness of beta in predicting the relationship between risk and required return. Finally, a considerable amount of judgment must be employed in determining the risk-free rate and market return portions of the CAPM equation. The analyst's application of judgment can significantly influence the results obtained from the CAPM. My past experience with the CAPM indicates that it is prudent to use a wide variety of data in estimating returns. Of course, the range of results may also be wide, indicating the difficulty in obtaining a reliable estimate from the CAPM.

Q. How did you estimate the market return portion of the CAPM?

A. The first source I used was the Value Line Investment Survey for Windows. Value Line provides a summary statistical report detailing, among other things, forecasted growth in dividends, earnings and book value for the companies Value Line follows. I have presented these three growth rates and the average on page 2 of Exhibit ____(RAB-6). The average growth rate is 10.52%. Combining this growth rate

3 For a more complete discussion of some of the controversy surrounding the use of the CAPM, refer to *A Random Walk Down Wall* Street by Burton Malkiel, pages 229 – 239, 1999 edition.

with the average expected dividend yield of the Value Line companies of 1.18% results in an expected market return of 11.70%. The detailed calculations are shown on page 1 of Exhibit ____(RAB-6).

I also considered a supplemental check to this market estimate. Ibbotson Associates published a study of historical returns on the stock market in its *Stocks, Bonds, Bills, and Inflation 2004 Yearbook.* Some analysts employ this historical data to estimate the market risk premium of stocks over the risk-free rate. The assumption is that a risk premium calculated over a long period of time is reflective of investor expectations going forward. Exhibit ____(RAB-7) presents the calculation of the market return using the Ibbotson historical data.

Q. Please address the use of historical earned returns to estimate the market risk premium.

A. The use of historic earned returns on the Standard and Poor 500 to estimate the current market risk premium is rather suspect because it naively assumes that investors currently expect historical risk premiums to continue unchanged into the future forever regardless of present or forecasted economic conditions. Brigham, Shome and Vinson noted the following with respect to the use of historic risk premiums calculated using the returns as reported by Ibbotson and Sinquefield (referred to in the quote as "I&S"):

> **"There are both conceptual and measurement problems with using I&S data for purposes of estimating the cost of capital. Conceptually, there is no compelling reason to think that investors expect the same relative returns that were earned in the past. Indeed, evidence presented in the following sections**

indicates that relative expected returns should, and do, vary significantly over time. Empirically, the measured historic premium is sensitive both to the choice of estimation horizon and to the end points. These choices are essentially arbitrary, yet can result in significant differences in the final outcome."[4]

In summary, the use of historic earned returns should be viewed with a great deal of caution and skepticism. There is no real support for the proposition that an unchanging, mechanistically applied historical risk premium is representative of current investor expectations and return requirements.

Q. How did you determine the risk free rate?

A. I used the average yields on the 20-year Treasury bond and five-year Treasury note over the six-month period from October 2003 through March 2004. The 20-year Treasury bond is often used by rate of return analysts as the risk-free rate, but it contains a significant amount of interest rate risk. The five-year Treasury note carries less interest rate risk than the 20-year bond and is more stable than three-month Treasury bills. Therefore, I have employed both of these securities as proxies for the risk-free rate of return. This approach provides a reasonable range over which the CAPM may be estimated.

Q. What is your estimate of the market risk premium?

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

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A. Exhibit ____(RAB-6), line 9 of page 1, presents my estimates of the market risk premium based on a DCF analysis applied to current market data. The market risk premium is 6.67% using the 20-year Treasury bond and 8.57% using the five-year Treasury bond.

Utilizing the historical Ibbotson data on market returns, the market risk premium ranges from 5.20% to 7.20%. This is shown on Exhibit ____(RAB-7).

Q. How did you determine the value for beta?

A. I obtained the betas for the companies in the electric company comparison group from most recent Value Line reports. The average of the Value Line betas for the electric group is .73.

Q. Please summarize the CAPM results.

A. Please refer to line 14 of page 1 of Exhibit ____(RAB-6) for the CAPM results for the 20-year and five-year Treasury bond yields. For the electric comparison group, the CAPM returns are 9.37% (five-year bond) and 9.89% (20-year bond).

The CAPM results using the historical Ibbotson data range from 8.82% to 10.28%. These results are shown on Exhibit ____(RAB-7).

<u>Conclusions and Recommendations</u>

Q. Please summarize the cost of equity estimates you have developed up to this point in your testimony.

A. Utilizing the DCF model, I developed cost of equity estimates for a comparison group of electric utility companies. The results for the electric company comparison group using the constant-growth DCF model ranged from 7.88% to 9.45%. The results using the CAPM ranged from 8.82% to 10.28%.

Q. What is your recommendation for a fair rate of return on equity for Aquila?

A. My recommended rate of return on equity range for Aquila is 8.80% - 9.00%. Given the Company's present circumstances, I believe this value is the most representative of the investor-required return on equity for an average risk company such as Aquila.

Q. Please explain how you arrived at your recommended return on equity range of 8.80% – 9.00% for Aquila.

A. My recommendation is based on the average of DCF cost of equity estimates shown on page 5 of Exhibit ____(RAB-5), which is 8.80%, rounded up to the nearest tenth of a percentage point. I believe that this estimate reflects the most reasonable representation of investor expected returns for the regulated utility operations of Aquila, Inc.

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However, if the Commission determines that Aquila is more risky than the avarage utility, I recommend an adjustment of no more than 20 basis points upward from the 8.80% recommendation. I determined this 20 basis point adjustment in the following manner. The average bond rating of the electric utility comparison group is between Baa/BBB and A. For 2003, the average spread between Baa and A rated utility bonds was 26 basis points, or 0.26%. During the six-month period from September 2003 through February 2004, the average spread was 30 basis points, or 0.30%.

Since the comparison group's rating is split between Baa/BBB and A, I do not believe that it would be appropriate to add the full yield spread between Baa and A bonds to the DCF cost of equity results. Therefore, I recommend no more than a 20 basis point risk adjustment in this proceeding. Adding 20 basis points to my recommendation results in a cost of equity of 9.00%.

Q. Mr. Baudino, in your Direct Testimony in the last Aquila proceeding, Docket No. 02S-594E, dated February 2003, you recommended 10.0% for Aquila. Does your recommendation in this case reflect changes that have occurred since you filed your testimony in that prior proceeding?

A. Yes. As I noted in Section II of my Direct Testimony, utility stocks experienced a significant rally last year. Further, the Mergent average public utility bond yield declined from 6.92% in February 2003 to 6.17% in February 2004. This points to a lower required return on utility stocks in general. My recommendation in this proceeding reflects these changes.

Q. Does this conclude your direct testimony?

A. Yes.

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Economics
English

Twenty years of experience in utility ratemaking. Broad based experience in revenue requirement analysis, cost of capital, utility financing, phase-ins and rate design. Has designed revenue requirement and rate design analysis programs.

REGULATORY TESTIMONY

Preparation and presentation of expert testimony in the areas of:

Electric and Gas Utility Rate Design
Cost of Capital for Electric, Gas and Water Companies
Ratemaking Treatment of Generating Plant Sale/Leasebacks
Electric and Gas Utility Cost of Service
Revenue Requirements
Gas industry restructuring and competition

RESUME OF RICHARD A. BAUDINO, DIRECTOR OF CONSULTING

EXPERIENCE

1989 to Present: Kennedy and Associates: **Director of Consulting** - Responsible for consulting assignments in the area of revenue requirements, rate design, cost of capital, economic analysis of generation alternatives, gas industry restructuring and competition.

1982 to 1989: New Mexico Public Service Commission Staff: **Utility Economist** - Responsible for preparation of analysis and expert testimony in the areas of rate of return, cost allocation, rate design, finance, phase-in of electric generating plants, and sale/leaseback transactions.

CLIENTS SERVED

Regulatory Commissions

Louisiana Public Service Commission

Industrial Groups

Ad Hoc Committee for a Competitive
 Electric Supply System
Air Products and Chemicals, Inc.
Arkansas Electric Energy Consumers
Arkansas Gas Consumers
Armco Steel Company, L.P.
Association of Business Advocating
 Tariff Equity
General Electric Company
Industrial Energy Consumers
Kentucky Industrial Utility Consumers
Large Electric Consumers Organization
Newport Steel
Northwest Arkansas Gas Consumers
Maryland Industrial Group
Occidental Chemical
PSI Industrial Group
Taconite Intervenors (Minnesota)
Tyson Foods

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Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004

Date	Case	Jurisdict.	Party	Utility	Subject
3/83	1780	NM	New Mexico Public Service Commission	Boles Water Co.	Rate design, rate of return.
10/83	1803, 1817	NM	New Mexico Public Service Commission	Southwestern Electric Coop	Rate design.
11/84	1833	NM	New Mexico Public Service Commission	El Paso Electric Co.	Service contract approval, rate design, performance standards for Palo Verde nuclear generating system
1983	1835	NM	New Mexico Public Service Commission	Public Service Co. of NM	Rate design.
1984	1848	NM	New Mexico Public Service Commission	Sangre de Cristo Water Co.	Rate design.
02/85	1906	NM	New Mexico Public Service Commission	Southwestern Public Service Co.	Rate of return.
09/84	1907	NM	New Mexico Public Service Commission	Jornada Water Co.	Rate of return.
11/85	1957	NM	New Mexico Public Service Commission	Southwestern Public Service Co.	Rate of return.
04/86	2009	NM	New Mexico Public Service Commission	El Paso Electric Co.	Phase-in plan, treatment of sale/leaseback expense.
06/86	2032	NM	New Mexico Public Service Commission	El Paso Electric Co.	Sale/leaseback approval.
09/86	2033	NM	New Mexico Public Service Commission	El Paso Electric Co.	Order to show cause, PVNGS audit.
02/87	2074	NM	New Mexico Public Service Commission	El Paso Electric Co.	Diversification.
05/87	2089	NM	New Mexico Public Service Commission	El Paso Electric Co.	Fuel factor adjustment.
08/87	2092	NM	New Mexico Public Service Commission	El Paso Electric Co.	Rate design.

**Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004**

Date	Case	Jurisdict.	Party	Utility	Subject
10/88	2146	NM	New Mexico Public Service Commission	Public Service Co. of New Mexico	Financial effects of restructuring, reorganization.
07/88	2162	NM	New Mexico Public Service Commission	El Paso Electric Co.	Revenue requirements, rate design, rate of return.
01/89	2194	NM	New Mexico Public Service Commission	Plains Electric G&T Cooperative	Economic development.
1/89	2253	NM	New Mexico Public Service Commission	Plains Electric G&T Cooperative	Financing.
08/89	2259	NM	New Mexico Public Service Commission	Homestead Water Co.	Rate of return, rate design.
10/89	2262	NM	New Mexico Public Service Commission	Public Service Co. of New Mexico	Rate of return.
09/89	2269	NM	New Mexico Public Service Commission	Ruidoso Natural Gas Co.	Rate of return, expense from affiliated interest.
12/89	89-208-TF	AR	Arkansas Electric Energy Consumers	Arkansas Power & Light Co.	Rider M-33.
01/90	U-17282	LA	Louisiana Public Service Commission	Gulf States Utilities	Cost of equity.
09/90	90-158	KY	Kentucky Industrial Utility Consumers	Louisville Gas & Electric Co.	Cost of equity.
09/90	90-004-U	AR	Northwest Arkansas Gas Consumers	Arkansas Western Gas Co.	Cost of equity, transportation rate.
12/90	U-17282 Phase IV	LA	Louisiana Public Service Commission	Gulf States Utilities	Cost of equity.
04/91	91-037-U	AR	Northwest Arkansas Gas Consumers	Arkansas Western Gas Co.	Transportation rates.
12/91	91-410-EL-AIR	OH	Air Products & Chemicals, Inc., Armco Steel Co., General Electric Co., Industrial Energy Consumers	Cincinnati Gas & Electric Co.	Cost of equity.

Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004

Date	Case	Jurisdict.	Party	Utility	Subject
05/92	910890-EI	FL	Occidental Chemical Corp.	Florida Power Corp.	Cost of equity, rate of return.
09/92	92-032-U	AR	Arkansas Gas Consumers	Arkansas Louisiana Gas Co.	Cost of equity, rate of return, cost-of-service.
09/92	39314	ID	Industrial Consumers for Fair Utility Rates	Indiana Michigan Power Co.	Cost of equity, rate of return.
09/92	92-009-U	AR	Tyson Foods	General Waterworks	Cost allocation, rate design.
01/93	92-346	KY	Newport Steel Co.	Union Light, Heat & Power Co.	Cost allocation.
01/93	39498	IN	PSI Industrial Group	PSI Energy	Refund allocation.
01/93	U-10105	MI	Association of Businesses Advocating Tariff Equality (ABATE)	Michigan Consolidated Gas Co.	Return on equity.
04/93	92-1464-EL-AIR	OH	Air Products and Chemicals, Inc., Armco Steel Co., Industrial Energy Consumers	Cincinnati Gas & Electric Co.	Return on equity.
09/93	93-189-U	AR	Arkansas Gas Consumers	Arkansas Louisiana Gas Co.	Transportation service terms and conditions.
09/93	93-081-U	AR	Arkansas Gas Consumers	Arkansas Louisiana Gas Co.	Cost-of-service, transportation rates, rate supplements; return on equity; revenue requirements.
12/93	U-17735	LA	Louisiana Public Service Commission Staff	Cajun Electric Power Cooperative	Historical reviews; evaluation of economic studies.
03/94	10320	KY	Kentucky Industrial Utility Customers	Louisville Gas & Electric Co.	Trimble County CWIP revenue refund.

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Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004

Date	Case	Jurisdict.	Party	Utility	Subject
4/94	E-015/ GR-94-001	MN	Large Power Intervenors	Minnesota Power Co.	Evaluation of the cost of equity, capital structure, and rate of return.
5/94	R-00942993	PA	PG&W Industrial Intervenors	Pennsylvania Gas & Water Co.	Analysis of recovery of transition costs.
5/94	R-00943001	PA	Columbia Industrial Intervenors	Columbia Gas of Pennsylvania	Evaluation of cost allocation, rate design, rate plan, and carrying charge proposals.
7/94	R-00942986	PA	Armco, Inc., West Penn Power Industrial Intervenors	West Penn Power Co.	Return on equity and rate of return.
7/94	94-0035-E-42T	WV	West Virginia Energy Users' Group	Monongahela Power Co.	Return on equity and rate of return.
8/94	8652	MD	Westvaco Corp.	Potomac Edison Co.	Return on equity and rate of return.
9/94	930357-C	AR	West Central Arkansas Gas Consumers	Arkansas Oklahoma Gas Corp.	Evaluation of transportation service.
9/94	U-19904	LA	Louisiana Public Service Commission	Gulf States Utilities	Return on equity.
9/94	8629	MD	Maryland Industrial Group	Baltimore Gas & Electric Co.	Transition costs.
11/94	94-175-U	AR	Arkansas Gas Consumers	Arkla, Inc.	Cost-of-service, rate design, rate of return.
3/95	RP94-343-000	FERC	Arkansas Gas Consumers	NorAm Gas Transmission	Rate of return.
4/95	R-00943271	PA	PP&L Industrial Customer Alliance	Pennsylvania Power & Light Co.	Return on equity.
6/95	U-10755	MI	Association of Businesses Advocating Tariff Equity	Consumers Power Co.	Revenue requirements.
7/95	8697	MD	Maryland Industrial Group	Baltimore Gas & Electric Co.	Cost allocation and rate design.

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**Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004**

Date	Case	Jurisdict.	Party	Utility	Subject
8/95	95-254-TF U-2811	AR	Tyson Foods, Inc.	Southwest Arkansas Electric Cooperative	Refund allocation.
10/95	ER95-1042 -000	FERC	Louisiana Public Service Commission	Systems Energy Resources, Inc.	Return on Equity.
11/95	I-940032	PA	Industrial Energy Consumers of Pennsylvania	State-wide - all utilities	Investigation into Electric Power Competition.
5/96	96-030-U	AR	Northwest Arkansas Gas Consumers	Arkansas Western Gas Co.	Revenue requirements, rate of return and cost of service.
7/96	8725	MD	Maryland Industrial Group	Baltimore Gas & Electric Co., Potomac Electric Power Co. and Constellation Energy Corp.	Return on Equity.
7/96	U-21496	LA	Louisiana Public Service Commission	Central Louisiana Electric Co.	Return on equity, rate of return.
9/96	U-22092	LA	Louisiana Public Service Commission	Entergy Gulf States, Inc.	Return on equity.
1/97	RP96-199-000	FERC	The Industrial Gas Users Conference	Mississippi River Transmission Corp.	Revenue requirements, rate of return and cost of service.
3/97	96-420-U	AR	West Central Arkansas Gas Corp.	Arkansas Oklahoma Gas Corp.	Revenue requirements, rate of return, cost of service and rate design.
7/97	U-11220	MI	Association of Business Advocating Tariff Equity	Michigan Gas Co. and Southeastern Michigan Gas Co.	Transportation Balancing Provisions
7/97	R-00973944	PA	Pennsylvania American Water Large Users Group	Pennsylvania-American Water Co.	Rate of return, cost of service, revenue requirements.
3/98	8390-U	GA	Georgia Natural Gas Group and the Georgia Textile Manufacturers Assoc.	Atlanta Gas Light	Rate of return, restructuring issues, unbundling, rate design issues.

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**Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004**

Date	Case	Jurisdict.	Party	Utility	Subject
7/98	R-00984280	PA	PG Energy, Inc.	PGE Industrial Intervenors	Cost allocation.
8/98	U-17735	LA	Louisiana Public Service Commission	Cajun Electric Power Cooperative	Revenue requirements.
10/98	97-596	ME	Maine Office of the Public Advocate	Bangor Hydro-Electric Co.	Return on equity, rate of return.
10/98	U-23327	LA	Louisiana Public Service Commission	SWEPCO, CSW and AEP	Analysis of proposed merger.
12/98	98-577	ME	Maine Office of the Public Advocate	Maine Public Service Co.	Return on equity, rate of return.
12/98	U-23358	LA	Louisiana Public Service Commission	Entergy Gulf States, Inc.	Return on equity, rate of return.
3/99	98-426	KY	Kentucky Industrial Utility Customers, Inc.	Louisville Gas and Electric Co	Return on equity.
3/99	99-082	KY	Kentucky Industrial Utility Customers, Inc.	Kentucky Utilities Co.	Return on equity.
4/99	R-984554	PA	T. W. Phillips Users Group	T. W. Phillips Gas and Oil Co.	Allocation of purchased gas costs.
6/99	R-0099462	PA	Columbia Industrial Intervenors	Columbia Gas of Pennsylvania	Balancing charges.
10/99	U-24182	LA	Louisiana Public Service Commission	Entergy Gulf States,Inc.	Cost of debt.
10/99	R-00994782	PA	Peoples Industrial Intervenors	Peoples Natural Gas Co.	Restructuring issues.
10/99	R-00994781	PA	Columbia Industrial Intervenors	Columbia Gas of Pennsylvania	Restructuring, balancing charges, rate flexing, alternate fuel.
01/00	R-00994786	PA	UGI Industrial Intervenors	UGI Utilities, Inc.	Universal service costs, balancing, penalty charges, capacity assignment.

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Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004

Date	Case	Jurisdict.	Party	Utility	Subject
01/00	8829	MD	Maryland Industrial Gr. & United States	Baltimore Gas & Electric Co.	Revenue requirements, cost allocation, rate design.
02/00	R-00994788	PA	Penn Fuel Transportation	PFG Gas, Inc., and	Tariff charges, balancing provisions.
05/00	U-17735	LA	Louisiana Public Service Comm.	Louisiana Electric Cooperative	Rate restructuring.
07/00	2000-080	KY	Kentucky Industrial Utility Consumers	Louisville Gas and Electric Co.	Cost allocation.
07/00	U-21453 U-20925 (SC), U-22092 (SC) (Subdocket E)	LA	Louisiana Public Service Comm.	Southwestern Electric Power Co.	Stranded cost analysis.
09/00	R-00005654	PA	Philadelphia Industrial And Commercial Gas Users Group.	Philadelphia Gas Works	Interim relief analysis.
10/00	U-21453 U-20925 (SC), U-22092 (SC) (Subdocket B)	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Restructuring, Business Separation Plan.
11/00	R-00005277 (Rebuttal)	PA	Penn Fuel Transportation Customers	PFG Gas, Inc. and North Penn Gas Co.	Cost allocation issues.
12/00	U-24993	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Return on equity.
03/01	U-22092	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Stranded cost analysis.
04/01	U-21453 U-20925 (SC), U-22092 (SC) (Subdocket B) (Addressing Contested Issues)	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Restructuring issues.
04/01	R-00006042	PA	Philadelphia Industrial and Commercial Gas Users Group	Philadelphia Gas Works	Revenue requirements, cost allocation and tariff issues.
11/01	U-25687	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Return on equity.

**Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004**

Date	Case	Jurisdict.	Party	Utility	Subject
03/02	14311-U	GA	Georgia Public Service Commission	Atlanta Gas Light	Capital structure.
08/02	2002-00145	KY	Kentucky Industrial Utility Customers	Columbia Gas of Kentucky	Revenue requirements.
09/02	M-00021612	PA	Philadelphia Industrial And Commercial Gas Users Group	Philadelphia Gas Works	Transportation rates, terms, and conditions.
01/03	2002-00169	KY	Kentucky Industrial Utility Customers	Kentucky Power	Return on equity.
02/03	02S-594E	CO	Cripple Creek & Victor Gold Mining Company	Aquila Networks – WPC	Return on equity.
04/03	U-26527	LA	Louisiana Public Service Commission	Entergy Gulf States, Inc.	Return on equity.
10/03	CV020495AB	GA	The Landings Assn., Inc.	Utilities Inc. of GA	Revenue requirement & overcharge refund
03/04	2003-00433	KY	Kentucky Industrial Utility Customers	Louisville Gas & Electric	Return on equity, Cost allocation & rate design
03/04	2003-00434	KY	Kentucky Industrial Utility Customers	Kentucky Utilities	Return on equity
4/04	ER03-583-000, et. al.	FERC	Louisiana Public Service Commission	Entergy Corp.	Return on Equity

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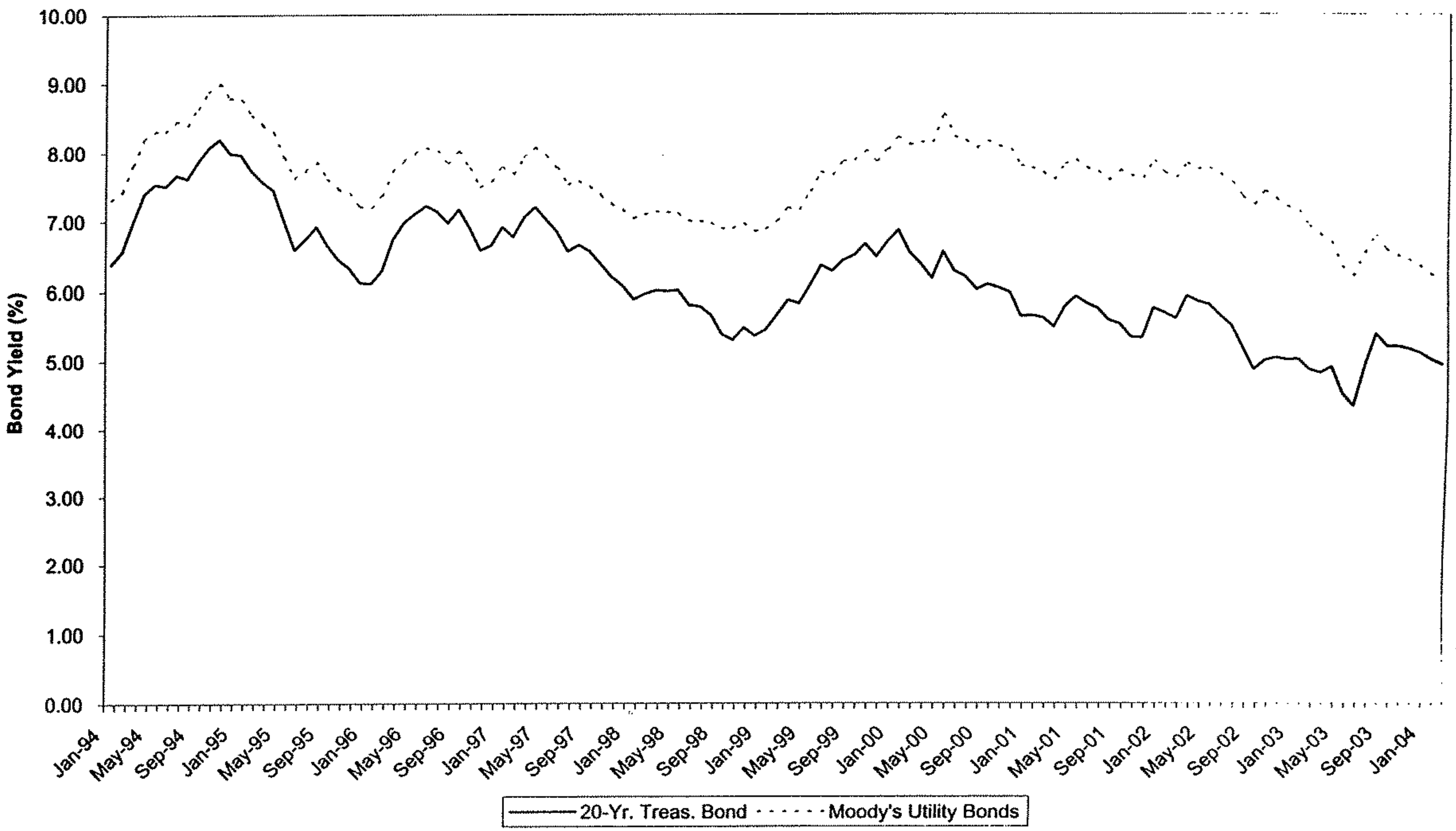
Exhibit ____(RAB-2)

HISTORICAL BOND YIELDS
AVERAGE PUBLIC UTILITY BOND VS 20-YEAR TREASURY BOND



AQUILA NETWORKS - WPC
COMPARISON GROUP

	S&P Rating	Moody's Rating
Central Vermont Public Service	BBB+	N/A
CINergy Corp.	BBB+	A3
Cleco Corporation	BBB+	A3
Consolidation Edison	A	A1
Dominion Resources	A-	A2
Empire District Electric	BBB	Baa1
Energy East Corporation	BBB+	A3
Entergy	BBB	Baa2
Exelon	A	A2
Green Mountain Power	BBB	Baa1
Hawaiian Electric Industries	BBB+	Baa1
Northeast Utilities	A-	A3
NSTAR	A	A1
Pinnacle West Capital Corp.	A-	A3
PPL Corporation	A-	Baa1
Progress Energy	BBB	A2
Public Service Enterprise Group	A-	A3
SEMPRA Energy	A+	A1
Southern Company	A+	A1

N/A = Not Available

AQUILA NETWORKS - WPC
COMPARISON GROUP
AVERAGE PRICE, DIVIDEND AND DIVIDEND YIELD

		Oct '03	Nov '03	Dec '03	Jan '04	Feb '04	Mar '04
Central Vermont PS	High Price ($)	23.880	24.380	24.500	24.080	24.000	23.630
	Low Price ($)	22.230	22.100	22.110	23.400	21.760	22.140
	Avg. Price ($)	23.055	23.240	23.305	23.740	22.880	22.885
	Dividend ($)	0.220	0.220	0.220	0.230	0.230	0.230
	Mo. Avg. Div.	3.82%	3.79%	3.78%	3.88%	4.02%	4.02%
	6 mos. Avg.	3.88%					
CINergy Corp.	High Price ($)	37.300	36.970	38.860	39.230	39.300	41.100
	Low Price ($)	35.790	35.190	36.470	37.480	37.170	39.450
	Avg. Price ($)	36.545	36.080	37.665	38.355	38.235	40.275
	Dividend ($)	0.460	0.460	0.460	0.470	0.470	0.470
	Mo. Avg. Div.	5.03%	5.10%	4.89%	4.90%	4.92%	4.67%
	6 mos. Avg.	4.92%					
Cleco Corporation	High Price ($)	17.000	17.920	18.360	19.630	19.350	19.750
	Low Price ($)	16.000	16.280	17.280	17.870	17.720	18.050
	Avg. Price ($)	16.500	17.100	17.820	18.750	18.535	18.900
	Dividend ($)	0.225	0.225	0.225	0.225	0.225	0.225
	Mo. Avg. Div.	5.45%	5.26%	5.05%	4.80%	4.86%	4.76%
	6 mos. Avg.	5.03%					
Consolidated Edison	High Price ($)	41.430	41.310	43.480	44.100	44.490	45.010
	Low Price ($)	40.050	38.800	40.050	42.210	42.450	43.420
	Avg. Price ($)	40.740	40.055	41.765	43.155	43.470	44.215
	Dividend ($)	0.560	0.560	0.560	0.565	0.565	0.565
	Mo. Avg. Div.	5.50%	5.59%	5.36%	5.24%	5.20%	5.11%
	6 mos. Avg.	5.33%					
Dominion Resources	High Price ($)	63.500	61.740	64.450	64.700	64.230	65.850
	Low Price ($)	60.280	59.270	60.180	61.200	61.270	62.160
	Avg. Price ($)	61.890	60.505	62.315	62.950	62.750	64.005
	Dividend ($)	0.645	0.645	0.645	0.645	0.645	0.645
	Mo. Avg. Div.	4.17%	4.26%	4.14%	4.10%	4.11%	4.03%
	6 mos. Avg.	4.14%					
Empire District	High Price ($)	22.450	22.250	22.050	22.000	23.480	23.250
	Low Price ($)	21.150	21.150	21.000	21.380	21.600	22.200
	Avg. Price ($)	21.800	21.700	21.525	21.690	22.540	22.725
	Dividend ($)	0.320	0.320	0.320	0.320	0.320	0.320
	Mo. Avg. Div.	5.87%	5.90%	5.95%	5.90%	5.68%	5.63%
	6 mos. Avg.	5.82%					
Energy East	High Price ($)	23.710	23.130	23.200	23.750	24.250	25.490
	Low Price ($)	22.160	21.640	22.000	22.290	22.650	24.060
	Avg. Price ($)	22.935	22.385	22.600	23.020	23.450	24.775
	Dividend ($)	0.250	0.250	0.250	0.260	0.260	0.260
	Mo. Avg. Div.	4.36%	4.47%	4.42%	4.52%	4.43%	4.20%
	6 mos. Avg.	4.40%					

AQUILA NETWORKS - WPC
COMPARISON GROUP
AVERAGE PRICE, DIVIDEND AND DIVIDEND YIELD

		Oct '03	Nov '03	Dec '03	Jan '04	Feb '04	Mar '04
Entergy	High Price ($)	55.300	55.130	57.240	58.520	60.200	59.820
	Low Price ($)	53.400	51.060	52.880	56.010	57.150	57.250
	Avg. Price ($)	54.350	53.095	55.060	57.265	58.675	58.535
	Dividend ($)	0.450	0.450	0.450	0.450	0.450	0.450
	Mo. Avg. Div.	3.31%	3.39%	3.27%	3.14%	3.07%	3.08%
	6 mos. Avg.	3.21%					
Exelon	High Price ($)	65.130	65.270	66.620	67.190	67.470	68.870
	Low Price ($)	63.300	60.950	61.500	64.360	65.090	65.710
	Avg. Price ($)	64.215	63.110	64.060	65.775	66.280	67.290
	Dividend ($)	0.500	0.500	0.500	0.550	0.550	0.550
	Mo. Avg. Div.	3.11%	3.17%	3.12%	3.34%	3.32%	3.27%
	6 mos. Avg.	3.22%					
Green Mountain Power	High Price ($)	22.830	22.930	23.840	23.820	26.270	26.290
	Low Price ($)	22.200	21.980	22.650	22.600	23.160	25.350
	Avg. Price ($)	22.515	22.455	23.245	23.210	24.715	25.820
	Dividend ($)	0.190	0.190	0.190	0.190	0.220	0.220
	Mo. Avg. Div.	3.38%	3.38%	3.27%	3.27%	3.56%	3.41%
	6 mos. Avg.	3.38%					
Hawaiian Electric Ind.	High Price ($)	45.840	46.250	48.000	50.990	52.950	53.750
	Low Price ($)	43.320	44.470	45.590	47.100	50.560	50.700
	Avg. Price ($)	44.580	45.360	46.795	49.045	51.755	52.225
	Dividend ($)	0.620	0.620	0.620	0.620	0.620	0.620
	Mo. Avg. Div.	5.56%	5.47%	5.30%	5.06%	4.79%	4.75%
	6 mos. Avg.	5.15%					
Northeast Utilities	High Price ($)	19.500	19.950	20.320	20.270	19.740	19.380
	Low Price ($)	17.880	18.580	19.220	19.050	18.720	18.280
	Avg. Price ($)	18.690	19.265	19.770	19.660	19.230	18.830
	Dividend ($)	0.150	0.150	0.150	0.150	0.150	0.150
	Mo. Avg. Div.	3.21%	3.11%	3.03%	3.05%	3.12%	3.19%
	6 mos. Avg.	3.12%					
NSTAR	High Price ($)	47.990	48.590	48.960	49.980	51.200	52.850
	Low Price ($)	45.080	46.360	47.000	48.000	48.340	49.900
	Avg. Price ($)	46.535	47.475	47.980	48.990	49.770	51.375
	Dividend ($)	0.540	0.540	0.555	0.555	0.555	0.555
	Mo. Avg. Div.	4.64%	4.55%	4.63%	4.53%	4.46%	4.32%
	6 mos. Avg.	4.52%					
Pinnacle West	High Price ($)	36.850	39.830	40.480	40.810	39.280	39.750
	Low Price ($)	34.910	36.210	38.590	38.070	36.900	38.020
	Avg. Price ($)	35.880	38.020	39.535	39.440	38.090	38.885
	Dividend ($)	0.425	0.425	0.450	0.450	0.450	0.450
	Mo. Avg. Div.	4.74%	4.47%	4.55%	4.56%	4.73%	4.63%
	6 mos. Avg.	4.61%					

AQUILA NETWORKS - WPC
COMPARISON GROUP
AVERAGE PRICE, DIVIDEND AND DIVIDEND YIELD

		Oct '03	Nov '03	Dec '03	Jan '04	Feb '04	Mar '04
PPL Corp.	High Price ($)	42.290	41.370	43.890	46.280	46.530	47.230
	Low Price ($)	38.880	39.670	39.950	42.730	44.720	44.150
	Avg. Price ($)	40.585	40.520	41.920	44.505	45.625	45.690
	Dividend ($)	0.385	0.385	0.385	0.385	0.410	0.410
	Mo. Avg. Div.	3.79%	3.80%	3.67%	3.46%	3.59%	3.59%
	6 mos. Avg.	3.65%					
Progress Energy	High Price ($)	46.000	43.860	45.730	46.120	46.500	47.950
	Low Price ($)	42.630	41.600	43.400	43.020	44.010	45.510
	Avg. Price ($)	44.315	42.730	44.565	44.570	45.255	46.730
	Dividend ($)	0.560	0.560	0.575	0.575	0.575	0.575
	Mo. Avg. Div.	5.05%	5.24%	5.16%	5.16%	5.08%	4.92%
	6 mos. Avg.	5.10%					
Pub. Svc. Enterprise Gp.	High Price ($)	42.930	41.400	44.200	45.950	47.290	47.720
	Low Price ($)	40.250	39.400	40.580	42.850	44.700	44.850
	Avg. Price ($)	41.590	40.400	42.390	44.400	45.995	46.285
	Dividend ($)	0.540	0.540	0.540	0.550	0.550	0.550
	Mo. Avg. Div.	5.19%	5.35%	5.10%	4.95%	4.78%	4.75%
	6 mos. Avg.	5.02%					
Sempra Energy	High Price ($)	30.900	28.380	30.220	32.080	31.860	32.990
	Low Price ($)	27.630	26.360	27.900	29.510	30.670	30.800
	Avg. Price ($)	29.265	27.370	29.060	30.795	31.265	31.895
	Dividend ($)	0.250	0.250	0.250	0.250	0.250	0.250
	Mo. Avg. Div.	3.42%	3.65%	3.44%	3.25%	3.20%	3.14%
	6 mos. Avg.	3.35%					
Southern Company	High Price ($)	30.580	30.170	30.410	30.560	30.340	31.000
	Low Price ($)	29.060	28.550	29.100	29.110	29.050	29.800
	Avg. Price ($)	29.820	29.360	29.755	29.835	29.695	30.400
	Dividend ($)	0.350	0.350	0.350	0.350	0.350	0.350
	Mo. Avg. Div.	4.69%	4.77%	4.71%	4.69%	4.71%	4.61%
	6 mos. Avg.	4.70%					
Average Dividend Yield		4.35%					

Source: Standard and Poor's Stock Guide, November 2003 through March 2004, Yahoo! Finance

AQUILA NETWORKS - WPC
COMPARISON GROUP
DCF Growth Rate Analysis

Company	(1) Value Line DPS	(2) Value Line EPS	(3) Zacks	(4) Value Line B x R
Central Vermont Public Service	4.18%	6.15%	N/A	3.95%
CINergy Corp.	2.13%	3.44%	4.00%	4.30%
Cleco Corporation	0.00%	0.04%	N/A	5.00%
Consolidation Edison	0.88%	-0.04%	3.00%	2.21%
Dominion Resources	2.37%	6.68%	6.00%	6.20%
Empire District Electric	0.00%	6.24%	10.00%	1.39%
Energy East Corporation	3.71%	1.09%	5.00%	2.67%
Entergy	9.19%	5.61%	6.00%	5.11%
Exelon	6.25%	5.88%	5.00%	9.39%
Green Mountain Power	9.57%	3.52%	N/A	5.25%
Hawaiian Electric Industries	0.00%	2.66%	4.00%	2.91%
Northeast Utilities	7.69%	9.32%	4.00%	5.70%
NSTAR	2.78%	3.00%	4.00%	4.88%
Pinnacle West Capital Corp.	5.50%	1.09%	5.00%	3.55%
PPL Corporation	3.74%	3.59%	5.00%	7.91%
Progress Energy	2.52%	1.51%	4.00%	3.52%
Public Service Enterprise Group	1.79%	1.79%	4.00%	5.73%
Sempra Energy	0.00%	4.70%	6.00%	9.00%
Southern Company	3.36%	5.18%	5.00%	4.63%
Averages Excluding Negative Values	3.46%	3.97%	5.00%	4.91%

Sources: **Zacks Detailed Analysts' Estimates, March 2004**
Value Line Investment Survey, January 2, February 13, and March 5, 2004

AQUILA NETWORKS - WPC
COMPARISON GROUP
DCF Growth Rate Analysis

Value Line Projected Dividend Per Share Growth

Company	2002/ 2003 DPS	Projected DPS	Compound Growth Rate
Central Vermont Public Service	$ 0.88	$ 1.08	4.18%
CINergy Corp.	$ 1.80	$ 2.00	2.13%
Cleco Corporation	$ 0.90	$ 0.90	0.00%
Consolidation Edison	$ 2.24	$ 2.34	0.88%
Dominion Resources	$ 2.58	$ 2.90	2.37%
Empire District Electric	$ 1.28	$ 1.28	0.00%
Energy East Corporation	$ 1.00	$ 1.20	3.71%
Entergy	$ 1.34	$ 2.08	9.19%
Exelon	$ 1.92	$ 2.60	6.25%
Green Mountain Power	$ 0.76	$ 1.20	9.57%
Hawaiian Electric Industries	$ 2.48	$ 2.48	0.00%
Northeast Utilities	$ 0.58	$ 0.84	7.69%
NSTAR	$ 2.18	$ 2.50	2.78%
Pinnacle West Capital Corp.	$ 1.63	$ 2.13	5.50%
PPL Corporation	$ 1.54	$ 1.85	3.74%
Progress Energy	$ 2.26	$ 2.56	2.52%
Public Service Enterprise Group	$ 2.16	$ 2.36	1.79%
Sempra Energy	$ 1.00	$ 1.00	0.00%
Southern Company	$ 1.39	$ 1.64	3.36%
Average			3.46%

AQUILA NETWORKS - WPC
COMPARISON GROUP
DCF Growth Rate Analysis

Value Line Projected Earnings Per Share Growth

Company		3-Year Avg. EPS		Projected EPS	Compound Growth Rate
Central Vermont Public Service	$	1.29	$	1.85	6.15%
CINergy Corp.	$	2.49	$	3.05	3.44%
Cleco Corporation	$	1.50	$	1.50	0.04%
Consolidation Edison	$	3.06	$	3.05	-0.04%
Dominion Resources	$	3.90	$	5.75	6.68%
Empire District Electric	$	1.04	$	1.50	6.24%
Energy East Corporation	$	1.64	$	1.75	1.09%
Entergy	$	3.24	$	4.50	5.61%
Exelon	$	4.68	$	6.60	5.88%
Green Mountain Power	$	1.95	$	2.40	3.52%
Hawaiian Electric Industries	$	2.99	$	3.50	2.66%
Northeast Utilities	$	1.23	$	2.10	9.32%
NSTAR	$	3.35	$	4.00	3.00%
Pinnacle West Capital Corp.	$	3.19	$	3.40	1.09%
PPL Corporation	$	3.44	$	4.25	3.59%
Progress Energy	$	3.61	$	3.95	1.51%
Public Service Enterprise Group	$	3.69	$	4.10	1.79%
Sempra Energy	$	2.47	$	3.25	4.70%
Southern Company	$	1.81	$	2.45	5.18%
Average					3.76%

AQUILA NETWORKS - WPC
COMPARISON GROUP
DCF Growth Rate Analysis

Sustainable Growth Calculation

Company	Forecasted Payout Ratio	Forecasted Retention Ratio	Expected Return	Growth Rate
Central Vermont Public Service	58.38%	41.62%	9.50%	3.95%
CINergy Corp.	65.57%	34.43%	12.50%	4.30%
Cleco Corporation	60.00%	40.00%	12.50%	5.00%
Consolidation Edison	76.72%	23.28%	9.50%	2.21%
Dominion Resources	50.43%	49.57%	12.50%	6.20%
Empire District Electric	85.33%	14.67%	9.50%	1.39%
Energy East Corporation	68.57%	31.43%	8.50%	2.67%
Entergy	46.22%	53.78%	9.50%	5.11%
Exelon	39.39%	60.61%	15.50%	9.39%
Green Mountain Power	50.00%	50.00%	10.50%	5.25%
Hawaiian Electric Industries	70.86%	29.14%	10.00%	2.91%
Northeast Utilities	40.00%	60.00%	9.50%	5.70%
NSTAR	62.50%	37.50%	13.00%	4.88%
Pinnacle West Capital Corp.	62.65%	37.35%	9.50%	3.55%
PPL Corporation	43.53%	56.47%	14.00%	7.91%
Progress Energy	64.81%	35.19%	10.00%	3.52%
Public Service Enterprise Group	57.56%	42.44%	13.50%	5.73%
Sempra Energy	30.77%	69.23%	13.00%	9.00%
Southern Company	66.94%	33.06%	14.00%	4.63%
Average	58.97%	41.03%	11.15%	4.91%

AQUILA NETWORKS - WPC
COMPARISON GROUP
DCF Growth Rate Analysis

RETURN ON EQUITY CALCULATION
COMPARISON GROUP

	(1) Value Line Dividend Gr.	(2) Value Line Earnings Gr.	(3) Zack's Earning Gr.	(4) Retention Earning Gr.	(5) Average of All Gr. Rates
Dividend Yield	4.35%	4.35%	4.35%	4.35%	4.35%
Growth Rate	3.46%	3.97%	5.00%	4.91%	4.33%
Expected Div. Yield	4.42%	4.43%	4.45%	4.45%	4.44%
DCF Return on Equity	7.88%	8.40%	9.45%	9.36%	8.77%

AQUILA NETWORKS - WPC
Capital Asset Pricing Model Analysis
Comparison Group

20-Year Treasury Bond

Line No.		Value Line
1	Market Required Return Estimate	
2	Expected Dividend Yield	1.18%
3	Expected Growth	10.52%
4	Required Return	11.70%
5	Risk-free Rate of Return, 20-Year Treasury Bond	
6	Average of Last Six Months	5.03%
8	Risk Premium	
9	@ 6 Month Average RFR (Line 4 minus Line 6)	6.67%
10	Comparison Group Beta	0.73
11	Comparison Group Beta * Risk Premium	
12	@ 6 Month Average RFR (Line 10 * Line 9)	4.86%
13	CAPM Return on Equity	
14	@ 6 Month Average RFR (Line 12 plus Line 6)	9.89%

5-Year Treasury Bond

Line No.		Value Line
1	Market Required Return Estimate	
2	Expected Dividend Yield	1.18%
3	Expected Growth	10.52%
4	Required Return	11.70%
5	Risk-free Rate of Return, 5-Year Treasury Bond	
6	Average of Last Six Months	3.12%
8	Risk Premium	
9	@ 6 Month Average RFR (Line 4 minus Line 6)	8.57%
10	Comparison Group Beta	0.73
11	Comparison Group Beta * Risk Premium	
12	@ 6 Month Average RFR (Line 9 * Line 10)	6.25%
13	CAPM Return on Equity	
14	@ 6 Month Average RFR (Line 12 plus Line 6)	9.37%

AQUILA NETWORKS - WPC
Capital Asset Pricing Model Analysis
Comparison Group

Supporting Data for CAPM Analyses

20 Year Treasury Bond Data

	Avg. Yield
October-03	5.21%
November-03	5.17%
December-03	5.11%
January-04	5.01%
February-04	4.94%
March-04	4.72%
6 month average	5.03%

5 Year Treasury Bond Data

	Avg. Yield
October-03	3.19%
November-03	3.29%
December-03	3.27%
January-04	3.12%
February-04	3.07%
March-04	2.79%
6 month average	3.12%

Value Screen III Growth Rate Data:

Forecasted Data:	
Earnings	14.79%
Book Value	9.18%
Dividends	7.58%
Average	10.52%

Source: Value Line Investment Survey for Windows, March 2004

Value Line Betas
Comparison Group:

Central Vermont Public Service	0.45
CINergy Corp.	0.80
Cleco Corporation	1.00
Consolidation Edison	0.60
Dominion Resources	0.85
Empire District Electric	0.65
Energy East Corporation	0.75
Entergy	0.70
Exelon	0.70
Green Mountain Power	0.60
Hawaiian Electric Industries	0.60
Northeast Utilities	0.70
NSTAR	0.70
Pinnacle West Capital Corp.	0.80
PPL Corporation	0.90
Progress Energy	0.80
Public Service Enterprise Group	0.80
Sempra Energy	0.85
Southern Company	0.60
Average	0.73

Source: Value Line Investment Reports, January 2, February 13, and March 5, 2004

Exhibit ____(RAB-7)

AQUILA NETWORKS - WPC
Capital Asset Pricing Model Analysis

Historic Market Premium

	Geometric Mean	Arithmetic Mean
Long-Term Annual Return on Stocks	10.40%	12.40%
Long-Term Annual Income Return on Long-Term Government Bond:	5.20%	5.20%
Historical Market Risk Premium	5.20%	7.20%
Comparison Group Beta	0.73	0.73
Beta * Market Premium	3.79%	5.25%
Current 20-Year Tresury Bond Yield	5.03%	5.03%
CAPM Cost of Equity	8.82%	10.28%

Source: *Stocks, Bonds, Bills, and Inflation 2004 Yearbook,* Ibbotson Associates

BEFORE THE
LOUSIANA PUBLIC SERVICE COMMISSION

RE:	INVESTIGATION OF SOUTHWESTERN ELECTRIC POWER COMPANY; REVENUE REQUIREMENT REVIEW CONDUCTED PURSUANT TO MERGER ORDER U-23327, SUBDOCKET A	) Docket No. U-23327,) Subdocket A

DIRECT TESTIMONY

OF

RICHARD A. BAUDINO

ON BEHALF OF

THE LOUISIANA PUBLIC SERVICE COMMISSION

J. KENNEDY AND ASSOCIATES, INC.
ROSWELL, GEORGIA

OCTOBER 2004

007098

BEFORE THE
LOUSIANA PUBLIC SERVICE COMMISSION

RE:	**INVESTIGATION OF SOUTHWESTERN ELECTRIC POWER COMPANY; REVENUE REQUIREMENT REVIEW CONDUCTED PURSUANT TO MERGER ORDER U-23327, SUBDOCKET A**	)))))	**Docket No. U-23327, Subdocket A**

DIRECT TESTIMONY OF RICHARD A. BAUDINO

I. QUALIFICATIONS AND SUMMARY

Q. Please state your name and business address.

A. Richard A. Baudino, J. Kennedy and Associates, Inc. ("Kennedy and Associates"), 570 Colonial Park Drive, Suite 305, Roswell, Georgia 30075.

Q. What is your occupation and who employs you?

A. I am a utility rate and economic consultant holding the position of Director of Consulting with the firm of Kennedy and Associates.

Q. Please describe your education and professional background.

A. I received my Master of Arts degree with a major in Economics and a minor in Statistics from New Mexico State University in 1982. I also received my Bachelor of Arts degree with majors in Economics and English from New Mexico State in 1979.

I began my professional career with the New Mexico Public Service Commission Staff in October of 1982 and was employed there as a Utility Economist. During my employment with the Staff, my responsibilities included the analysis of a broad range of issues in the ratemaking field. Areas in which I testified included cost of service, rate of return, rate design, revenue requirements, analysis of sale/leasebacks of generating plants, utility finance issues, and generating plant phase-ins.

In October 1989 I joined the utility consulting firm of Kennedy and Associates as a Senior Consultant where my duties and responsibilities covered substantially the same areas as those during my tenure with the New Mexico Public Service Commission Staff. I became Manager in July 1992 and was named to my current position in January 1995.

Exhibit____(RAB-1) summarizes my expert testimony experience.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of the Staff of the Louisiana Public Service Commission ("LPSC" or "Commission").

Q. What is the purpose of your Direct Testimony?

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A. The purpose of testimony is to address the investor required return on equity for Southwestern Electric Power Company ("SWEPCO" or "Company").

Q. Please summarize your recommendation.

A. I conclude that the investor required return on equity for SWEPCO is 8.95%.

Q. How is your testimony organized?

A. Section II provides a summary of past and current economic conditions, which sets the backdrop for my rate of return analysis. Section III contains a discussion of my approach to estimating the cost of equity and the results of the methodologies that I utilize.

II. REVIEW OF ECONOMIC AND FINANCIAL CONDITIONS

Q. Please describe the general economic trends that have affected utilities in the last few years.

A. The trend for the stock and bond markets was quite positive through the '90s. Although there was a recession in late 1990 through early 1991, the markets continued to post strong, above average gains through 1999. During the period from 1990 - 1999, the S&P 500 posted an average annual gain of 18.2%, still well above the long-term average stock market return of 12.2%[1]. Long-term government bonds also provided excellent returns during the '90s, averaging 8.8% per year compared to the long-run average of 5.8%. During the 1990s, inflation remained moderate, averaging 2.9%.

In 2000, the stock and bond markets substantially diverged. The total return for the S&P 500 was –9.11%, while the return for small company stocks was –3.59%. Bonds prices, however, staged a strong rally despite two interest rate increases by the Federal Reserve. The total return for long-term government bonds for the year was 21.48%, with the yield falling from 6.82% at the end of 1999 to 5.58% at the end of December 2000. The inflation rate rose to 3.39% for the year.

During 2001, the economy slowed considerably and was affected drastically by the terrorist attacks of September 11. The unemployment rate rose to 5.8% and GDP growth slowed to only 1.1% for the year. Stock and bond markets again showed divergent returns. The Standard and Poor's 500 returned –11.88% for the year,

[1] *Stocks, Bonds Bills, and Inflation 2003 Yearbook,* Ibbotson Associates, pages 18 and 112.

Q. What has the trend in capital costs been over the last few years?

A. Exhibit____(RAB-2) presents a graphic depiction of the trend in interest rates from January 1994 through August 2004. The interest rates shown are for the 20-year U.S. Treasury Bond and the average public utility bond from the Mergent Bond Record. Exhibit____(RAB-2) shows that the yields on long-term treasury bonds have declined significantly since early 1995, although rates have been quite volatile. Increased bond market volatility actually began in the early 1970s, when inflation became more of a sustained long-term concern.

Yields have trended downward from 2002 through 2004, with the 20-year bond yield ending the month of September 2004 at 4.89%. The yield on the average public utility bond has also decreased significantly over the last two years, falling from 7.83% in March 2002 to 6.18% in August 2004. As of October 18, 2004, the Moody's average public utility bond yield stood at 5.94%. A-rated utility bonds yielded 5.92%, while Baa bonds yielded 6.15%.

Current bond yields are either at or near their lowest levels in recent history. Exhibit____(RAB-2) shows that since 1994 public utility bond yields are at their lowest level over that ten-year historical period. I also reviewed the Mergent *Public Utility Manual* and found that average public utility bond yields have not been as low as they are now since the 1968 – 1969 time period, almost 35 years ago.

Q. Mr. Baudino, in your opinion what effect does the current interest rate environment have on utility stocks?

A. In my view, the currently low bond yields strongly suggest lower return on equity requirements on the part on the investing public. The results of my return on equity analysis in the subsequent section of my Direct Testimony are consistent with these historically low bond yields.

Q. In 2003, Congress enacted a change in tax policy that lowered that tax rate on dividends and capital gains. Please explain the effect of this tax change on utility common stocks and on investor required returns for utilities.

A. Other things being equal, the dividend tax rate reduction means that investors should require lower pre-tax rates of return for utilities. This is because the after-tax dividend streams have now become more valuable because of the reduction in federal taxation. Thus, for a given stock price investors will discount the future dividend payments at a lower return on equity. The stock prices that I use in my cost of equity analyses fully incorporate the effects of this change in tax rates and on the expected returns for utilities. This also means that investors require *lower* risk premiums for stocks compared to utility bonds.

Q. How does the investment community regard the electric utility industry as a whole?

A. The Value Line Investment Survey reported the following in its October 1, 2004 report on the electric utility industry (central):

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> **"The Electric Utility Industry's finances have undergone dramatic changes since the start of the 21st century. Through the 1990s, returns on total capital, share equity, and common equity showed relatively little change. But starting with the year 2000, as retail competition spread, many utilities were confronted with reduced earnings from basic operations. This induced company managements to look for investments elsewhere to shore up profits. Though many of these investments were initially successful, several eventually turned sour. That led to a weakening of finances and a reduction in earnings.**
>
> *** * * * ***
>
> **The power glut in 2002 resulted in a slowdown in new plant construction the following year. This reduced borrowing needs and lowered interest expense. In turn, it led to a rise in common equity ratios and fixed charge coverages. Company managements initiated additional steps to improve finances by selling unprofitable assets, canceling acquisitions, and focusing on core business operations.**
>
> *** * * * ***
>
> **By the end of the current year, industry finances will probably recover to the level attained at the start of the century. Over the next 3 to 5 years, further progress is likely. Based on our projection of steady profit growth for the industry to 2007 to 2009, we look for solid improvement in free cash flow."**

Value Line also noted that available funds could be used by utilities to buy back stock, increase dividend payments, or both.

Q. What conclusions do you draw from Value Line's comments regarding the state of the electric industry today?

A. In my opinion, it appears that the electric industry is entering a more stable, less risky environment than it experienced during the last few years. Companies that focus on core electric operations will be lower risk than those with unregulated and/or deregulated operations and investments.

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Q. How does the investment community view SWEPCO?

A. SWEPCO is an operating subsidiary of American Electric Power ("AEP"). As such, SWEPCO has no publicly held common stock of its own. However, SWEPCO's bonds are rated by major rating agencies, namely Moody's and Standard and Poor's. Currently, SWEPCO's first mortgage bonds are rated A3 by Moody's and A- by Standard & Poor's.

In its rating report on SWEPCO dated September 13, 2004, Moody's stated its A3 rating for the Company was supported by its competitive rates and the benefits of being affiliated with AEP. Another credit strength noted by Moody's was that deregulation is not occurring in SWEPCO's service territories, providing for a more stable and predictable operating environment.

S&P's August 2, 2004 report on SWEPCO stated that the Company's credit rating was based on the consolidated credit quality of its parent, AEP. AEP's ratings "reflect the company's transition to a renewed strategic focus on its core utility operations from a business model that balanced regulated and unregulated activities."

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III. DETERMINATION OF FAIR RATE OF RETURN

Q. Please describe the methods you employed in estimating a fair rate of return for SWEPCO.

A. I employed a Discounted Cash Flow ("DCF") analysis for a group of comparison electric companies to estimate the cost of equity for SWEPCO's electric operations. I also employed a Capital Asset Pricing Model ("CAPM") analysis, although I did not incorporate its results into my recommendation.

Q. What are the main guidelines to which you adhere in estimating the cost of equity for a firm?

A. Generally speaking, the estimated cost of equity should be comparable to the returns of other firms with similar risk structures and should be sufficient for the firm to attract capital. These are the basic standards set out in <u>Federal Power Comm'n v. Hope Natural Gas Co.</u>, 320 U.S. 591 (1944) and <u>Bluefield W.W. & Improv. Co. v. Public Service Comm'n.</u>, 262 U.S. 679 (1922).

From an economist's perspective, the notion of "opportunity cost" plays a vital role in estimating the cost of equity. One measures the opportunity cost of an investment equal to what one would have obtained in the next best alternative. For example, let us suppose that an investor decides to purchase the stock of a publicly traded electric utility. That investor made the decision based on the expectation of dividend payments and perhaps some appreciation in the stock's value over time. However, that investor's opportunity cost is measured by what she or he could have invested in as the next best alternative. That alternative could have been another utility stock, a utility bond, a mutual fund, a money market fund, or any other number of investment vehicles.

The key determinant in deciding whether to invest, however, is based on comparative levels of risk. Our hypothetical investor would not invest in a particular electric company stock if it offered a return lower than other investments of similar risk. The opportunity cost simply would not justify such an investment. Thus, the task for the rate of return analyst is to estimate a return that is equal to the return being offered by other risk-comparable firms. Failing this, the subject firm will be impaired in its ability to attract capital.

Q. What are the major types of risk faced by utility companies?

A. In general, risk associated with the holding of common stock can be separated into three major categories: business risk, financial risk, and liquidity risk. Business risk refers to risks inherent in the operation of the business. Volatility of the firm's sales, long-term demand for its product(s), the amount of operating leverage, and quality of management are all factors that affect business risk. The quality of regulation at the state and federal levels also plays an important role in business risk for regulated utility companies.

Financial risk refers to the impact on a firm's future cash flows from the use of debt in the capital structure. Interest payments to bondholders represent a prior call on the firm's cash flows and must be met before income is available to the common shareholders. Additional debt means additional variability in the firm's earnings, leading to additional risk.

Liquidity risk refers to the ability of an investor to quickly sell an investment without a substantial price concession. The easier it is for an investor to sell an investment for cash, the lower the liquidity risk will be. Stock markets, such as the New York and American Stock Exchanges, help ease liquidity risk substantially. Investors who own stocks that are traded in these markets know on a daily basis what the market prices of their investments are and that they can sell these investments fairly quickly. Many electric utility stocks are traded on the New York Stock Exchange and are considered liquid investments.

Q. Are there any indices available to investors that quantify the total risk of a company?

A. Yes. Published measures exist that categorize companies based on various measures of risk. One of the best-known and most widely available sources is from Value Line. Each company on which Value Line reports is assigned a Safety Rank. The Safety Rank consists of a number from 1 to 5, with 1 being the highest - meaning least risky - and 5 being the lowest - meaning most risky. The Safety Rank measures the total risk of a stock and encompasses just about all factors that affect financial and business risk. These factors include:

- Stock price volatility
- Fixed charge coverage ratio
- Quality of earnings

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- Capitalization ratio
- Earnings on common stock
- Payout ratio
- Regulatory risk

By selecting companies with the same Safety Rank, investors can be relatively confident that the market views them as similarly risky investments.

Bond ratings are another good tool that investors may utilize to determine the risk comparability of firms. Bond rating agencies such as Moody's and Standard and Poor's perform detailed analyses of all the factors that contribute to the business and financial risk of a particular investment. The end result of their analyses is a bond rating that reflects these risks.

<u>Discounted Cash Flow Method</u>

Q. Please describe the basic DCF approach.

A. The basic DCF approach is rooted in valuation theory. It is based on the premise that the value of a financial asset is determined by its ability to generate future net cash flows. In the case of a common stock, those future cash flows take the form of dividends and appreciation in price. The value of the stock to investors is the discounted present value of future cash flows. The general equation then is:

$$V = \frac{R}{(1+r)} + \frac{R}{(1+r)^2} + \frac{R}{(1+r)^3} + \dots \frac{R}{(1+r)^n}$$

Where: V = *asset value*
R = *yearly cash flows*
r = *discount rate*

This is no different from determining the value of any asset from an economic point of view. However, the DCF model that I employ does make certain simplifying assumptions. One is that the stream of income from the equity share is assumed to be perpetual; that is, there is no salvage or residual value at the end of some maturity date (as is the case with a bond). Another important assumption is that financial markets are efficient; that is, they correctly evaluate the cash flows relative to the appropriate discount rate, thus rendering the stock price efficient relative to other alternatives. Finally, the model I employ also assumes a constant growth rate in dividends. The fundamental relationship employed in the DCF method is described by the formula:

$$k = \frac{D_1}{P_0} + g$$

Where: D_1 = *the next period dividend*
P_0 = *current stock price*
g = *expected growth rate*
k = *investor-required return*

It is apparent that the "k" so determined must relate to the investors' expected return. Use of the discounted cash flow method to determine an investor-required return is complicated by the need to express investors' expectations relative to dividends, earnings, and book value over an infinite time horizon. Financial theory suggests that stockholders purchase common stock on the assumption that there will be some change in the rate of dividend payments over time. We assume that the rate of growth in dividends is constant over the assumed time horizon, but the model could easily handle varying growth rates if we knew what they were. Finally, the relevant time frame is prospective rather than retrospective.

Q. What was your first step in conducting your DCF analysis for SWEPCO?

A. My first step was to construct a comparison group of companies that has a risk profile that is reasonably similar to that of the Company. This is necessary because the Company is a subsidiary of AEP and, as such, does not have publicly traded common stock. Thus, a DCF analysis cannot be performed directly on SWEPCO. Using a comparison group of utilities that do have publicly traded common stock is both a necessary and appropriate step in estimating the cost of equity for SWEPCO in this proceeding.

Q. Please describe your criteria for selecting the comparison group of electric companies.

A. I used several criteria to select a comparison group. First, using the October 2004 issue of the *C. A. Turner Utility Reports,* I selected electric companies that were rated either A or Baa/BBB by Moody's and Standard and Poor's. From that group I selected companies that had at least 50% of their revenues from electric operations. This resulted in a group of electric and/or electric and gas companies that have operational and risk profiles similar to SWEPCO.

From this group, I then eliminated companies that had recently cut or eliminated dividends, were recently or currently involved in merger or restructuring activities, and had recent experience with significant earnings fluctuations. These criteria are important because utilities that are undergoing those types of changes are not good candidates for the DCF model.

The resulting group of comparison electric companies I used in my analysis is:

1. Avista Corp.
2. Central Vermont Public Service
3. CH Energy Group
4. CINergy Corp.
5. Cleco Corporation
6. Consolidation Edison
7. Empire District Electric
8. Energy East Corporation
9. Entergy
10. Exelon Corporation
11. FirstEnergy Corporation
12. Green Mountain Power
13. Hawaiian Electric Industries
14. Northeast Utilities
15. NSTAR
16. Pinnacle West Capital Corp.
17. PPL Corporation
18. Progress Energy
19. Public Service Enterprise Group
20. SEMPRA Energy
21. Southern Company

Q. You mentioned that one of your selection criteria was a bond rating of A/BBB. Please explain why this is an appropriate criterion to use in the selection of a comparison group for SWEPCO in this proceeding.

A. It was my goal to construct a comparison group of electric utilities that was roughly similar in risk to SWEPCO. Please refer to Exhibit____(RAB-3), which lists the bond ratings for each of these companies. As a group, the average bond rating is around a low A to high BBB. As I described in Section II of my testimony, SWEPCO's first mortgage bonds are currently rated A-/A3, which is at the low end of the A range. Further, SWEPCO's bond rating was recently raised from BBB to A- by S&P on July 22, 2004. In my view, this group of utilities with mixed A/BBB ratings is a reasonable proxy group for estimating the cost of equity for SWEPCO in this proceeding.

Q. What was your first step in determining the DCF return on equity for the comparison group?

A. I first determined the current dividend yield, D_0/P_0, from the basic equation. My general practice is to use six months as the most reasonable period over which to estimate the dividend yield. The six-month period I used covered the months from April through September 2004. I obtained historical prices and dividends from Yahoo! Finance and the Standard and Poor's Stock Guide. The annualized dividend divided by the average monthly price represents the average dividend yield for each month in the period.

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Using this approach results in an average dividend yield for the group of 4.35%. These calculations are shown in Exhibit____(RAB-4).

Q. Having established the average dividend yield, how did you determine the expected growth rate for the electric comparison group?

A. "Expected" refers to the investor's expected growth rate. The task, in theory, is to use a growth rate that will correctly forecast the constant rate of growth in dividends. We refer to a perpetual growth rate since the DCF model has no cut-off point. The obvious fact is that there is no way to know with absolute certainty what investors expect the growth rate to be in the short term, much less in perpetuity. The dividend growth rate is a function of earnings growth and the payout ratio, neither of which is known precisely for the future.

In this analysis, I relied on two major sources of analysts' forecasts for growth. These sources are Value Line and Zacks Investment Research ("Zacks").

Q. Please briefly describe Value Line and Zacks.

A. Value Line is an investment survey that is published for approximately 1,700 companies, both regulated and unregulated. It is updated quarterly and probably represents the most comprehensive and widely used of all investment information services. It provides both historical and forecasted information on a number of important data elements. Value Line neither participates in financial markets as a broker nor works for the utility industry in any capacity of which I am aware.

According to Zacks' website, Zacks "was formed in 1978 to compile, analyze, and distribute investment research to both institutional and individual investors." Zacks gathers opinions from a variety of analysts on earnings growth forecasts for numerous firms including regulated electric utilities. The estimates of the analysts responding are combined to produce consensus average and median estimates of earnings growth.

Q. **Why did you rely on analysts' forecasts in your analysis?**

A. The finance literature has shown that analysts' forecasts provide better predictions of future growth than do estimates based on historical growth alone[2].

Q. **How did you utilize your data sources to estimate growth rates for the comparison group?**

A. Exhibit____(RAB-5), pages 1 through 4, presents the details of the calculations for the Value Line and Zacks forecasted growth estimates. The Value Line growth estimates are based on five-year forecasts for dividend growth and six-year forecasts for earnings growth. The Zacks earnings growth estimates are forecasts for the next five years. These earnings and dividend growth estimates for the comparison group are summarized on Columns (1) through (3) of page 1 of Exhibit____(RAB-5).

[2] See Rozeff (*Journal of Forecasting*, Volume 2, Issue No. 4, 1983), Brown and Rozeff (*Journal of Finance*, March 1978), Moyer, Chatfield and Kelley (*International Journal of Forecasting*, 1985), and a study by Vander Weide and Carleton that was incorporated as part of the Edison Electric Institute's comments in the Federal Energy Regulatory Commission's generic cost of capital proceedings.

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I also utilized the sustainable growth formula in estimating the expected growth rate. The sustainable growth method, also known as the retention ratio method, recognizes that the firm's retaining a portion of its earnings fuels growth in dividends. These retained earnings, which are plowed back into the firm's asset base, are expected to earn a rate of return. This, in turn, generates growth in the firm's book value, market value, and dividends.

The sustainable growth method is calculated using the following formula:

$$G = B \times R$$

Where: G = *expected retention growth rate*
B = *the firm's expected retention ratio*
R = *the expected return*

In its proper form, this calculation is forward-looking. That is, the investors' expected retention ratio and return must be used in order to measure what investors anticipate will happen in the future. Data on expected retention ratios and returns may be obtained from Value Line.

The expected sustainable growth estimates for the comparison group are presented in Column (4) on page 1 of Exhibit____(RAB-5). The data came from the Value Line forecasts for the comparison group.

Q. How did you proceed to determine the DCF cost of equity for the electric comparison group?

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A. To estimate the expected dividend yield (D_1) for the group, the current dividend yield must be moved forward in time to account for dividend increases over the next twelve months. I estimated the expected dividend yield by multiplying the current dividend yield by one plus one-half the expected growth rate.

I then added the expected growth rate ranges to the expected dividend yield for the comparison group. The calculation of the resulting DCF returns on equity is presented on page 5 of Exhibit____(RAB-5). The expected growth rates range from 3.96% to 4.86%.

Q. Please explain how you calculated your DCF cost of equity estimates.

A. Page 5 of Exhibit____(RAB-5) shows four alternative DCF cost of equity calculations using the four growth estimates shown on page 1. In calculating the average growth rates for the group, I eliminated negative earnings growth rates for one company in the group because negative growth rates are not appropriate proxies for long-term growth expectations.

The DCF returns range from 8.40% to 9.32%. The DCF return on equity utilizing the average of all the growth rates is 8.95%.

<u>**Capital Asset Pricing Model**</u>

Q. Briefly summarize the Capital Asset Pricing Model ("CAPM") approach.

A. The theory underlying the CAPM approach is that investors, through diversified portfolios, may combine assets to minimize the total risk of the portfolio. Diversification allows investors to diversify away all risks specific to a particular company and be left only with market risk that affects all companies. Thus, CAPM theory identifies two types of risks for a security: company-specific risk and market risk. Company-specific risk includes such events as strikes, management errors, marketing failures, lawsuits, and other events that are unique to a particular firm. Market risk includes inflation, business cycles, war, variations in interest rates, and changes in consumer confidence. Market risk tends to affect all stocks and cannot be diversified away. The idea behind the CAPM is that diversified investors are rewarded with returns based on market risk.

Within the CAPM framework, the expected return on a security is equal to the risk-free rate of return plus a risk premium that is proportional to the security's market, or nondiversifiable risk. Beta is the factor that reflects the inherent market risk of a security. It measures the volatility of a particular security relative to overall market for securities. For example, a stock with a beta of 1.0 indicates that if the market rises by 15.00%, that stock will also rise by 15.00%. This stock moves in tandem with movements in the overall market. A stock with a beta of 0.5 will only rise or fall 50.00% as much as the overall market. So with an increase in the market of 15.00%, this stock will only rise 7.50%. Stocks with betas greater than 1.0 will rise and fall more than the overall market. Thus, beta is the relevant measure of the risk of individual securities vis-à-vis the market.

Based on the foregoing discussion, the equation for determining the return for a security in the CAPM framework is:

$$K = Rf + \beta(MRP)$$

Where: K = *Required Return on equity*
Rf = *Risk-free rate*
MRP = *Market risk premium*
β = *Beta*

This equation tells us about the risk/return relationship posited by the CAPM. Investors are risk averse and will only accept higher risk if they receive higher returns. These returns can be determined in relation to a stock's beta and the market risk premium. The general level of risk aversion in the economy determines the market risk premium. If the risk-free rate of return is 3.00% and the required return on the total market is 15.00%, then the risk premium is 12.00%. Any stock's required return can be determined by multiplying its beta by the market risk premium. Stocks with betas greater than 1.0 are considered riskier than the overall market and will have higher required returns. Conversely, stocks with betas less than 1.0 will have required returns lower than the market as a whole.

Q. In general, are there concerns regarding the use of the CAPM in estimating the return on equity?

A. Yes. There is considerable controversy surrounding the use of the CAPM[3]. There is strong evidence that beta is not the primary factor in determining the risk of a

[3] For a more complete discussion of some of the controversy surrounding the use of the CAPM, refer to *A Random Walk Down Wall* Street by Burton Malkiel, pages 229 – 239, 1999 edition.

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security. For example, Value Line states that its Safety Rank is a measure of total risk, not its calculated beta coefficient. Beta coefficients usually describe only a small amount of total investment risk. Also, recent finance literature has questioned the usefulness of beta in predicting the relationship between risk and required return. Finally, a considerable amount of judgment must be employed in determining the risk-free rate and market return portions of the CAPM equation. The analyst's application of judgment can significantly influence the results obtained from the CAPM. My past experience with the CAPM indicates that it is prudent to use a wide variety of data in estimating returns. Of course, the range of results may also be wide, indicating the difficulty in obtaining a reliable estimate from the CAPM.

Q. How did you estimate the market return portion of the CAPM?

A. The first source I used was the Value Line Investment Survey for Windows. Value Line provides a summary statistical report detailing, among other things, forecasted growth in dividends, earnings, and book value for the companies Value Line follows. I have presented these three growth rates and the average on page 2 of Exhibit ____(RAB-6). The average growth rate is 12.18%. Combining this growth rate with the average expected dividend yield of the Value Line companies of 1.20% results in an expected market return of 13.38%. The detailed calculations are shown on page 1 of Exhibit ____(RAB-6).

I also considered a supplemental check to this market estimate. Ibbotson Associates published a study of historical returns on the stock market in its *Stocks, Bonds, Bills, and Inflation 2004 Yearbook*. Some analysts employ this historical data to estimate the market risk premium of stocks over the risk-free rate. The assumption is that a risk premium calculated over a long period of time is reflective of investor expectations going forward. Exhibit ____(RAB-7) presents the calculation of the market return using the Ibbotson historical data.

Q. Please address the use of historical earned returns to estimate the market risk premium.

A. The use of historic earned returns on the Standard and Poor 500 to estimate the current market risk premium is rather suspect because it naively assumes that investors currently expect historical risk premiums to continue unchanged into the future forever regardless of present or forecasted economic conditions. Brigham, Shome and Vinson noted the following with respect to the use of historic risk premiums calculated using the returns as reported by Ibbotson and Sinquefield (referred to in the quote as "I&S"):

> **"There are both conceptual and measurement problems with using I&S data for purposes of estimating the cost of capital. Conceptually, there is no compelling reason to think that investors expect the same relative returns that were earned in the past. Indeed, evidence presented in the following sections indicates that relative expected returns should, and do, vary *significantly over time.* Empirically, *the measured historic* premium is sensitive both to the choice of estimation horizon and to the end points. These choices are essentially arbitrary, yet can result in significant differences in the final outcome."[4]**

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

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In summary, the use of historic earned returns should be viewed with a great deal of caution and skepticism. There is no real support for the proposition that an unchanging, mechanistically applied historical risk premium is representative of current investor expectations and return requirements.

Q. How did you determine the risk free rate?

A. I used the average yields on the 20-year Treasury bond and five-year Treasury note over the six-month period from April through September 2004. The 20-year Treasury bond is often used by rate of return analysts as the risk-free rate, but it contains a significant amount of interest rate risk. The five-year Treasury note carries less interest rate risk than the 20-year bond and is more stable than three-month Treasury bills. Therefore, I have employed both of these securities as proxies for the risk-free rate of return. This approach provides a reasonable range over which the CAPM may be estimated.

Q. What is your estimate of the market risk premium?

A. Exhibit ____(RAB-6), line 9 of page 1, presents my estimates of the market risk premium based on a DCF analysis applied to current market data. The market risk premium is 8.17% using the 20-year Treasury bond and 9.76% using the five-year Treasury bond.

Utilizing the historical Ibbotson data on market returns, the market risk premium ranges from 5.20% to 7.20%. This is shown on Exhibit ____(RAB-7).

Q. How did you determine the value for beta?

A. I obtained the betas for the companies in the electric company comparison group from most recent Value Line reports. The average of the Value Line betas for the electric group is .76.

Q. Please summarize the CAPM results.

A. Please refer to line 14 of page 1 of Exhibit ____(RAB-6) for the CAPM results for the 20-year and five-year Treasury bond yields. For the electric comparison group, the CAPM returns are 11.08% (five-year bond) and 11.45% (20-year bond).

The CAPM results using the historical Ibbotson data range from 9.19% to 10.71%. These results are shown on Exhibit ____(RAB-7).

Conclusions and Recommendations

Q. Please summarize the cost of equity estimates you have developed up to this point in your testimony.

A. Utilizing the DCF model, I developed cost of equity estimates for a comparison group of electric utility companies. The results for the electric company comparison group using the constant-growth DCF model ranged from 8.40% to 9.32%. The results using the CAPM ranged from 9.19% to 11.45%.

Q. What is your recommendation for a fair rate of return on equity for SWEPCO?

A. My recommended rate of return on equity for SWEPCO is 8.95%. This recommendation is based on the average of the four DCF cost of equity estimates. Given the Company's present circumstances, I believe this value is the most representative of the investor-required return on equity for an A-rated company such as SWEPCO.

Q. Your CAPM results are higher than your DCF results. Why didn't you take this into account in your recommended return on equity for SWEPCO?

A. First, the LPSC has consistently relied on the DCF model in past cases with which I am familiar. Based on current market conditions in the utility industry, there is no reason not to rely on the DCF in this proceeding or to incorporate CAPM results.

Second, it is my opinion that the CAPM results for the comparison group may be overstated at this time. This is due, in part, to the application of Value Line's beta for the group of .76. Value Line determines its betas based on five years of historical price data. Over the last five years, utility share prices in general have been quite volatile due to restructuring, deregulation, and the increase of unregulated investments that were more risky than core electric operations. These factors likely increased the historical betas for electric utilities, other things being equal. Given the Value Line quote cited in Section II of my testimony, it would appear that the industry should be more stable going forward and, in my opinion, historical betas are therefore likely to fall from their current level.

Third, the expected return on the market based on Value Line's most recent forecasts appears to be quite volatile at this time. In a piece of return on equity testimony I filed earlier this year for Aquila Networks – WPC, the expected return on the market was 11.70%, compared to 13.38% in this proceeding. This one change substantially increased the CAPM results in this proceeding compared to my Aquila testimony. However, my DCF results have remained quite stable since the Aquila testimony and are consistent with interest rates trends throughout the year.

Thus, I believe the CAPM results will likely overstate the investors' required return for SWEPCO in this proceeding.

Q. Does this conclude your direct testimony?

A. Yes.

BEFORE THE

LOUISIANA PUBLIC SERVICE COMMISSION

RE:	INVESTIGATION OF SOUTHWESTERN ELECTRIC POWER COMPANY; REVENUE REQUIREMENT REVIEW CONDUCTED PURSUANT TO MERGER ORDER U-23327, SUBDOCKET A	) Docket No. U-23327,) Subdocket A

EXHIBITS

OF

RICHARD A. BAUDINO

ON BEHALF OF THE

LOUISIANA PUBLIC SERVICE COMMISSION

J. KENNEDY AND ASSOCIATES, INC.
ROSWELL, GEORGIA

OCTOBER 2004

RESUME OF RICHARD A. BAUDINO, DIRECTOR OF CONSULTING

EDUCATION

New Mexico State University, M.A.
Major in Economics
Minor in Statistics

New Mexico State University, B.A.
Economics
English

Twenty two years of experience in utility ratemaking. Broad based experience in revenue requirement analysis, cost of capital, utility financing, phase-ins, auditing and rate design. Has designed revenue requirement and rate design analysis programs.

REGULATORY TESTIMONY

Preparation and presentation of expert testimony in the areas of:

Electric and Gas Utility Rate Design
Cost of Capital for Electric, Gas and Water Companies
Ratemaking Treatment of Generating Plant Sale/Leasebacks
Electric and Gas Utility Cost of Service
Revenue Requirements
Gas industry restructuring and competition
Fuel cost auditing

RESUME OF RICHARD A. BAUDINO, DIRECTOR OF CONSULTING

EXPERIENCE

1989 to Present: Kennedy and Associates: **Director of Consulting** - Responsible for consulting assignments in the area of revenue requirements, rate design, cost of capital, economic analysis of generation alternatives, gas industry restructuring and competition.

1982 to 1989: New Mexico Public Service Commission Staff: **Utility Economist** - Responsible for preparation of analysis and expert testimony in the areas of rate of return, cost allocation, rate design, finance, phase-in of electric generating plants, and sale/leaseback transactions.

CLIENTS SERVED

Regulatory Commissions

Louisiana Public Service Commission
Georgia Public Service Commission
New Mexico Public Service Commission

Industrial Groups

Ad Hoc Committee for a Competitive Electric Supply System
Air Products and Chemicals, Inc.
Arkansas Electric Energy Consumers
Arkansas Gas Consumers
Armco Steel Company, L.P.
Association of Business Advocating Tariff Equity
General Electric Company
Industrial Energy Consumers
Kentucky Industrial Utility Consumers
Large Electric Consumers Organization
Newport Steel
Northwest Arkansas Gas Consumers
Maryland Industrial Group
Occidental Chemical
PSI Industrial Group
Taconite Intervenors (Minnesota)
Tyson Foods

Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004

Date	Case	Jurisdict.	Party	Utility	Subject
3/83	1780	NM	New Mexico Public Service Commission	Boles Water Co.	Rate design, rate of return.
10/83	1803, 1817	NM	New Mexico Public Service Commission	Southwestern Electric Coop	Rate design.
11/84	1833	NM	New Mexico Public Service Commission	El Paso Electric Co.	Service contract approval, rate design, performance standards for Palo Verde nuclear generating system
1983	1835	NM	New Mexico Public Service Commission	Public Service Co. of NM	Rate design.
1984	1848	NM	New Mexico Public Service Commission	Sangre de Cristo Water Co.	Rate design.
02/85	1906	NM	New Mexico Public Service Commission	Southwestern Public Service Co.	Rate of return.
09/84	1907	NM	New Mexico Public Service Commission	Jornada Water Co.	Rate of return.
11/85	1957	NM	New Mexico Public Service Commission	Southwestern Public Service Co.	Rate of return.
04/86	2009	NM	New Mexico Public Service Commission	El Paso Electric Co.	Phase-in plan, treatment of sale/leaseback expense.
06/86	2032	NM	New Mexico Public Service Commission	El Paso Electric Co.	Sale/leaseback approval.
09/86	2033	NM	New Mexico Public Service Commission	El Paso Electric Co.	Order to show cause, PVNGS audit.
02/87	2074	NM	New Mexico Public Service Commission	El Paso Electric Co.	Diversification.
05/87	2089	NM	New Mexico Public Service Commission	El Paso Electric Co.	Fuel factor adjustment.
08/87	2092	NM	New Mexico Public Service Commission	El Paso Electric Co.	Rate design.

Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004

Date	Case	Jurisdict.	Party	Utility	Subject
10/88	2146	NM	New Mexico Public Service Commission	Public Service Co. of New Mexico	Financial effects of restructuring, reorganization.
07/88	2162	NM	New Mexico Public Service Commission	El Paso Electric Co.	Revenue requirements, rate design, rate of return.
01/89	2194	NM	New Mexico Public Service Commission	Plains Electric G&T Cooperative	Economic development.
1/89	2253	NM	New Mexico Public Service Commission	Plains Electric G&T Cooperative	Financing.
08/89	2259	NM	New Mexico Public Service Commission	Homestead Water Co.	Rate of return, rate design.
10/89	2262	NM	New Mexico Public Service Commission	Public Service Co. of New Mexico	Rate of return.
09/89	2269	NM	New Mexico Public Service Commission	Ruidoso Natural Gas Co.	Rate of return, expense from affiliated interest.
12/89	89-208-TF	AR	Arkansas Electric Energy Consumers	Arkansas Power & Light Co.	Rider M-33.
01/90	U-17282	LA	Louisiana Public Service Commission	Gulf States Utilities	Cost of equity.
09/90	90-158	KY	Kentucky Industrial Utility Consumers	Louisville Gas & Electric Co.	Cost of equity.
09/90	90-004-U	AR	Northwest Arkansas Gas Consumers	Arkansas Western Gas Co.	Cost of equity, transportation rate.
12/90	U-17282 Phase IV	LA	Louisiana Public Service Commission	Gulf States Utilities	Cost of equity.
04/91	91-037-U	AR	Northwest Arkansas Gas Consumers	Arkansas Western Gas Co.	Transportation rates.
12/91	91-410-EL-AIR	OH	Air Products & Chemicals, Inc., Armco Steel Co., General Electric Co., Industrial Energy Consumers	Cincinnati Gas & Electric Co.	Cost of equity.

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Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004

Date	Case	Jurisdict.	Party	Utility	Subject
05/92	910890-EI	FL	Occidental Chemical Corp.	Florida Power Corp.	Cost of equity, rate of return.
09/92	92-032-U	AR	Arkansas Gas Consumers	Arkansas Louisiana Gas Co.	Cost of equity, rate of return, cost-of-service.
09/92	39314	ID	Industrial Consumers for Fair Utility Rates	Indiana Michigan Power Co.	Cost of equity, rate of return.
09/92	92-009-U	AR	Tyson Foods	General Waterworks	Cost allocation, rate design.
01/93	92-346	KY	Newport Steel Co.	Union Light, Heat & Power Co.	Cost allocation.
01/93	39498	IN	PSI Industrial Group	PSI Energy	Refund allocation.
01/93	U-10105	MI	Association of Businesses Advocating Tariff Equality (ABATE)	Michigan Consolidated Gas Co.	Return on equity.
04/93	92-1464-EL-AIR	OH	Air Products and Chemicals, Inc., Armco Steel Co., Industrial Energy Consumers	Cincinnati Gas & Electric Co.	Return on equity.
09/93	93-189-U	AR	Arkansas Gas Consumers	Arkansas Louisiana Gas Co.	Transportation service terms and conditions.
09/93	93-081-U	AR	Arkansas Gas Consumers	Arkansas Louisiana Gas Co.	Cost-of-service, transportation rates, rate supplements; return on equity; revenue requirements.
12/93	U-17735	LA	Louisiana Public Service Commission Staff	Cajun Electric Power Cooperative	Historical reviews; evaluation of economic studies.
03/94	10320	KY	Kentucky Industrial Utility Customers	Louisville Gas & Electric Co.	Trimble County CWIP revenue refund.

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**Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004**

Date	Case	Jurisdict.	Party	Utility	Subject
4/94	E-015/ GR-94-001	MN	Large Power Intervenors	Minnesota Power Co.	Evaluation of the cost of equity, capital structure, and rate of return.
5/94	R-00942993	PA	PG&W Industrial Intervenors	Pennsylvania Gas & Water Co.	Analysis of recovery of transition costs.
5/94	R-00943001	PA	Columbia Industrial Intervenors	Columbia Gas of Pennsylvania	Evaluation of cost allocation, rate design, rate plan, and carrying charge proposals.
7/94	R-00942986	PA	Armco, Inc., West Penn Power Industrial Intervenors	West Penn Power Co.	Return on equity and rate of return.
7/94	94-0035-E-42T	WV	West Virginia Energy Users' Group	Monongahela Power Co.	Return on equity and rate of return.
8/94	8652	MD	Westvaco Corp.	Potomac Edison Co.	Return on equity and rate of return.
9/94	930357-C	AR	West Central Arkansas Gas Consumers	Arkansas Oklahoma Gas Corp.	Evaluation of transportation service.
9/94	U-19904	LA	Louisiana Public Service Commission	Gulf States Utilities	Return on equity.
9/94	8629	MD	Maryland Industrial Group	Baltimore Gas & Electric Co.	Transition costs.
11/94	94-175-U	AR	Arkansas Gas Consumers	Arkla, Inc.	Cost-of-service, rate design, rate of return.
3/95	RP94-343-000	FERC	Arkansas Gas Consumers	NorAm Gas Transmission	Rate of return.
4/95	R-00943271	PA	PP&L Industrial Customer Alliance	Pennsylvania Power & Light Co.	Return on equity.
6/95	U-10755	MI	Association of Businesses Advocating Tariff Equity	Consumers Power Co.	Revenue requirements.
7/95	8697	MD	Maryland Industrial Group	Baltimore Gas & Electric Co.	Cost allocation and rate design.

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**Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004**

Date	Case	Jurisdict.	Party	Utility	Subject
8/95	95-254-TF U-2811	AR	Tyson Foods, Inc.	Southwest Arkansas Electric Cooperative	Refund allocation.
10/95	ER95-1042 -000	FERC	Louisiana Public Service Commission	Systems Energy Resources, Inc.	Return on Equity.
11/95	I-940032	PA	Industrial Energy Consumers of Pennsylvania	State-wide - all utilities	Investigation into Electric Power Competition.
5/96	96-030-U	AR	Northwest Arkansas Gas Consumers	Arkansas Western Gas Co.	Revenue requirements, rate of return and cost of service.
7/96	8725	MD	Maryland Industrial Group	Baltimore Gas & Electric Co., Potomac Electric Power Co. and Constellation Energy Corp.	Return on Equity.
7/96	U-21496	LA	Louisiana Public Service Commission	Central Louisiana Electric Co.	Return on equity, rate of return.
9/96	U-22092	LA	Louisiana Public Service Commission	Entergy Gulf States, Inc.	Return on equity.
1/97	RP96-199-000	FERC	The Industrial Gas Users Conference	Mississippi River Transmission Corp.	Revenue requirements, rate of return and cost of service.
3/97	96-420-U	AR	West Central Arkansas Gas Corp.	Arkansas Oklahoma Gas Corp.	Revenue requirements, rate of return, cost of service and rate design.
7/97	U-11220	MI	Association of Business Advocating Tariff Equity	Michigan Gas Co. and Southeastern Michigan Gas Co.	Transportation Balancing Provisions
7/97	R-00973944	PA	Pennsylvania American Water Large Users Group	Pennsylvania-American Water Co.	Rate of return, cost of service, revenue requirements.
3/98	8390-U	GA	Georgia Natural Gas Group and the Georgia Textile Manufacturers Assoc.	Atlanta Gas Light	Rate of return, restructuring issues, unbundling, rate design issues.

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**Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004**

Date	Case	Jurisdict.	Party	Utility	Subject
7/98	R-00984280	PA	PG Energy, Inc.	PGE Industrial Intervenors	Cost allocation.
8/98	U-17735	LA	Louisiana Public Service Commission	Cajun Electric Power Cooperative	Revenue requirements.
10/98	97-596	ME	Maine Office of the Public Advocate	Bangor Hydro-Electric Co.	Return on equity, rate of return.
10/98	U-23327	LA	Louisiana Public Service Commission	SWEPCO, CSW and AEP	Analysis of proposed merger.
12/98	98-577	ME	Maine Office of the Public Advocate	Maine Public Service Co.	Return on equity, rate of return.
12/98	U-23358	LA	Louisiana Public Service Commission	Entergy Gulf States, Inc.	Return on equity, rate of return.
3/99	98-426	KY	Kentucky Industrial Utility Customers, Inc.	Louisville Gas and Electric Co	Return on equity.
3/99	99-082	KY	Kentucky Industrial Utility Customers, Inc.	Kentucky Utilities Co.	Return on equity.
4/99	R-984554	PA	T. W. Phillips Users Group	T. W. Phillips Gas and Oil Co.	Allocation of purchased gas costs.
6/99	R-0099462	PA	Columbia Industrial Intervenors	Columbia Gas of Pennsylvania	Balancing charges.
10/99	U-24182	LA	Louisiana Public Service Commission	Entergy Gulf States,Inc.	Cost of debt.
10/99	R-00994782	PA	Peoples Industrial Intervenors	Peoples Natural Gas Co.	Restructuring issues.
10/99	R-00994781	PA	Columbia Industrial Intervenors	Columbia Gas of Pennsylvania	Restructuring, balancing charges, rate flexing, alternate fuel.
01/00	R-00994786	PA	UGI Industrial Intervenors	UGI Utilities, Inc.	Universal service costs, balancing, penalty charges, capacity assignment.

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**Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004**

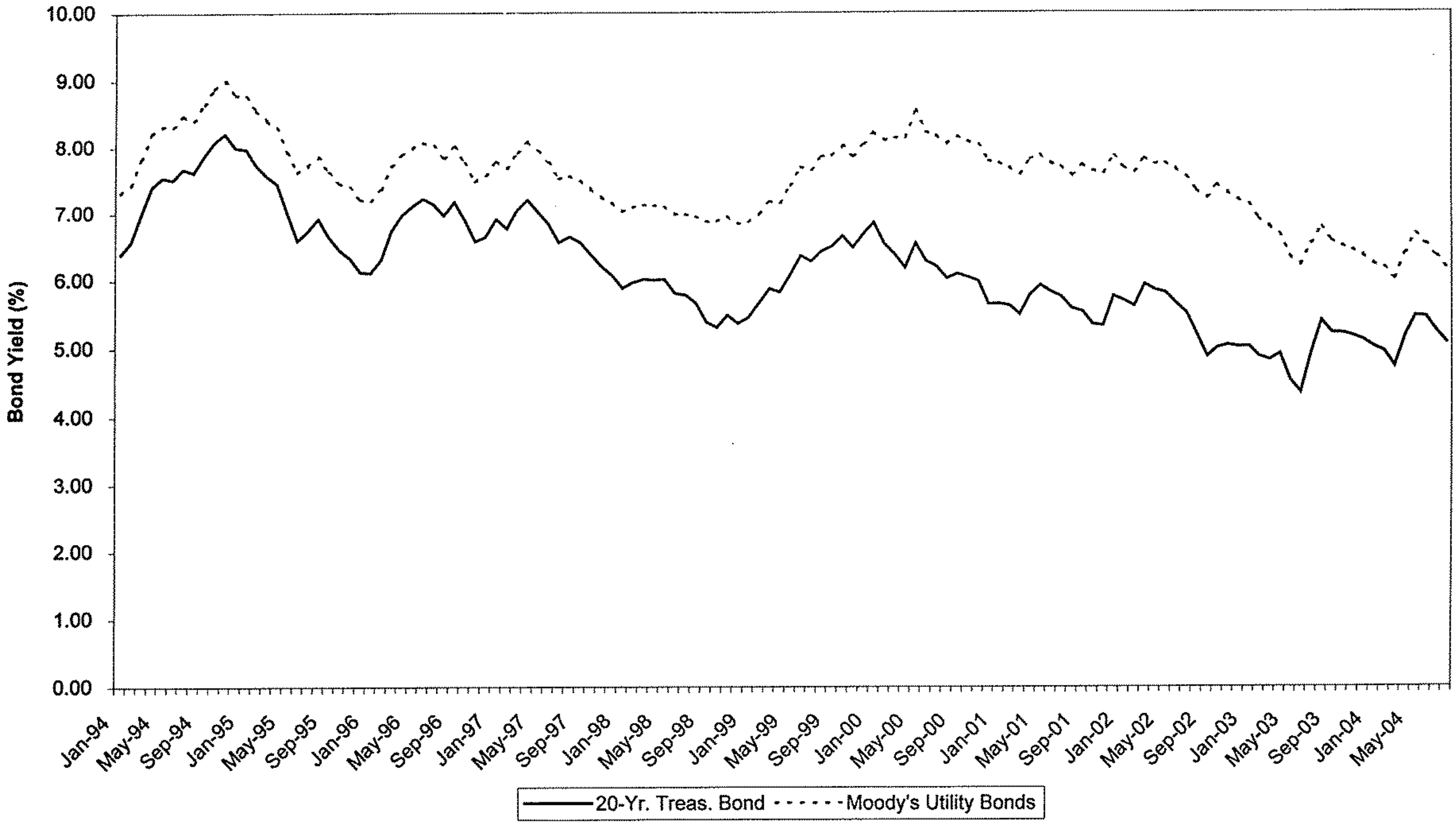
Date	Case	Jurisdict.	Party	Utility	Subject
01/00	8829	MD	Maryland Industrial Gr. & United States	Baltimore Gas & Electric Co.	Revenue requirements, cost allocation, rate design.
02/00	R-00994788	PA	Penn Fuel Transportation	PFG Gas, Inc., and	Tariff charges, balancing provisions.
05/00	U-17735	LA	Louisiana Public Service Comm.	Louisiana Electric Cooperative	Rate restructuring.
07/00	2000-080	KY	Kentucky Industrial Utility Consumers	Louisville Gas and Electric Co.	Cost allocation.
07/00	U-21453 U-20925 (SC), U-22092 (SC) (Subdocket E)	LA	Louisiana Public Service Comm.	Southwestern Electric Power Co.	Stranded cost analysis.
09/00	R-00005654	PA	Philadelphia Industrial And Commercial Gas Users Group.	Philadelphia Gas Works	Interim relief analysis.
10/00	U-21453 U-20925 (SC), U-22092 (SC) (Subdocket B)	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Restructuring, Business Separation Plan.
11/00	R-00005277 (Rebuttal)	PA	Penn Fuel Transportation Customers	PFG Gas, Inc. and North Penn Gas Co.	Cost allocation issues.
12/00	U-24993	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Return on equity.
03/01	U-22092	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Stranded cost analysis.
04/01	U-21453 U-20925 (SC), U-22092 (SC) (Subdocket B) (Addressing Contested Issues)	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Restructuring issues.
04/01	R-00006042	PA	Philadelphia Industrial and Commercial Gas Users Group	Philadelphia Gas Works	Revenue requirements, cost allocation and tariff issues.
11/01	U-25687	LA	Louisiana Public Service Comm.	Entergy Gulf States, Inc.	Return on equity.

Expert Testimony Appearances
of
Richard A. Baudino
As of April 2004

Date	Case	Jurisdict.	Party	Utility	Subject
03/02	14311-U	GA	Georgia Public Service Commission	Atlanta Gas Light	Capital structure.
08/02	2002-00145	KY	Kentucky Industrial Utility Customers	Columbia Gas of Kentucky	Revenue requirements.
09/02	M-00021612	PA	Philadelphia Industrial And Commercial Gas Users Group	Philadelphia Gas Works	Transportation rates, terms, and conditions.
01/03	2002-00169	KY	Kentucky Industrial Utility Customers	Kentucky Power	Return on equity.
02/03	02S-594E	CO	Cripple Creek & Victor Gold Mining Company	Aquila Networks – WPC	Return on equity.
04/03	U-26527	LA	Louisiana Public Service Commission	Entergy Gulf States, Inc.	Return on equity.
10/03	CV020495AB	GA	The Landings Assn., Inc.	Utilities Inc. of GA	Revenue requirement & overcharge refund
03/04	2003-00433	KY	Kentucky Industrial Utility Customers	Louisville Gas & Electric	Return on equity, Cost allocation & rate design
03/04	2003-00434	KY	Kentucky Industrial Utility Customers	Kentucky Utilities	Return on equity
4/04	ER03-583-000, et. al.	FERC	Louisiana Public Service Commission	Entergy Corp.	Return on Equity
4/04	04S-035E	CO	Cripple Creek & Victor Gold Mining Company, Goodrich Corp., Holcim (U.S.) Inc., and The Trane Co.	Aquila Networks – WPC	Return on equity
9/04	U-23327, Subdocket B	LA	Louisiana Public Service Commission	Southwestern Electric Power Company	Fuel cost review

Exhibit ____(RAB-2)

HISTORICAL BOND YIELDS
AVERAGE PUBLIC UTILITY BOND VS 20-YEAR TREASURY BOND



SOUTHWESTERN PUBLIC SERVICE COMPANY
COMPARISON GROUP

	S&P Rating	Moody's Rating
Avista Corp.	BBB-	Baa3
Central Vermont Public Service	BBB+	
CH Energy Group	A	A2
CINergy Corp.	BBB+	A3
Cleco Corporation	BBB+	A3
Consolidation Edison	A	A1
Empire District Electric	BBB	Baa1
Energy East Corporation	BBB+	Baa1
Entergy	BBB	Baa2
Exelon Corporation	A	A2
FirstEnergy Corporation	BBB-	Baa1
Green Mountain Power	BBB	Baa1
Hawaiian Electric Industries	BBB	Baa2
Northeast Utilities	A-	A3
NSTAR	A	A1
Pinnacle West Capital Corp.	BBB	Baa1
PPL Corporation	A-	Baa1
Progress Energy Inc.	BBB	A2
Public Service Enterprise Gp	A-	A3
SEMPRA Energy	A+	A1
Southern Company	A+	A1

SOUTHWESTERN ELECTRIC POWER COMPANY
COMPARISON GROUP
AVERAGE PRICE, DIVIDEND AND DIVIDEND YIELD

		Apr '04	May '04	June '04	July '04	Aug '04	Sept '04
Avista Corp.	High Price ($)	19.430	17.190	18.720	18.530	17.890	18.570
	Low Price ($)	16.890	15.350	16.790	17.190	16.950	17.740
	Avg. Price ($)	18.160	16.270	17.755	17.860	17.420	18.155
	Dividend ($)	0.125	0.130	0.130	0.130	0.130	0.130
	Mo. Avg. Div.	2.75%	3.20%	2.93%	2.91%	2.99%	2.86%
	6 mos. Avg.	2.94%					
Central Vermont PS	High Price ($)	22.500	20.400	20.600	20.600	21.120	21.750
	Low Price ($)	19.200	18.450	18.800	19.150	19.180	20.100
	Avg. Price ($)	20.850	19.425	19.700	19.875	20.150	20.925
	Dividend ($)	0.230	0.230	0.230	0.230	0.230	0.230
	Mo. Avg. Div.	4.41%	4.74%	4.67%	4.63%	4.57%	4.40%
	6 mos. Avg.	4.57%					
CH Energy Group	High Price ($)	49.580	47.750	46.440	46.720	45.610	46.750
	Low Price ($)	45.850	43.390	44.090	43.250	43.140	45.060
	Avg. Price ($)	47.715	45.570	45.265	44.985	44.375	45.905
	Dividend ($)	0.540	0.540	0.540	0.540	0.540	0.540
	Mo. Avg. Div.	4.53%	4.74%	4.77%	4.80%	4.87%	4.71%
	6 mos. Avg.	4.74%					
CINergy Corp.	High Price ($)	41.040	38.300	38.860	39.010	40.530	40.750
	Low Price ($)	37.540	34.920	36.760	36.950	38.100	38.900
	Avg. Price ($)	39.290	36.610	37.810	37.980	39.315	39.825
	Dividend ($)	0.470	0.470	0.470	0.470	0.470	0.470
	Mo. Avg. Div.	4.78%	5.14%	4.97%	4.95%	4.78%	4.72%
	6 mos. Avg.	4.89%					
Cleco Corporation	High Price ($)	19.180	18.180	18.350	18.200	17.860	18.260
	Low Price ($)	17.000	16.190	16.880	17.100	16.450	16.690
	Avg. Price ($)	18.090	17.185	17.615	17.650	17.155	17.475
	Dividend ($)	0.225	0.225	0.225	0.225	0.225	0.225
	Mo. Avg. Div.	4.98%	5.24%	5.11%	5.10%	5.25%	5.15%
	6 mos. Avg.	5.14%					
Consolidated Edison	High Price ($)	44.250	41.580	40.530	40.970	42.200	42.900
	Low Price ($)	40.900	37.230	38.610	39.120	40.400	41.360
	Avg. Price ($)	42.575	39.405	39.570	40.045	41.300	42.130
	Dividend ($)	0.565	0.565	0.565	0.565	0.565	0.565
	Mo. Avg. Div.	5.31%	5.74%	5.71%	5.64%	5.47%	5.36%
	6 mos. Avg.	5.54%					
Empire District	High Price ($)	22.990	21.050	20.650	20.450	20.870	20.800
	Low Price ($)	20.790	19.480	19.630	19.530	19.800	20.230
	Avg. Price ($)	21.890	20.265	20.140	19.990	20.335	20.515
	Dividend ($)	0.320	0.320	0.320	0.320	0.320	0.320
	Mo. Avg. Div.	5.85%	6.32%	6.36%	6.40%	6.29%	6.24%
	6 mos. Avg.	6.24%					

SOUTHWESTERN ELECTRIC POWER COMPANY
COMPARISON GROUP
AVERAGE PRICE, DIVIDEND AND DIVIDEND YIELD

		Apr '04	May '04	June '04	July '04	Aug '04	Sept '04
Energy East	High Price ($)	26.050	23.870	24.760	24.770	24.710	25.250
	Low Price ($)	23.450	21.850	23.230	23.480	23.750	24.260
	Avg. Price ($)	24.750	22.860	23.995	24.125	24.230	24.755
	Dividend ($)	0.260	0.260	0.260	0.260	0.260	0.260
	Mo. Avg. Div.	4.20%	4.55%	4.33%	4.31%	4.29%	4.20%
	6 mos. Avg.	4.31%					
Entergy	High Price ($)	59.920	54.990	57.160	57.780	60.480	61.980
	Low Price ($)	54.300	50.640	52.510	54.430	57.620	59.510
	Avg. Price ($)	57.110	52.815	54.835	56.105	59.050	60.745
	Dividend ($)	0.450	0.450	0.450	0.450	0.450	0.450
	Mo. Avg. Div.	3.15%	3.41%	3.28%	3.21%	3.05%	2.96%
	6 mos. Avg.	3.18%					
Exelon	High Price ($)	69.790	33.560	34.140	35.440	36.850	37.900
	Low Price ($)	64.400	30.920	32.100	32.690	34.650	35.990
	Avg. Price ($)	67.095	32.240	33.120	34.065	35.750	36.945
	Dividend ($)	0.550	0.275	0.275	0.275	0.305	0.305
	Mo. Avg. Div.	3.28%	3.41%	3.32%	3.23%	3.41%	3.30%
	6 mos. Avg.	3.33%					
First Energy Corporation	High Price ($)	39.650	39.490	39.730	39.170	40.410	42.230
	Low Price ($)	37.130	36.730	36.900	37.040	38.850	40.370
	Avg. Price ($)	38.390	38.110	38.315	38.105	39.630	41.300
	Dividend ($)	0.375	0.375	0.375	0.375	0.375	0.375
	Mo. Avg. Div.	3.91%	3.94%	3.91%	3.94%	3.79%	3.63%
	6 mos. Avg.	3.85%					
Green Mountain Power	High Price ($)	25.980	25.800	26.100	26.430	26.820	26.500
	Low Price ($)	24.650	24.400	25.080	25.590	25.080	25.400
	Avg. Price ($)	25.315	25.100	25.590	26.010	25.950	25.950
	Dividend ($)	0.220	0.220	0.220	0.220	0.220	0.220
	Mo. Avg. Div.	3.48%	3.51%	3.44%	3.38%	3.39%	3.39%
	6 mos. Avg.	3.43%					
Hawaiian Electric Ind.	High Price ($)	52.350	50.600	26.280	26.740	25.810	26.750
	Low Price ($)	48.590	45.930	24.400	25.200	24.890	25.700
	Avg. Price ($)	50.470	48.265	25.340	25.970	25.350	26.225
	Dividend ($)	0.620	0.620	0.310	0.310	0.310	0.310
	Mo. Avg. Div.	4.91%	5.14%	4.89%	4.77%	4.89%	4.73%
	6 mos. Avg.	4.89%					
Northeast Utilities	High Price ($)	18.730	19.240	19.710	19.530	19.210	19.410
	Low Price ($)	17.660	17.610	18.860	18.300	18.480	18.900
	Avg. Price ($)	18.195	18.425	19.285	18.915	18.845	19.155
	Dividend ($)	0.150	0.150	0.150	0.150	0.163	0.163
	Mo. Avg. Div.	3.30%	3.26%	3.11%	3.17%	3.45%	3.39%
	6 mos. Avg.	3.28%					

SOUTHWESTERN ELECTRIC POWER COMPANY
COMPARISON GROUP
AVERAGE PRICE, DIVIDEND AND DIVIDEND YIELD

		Apr '04	May '04	June '04	July '04	Aug '04	Sept '04
NSTAR	High Price ($)	51.300	48.980	48.600	47.970	48.880	50.500
	Low Price ($)	47.280	45.300	46.600	46.010	46.580	48.360
	Avg. Price ($)	49.290	47.140	47.600	46.990	47.730	49.430
	Dividend ($)	0.555	0.555	0.555	0.555	0.555	0.555
	Mo. Avg. Div.	4.50%	4.71%	4.66%	4.72%	4.65%	4.49%
	6 mos. Avg.	4.62%					
Pinnacle West	High Price ($)	40.220	40.450	41.500	41.190	42.990	42.560
	Low Price ($)	37.500	36.300	39.460	39.630	40.330	41.120
	Avg. Price ($)	38.860	38.375	40.480	40.410	41.660	41.840
	Dividend ($)	0.450	0.450	0.450	0.450	0.450	0.450
	Mo. Avg. Div.	4.63%	4.69%	4.45%	4.45%	4.32%	4.30%
	6 mos. Avg.	4.47%					
PPL Corp.	High Price ($)	46.970	43.810	46.200	46.730	47.870	48.390
	Low Price ($)	42.720	39.830	42.150	44.700	46.100	46.170
	Avg. Price ($)	44.845	41.820	44.175	45.715	46.985	47.280
	Dividend ($)	0.410	0.410	0.410	0.410	0.410	0.410
	Mo. Avg. Div.	3.66%	3.92%	3.71%	3.59%	3.49%	3.47%
	6 mos. Avg.	3.64%					
Progress Energy	High Price ($)	47.500	43.190	44.360	44.320	43.890	44.280
	Low Price ($)	42.660	40.090	42.220	40.760	42.000	41.530
	Avg. Price ($)	45.080	41.640	43.290	42.540	42.945	42.905
	Dividend ($)	0.575	0.575	0.575	0.575	0.575	0.575
	Mo. Avg. Div.	5.10%	5.52%	5.31%	5.41%	5.36%	5.36%
	6 mos. Avg.	5.34%					
Pub. Svc. Enterprise Gp.	High Price ($)	47.700	43.000	42.330	42.110	42.340	42.600
	Low Price ($)	42.700	39.660	39.700	38.100	39.130	40.680
	Avg. Price ($)	45.200	41.330	41.015	40.105	40.735	41.640
	Dividend ($)	0.550	0.550	0.550	0.550	0.550	0.550
	Mo. Avg. Div.	4.87%	5.32%	5.36%	5.49%	5.40%	5.28%
	6 mos. Avg.	5.29%					
Sempra Energy	High Price ($)	32.400	33.410	34.900	36.400	36.740	37.190
	Low Price ($)	30.870	30.800	33.130	33.970	35.250	35.530
	Avg. Price ($)	31.635	32.105	34.015	35.185	35.995	36.360
	Dividend ($)	0.250	0.250	0.250	0.250	0.250	0.250
	Mo. Avg. Div.	3.16%	3.11%	2.94%	2.84%	2.78%	2.75%
	6 mos. Avg.	2.93%					
Southern Company	High Price ($)	30.64	29.14	29.44	29.96	30.35	30.85
	Low Price ($)	28.57	27.44	28.61	28.67	29.17	29.71
	Avg. Price ($)	29.605	28.290	29.025	29.315	29.760	30.280
	Dividend ($)	0.350	0.350	0.350	0.358	0.358	0.358
	Mo. Avg. Div.	4.73%	4.95%	4.82%	4.88%	4.81%	4.73%
	6 mos. Avg.	4.82%					
Average Dividend Yield		4.35%					

Source: Yahoo! Finance, S&P Stock Guide

SOUTHWESTERN ELECTRIC POWER COMPANY
COMPARISON GROUP
DCF Growth Rate Analysis

Company	(1) Value Line DPS	(2) Value Line EPS	(3) Zacks	(4) Value Line B x R
Avista Corp.	7.39%	7.66%	5.00%	4.27%
Central Vermont Public Service	4.18%	7.08%	N/A	4.24%
CH Energy Group	0.00%	0.49%	N/A	1.82%
CINergy Corp.	2.09%	3.32%	4.00%	3.52%
Cleco Corporation	0.00%	0.80%	N/A	4.80%
Consolidation Edison	0.88%	-0.87%	3.00%	1.74%
Empire District Electric	0.00%	6.58%	5.00%	1.39%
Energy East Corporation	5.39%	3.33%	5.00%	3.50%
Entergy Corp.	6.19%	6.03%	6.00%	5.64%
Exelon Corp.	13.14%	6.11%	5.00%	7.50%
FirstEnergy Corp.	3.71%	9.79%	6.00%	6.33%
Green Mountain Power	10.99%	3.52%	N/A	4.90%
Hawaiian Electric Industries	0.00%	1.50%	4.00%	3.06%
Northeast Utilities	8.94%	9.75%	5.00%	5.86%
NSTAR	2.78%	2.86%	4.00%	4.50%
Pinnacle West Capital Corp.	4.44%	3.85%	5.00%	4.11%
PPL Corporation	5.78%	4.58%	5.00%	7.65%
Progress Energy	2.04%	-1.76%	4.00%	1.97%
Public Service Enterprise Group	1.79%	-1.08%	3.00%	3.75%
Sempra Energy	0.00%	5.09%	6.00%	9.17%
Southern Company	3.36%	5.18%	4.00%	4.63%
Averages Excluding Negative Values	3.96%	4.86%	4.65%	4.49%

Sources: Zacks Detailed Analysts' Estimates, October 2004
Value Line Investment Survey, August 13, September 3, and October 1, 2004

SOUTHWESTERN ELECTRIC POWER COMPANY
COMPARISON GROUP
DCF Growth Rate Analysis

Value Line Projected Dividend Per Share Growth

Company	2003 DPS	Projected DPS	Compound Growth Rate
Avista Corp.	$ 0.49	$ 0.70	7.39%
Central Vermont Public Service	$ 0.88	$ 1.08	4.18%
CH Energy Group	$ 2.16	$ 2.16	0.00%
CINergy Corp.	$ 1.84	$ 2.04	2.09%
Cleco Corporation	$ 0.90	$ 0.90	0.00%
Consolidation Edison	$ 2.24	$ 2.34	0.88%
Empire District Electric	$ 1.28	$ 1.28	0.00%
Energy East Corporation	$ 1.00	$ 1.30	5.39%
Entergy Corp.	$ 1.60	$ 2.16	6.19%
Exelon Corp.	$ 0.96	$ 1.78	13.14%
FirstEnergy Corp.	$ 1.50	$ 1.80	3.71%
Green Mountain Power	$ 0.76	$ 1.28	10.99%
Hawaiian Electric Industries	$ 1.24	$ 1.24	0.00%
Northeast Utilities	$ 0.58	$ 0.89	8.94%
NSTAR	$ 2.18	$ 2.50	2.78%
Pinnacle West Capital Corp.	$ 1.73	$ 2.15	4.44%
PPL Corporation	$ 1.54	$ 2.04	5.78%
Progress Energy	$ 2.26	$ 2.50	2.04%
Public Service Enterprise Group	$ 2.16	$ 2.36	1.79%
Sempra Energy	$ 1.00	$ 1.00	0.00%
Southern Company	$ 1.39	$ 1.64	3.36%
Average			3.96%

SOUTHWESTERN ELECTRIC POWER COMPANY
COMPARISON GROUP
DCF Growth Rate Analysis

Value Line Projected Earnings Per Share Growth

Company		3-Year Avg. EPS		Projected EPS	Compound Growth Rate
Avista Corp.	$	0.96	$	1.50	7.66%
Central Vermont Public Service	$	1.29	$	1.95	7.08%
CH Energy Group	$	2.67	$	2.75	0.49%
CINergy Corp.	$	2.47	$	3.00	3.32%
Cleco Corporation	$	1.43	$	1.50	0.80%
Consolidation Edison	$	3.06	$	2.90	-0.87%
Empire District Electric	$	1.02	$	1.50	6.58%
Energy East Corporation	$	1.64	$	2.00	3.33%
Entergy Corp.	$	3.48	$	4.95	6.03%
Exelon Corp.	$	2.35	$	3.35	6.11%
FirstEnergy Corp.	$	2.28	$	4.00	9.79%
Green Mountain Power	$	1.95	$	2.40	3.52%
Hawaiian Electric Industries	$	1.60	$	1.75	1.50%
Northeast Utilities	$	1.23	$	2.15	9.75%
NSTAR	$	3.38	$	4.00	2.86%
Pinnacle West Capital Corp.	$	2.91	$	3.65	3.85%
PPL Corporation	$	3.44	$	4.50	4.58%
Progress Energy	$	3.56	$	3.20	-1.76%
Public Service Enterprise Group	$	3.74	$	3.50	-1.08%
Sempra Energy	$	2.78	$	3.75	5.09%
Southern Company	$	1.81	$	2.45	5.18%
Average					3.99%

SOUTHWESTERN ELECTRIC POWER COMPANY
COMPARISON GROUP
DCF Growth Rate Analysis

Sustainable Growth Calculation

Company	Forecasted Payout Ratio	Forecasted Retention Ratio	Expected Return	Growth Rate
Avista Corp.	46.67%	53.33%	8.00%	4.27%
Central Vermont Public Service	55.38%	44.62%	9.50%	4.24%
CH Energy Group	78.55%	21.45%	8.50%	1.82%
CINergy Corp.	68.00%	32.00%	11.00%	3.52%
Cleco Corporation	60.00%	40.00%	12.00%	4.80%
Consolidation Edison	80.69%	19.31%	9.00%	1.74%
Empire District Electric	85.33%	14.67%	9.50%	1.39%
Energy East Corporation	65.00%	35.00%	10.00%	3.50%
Entergy Corp.	43.64%	56.36%	10.00%	5.64%
Exelon Corp.	53.13%	46.87%	16.00%	7.50%
FirstEnergy Corp.	45.00%	55.00%	11.50%	6.33%
Green Mountain Power	53.33%	46.67%	10.50%	4.90%
Hawaiian Electric Industries	70.86%	29.14%	10.50%	3.06%
Northeast Utilities	41.40%	58.60%	10.00%	5.86%
NSTAR	62.50%	37.50%	12.00%	4.50%
Pinnacle West Capital Corp.	58.90%	41.10%	10.00%	4.11%
PPL Corporation	45.33%	54.67%	14.00%	7.65%
Progress Energy	78.13%	21.88%	9.00%	1.97%
Public Service Enterprise Group	67.43%	32.57%	11.50%	3.75%
Sempra Energy	26.67%	73.33%	12.50%	9.17%
Southern Company	66.94%	33.06%	14.00%	4.63%
Average	59.66%	40.34%	10.90%	4.49%

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SOUTHWESTERN ELECTRIC POWER COMPANY
COMPARISON GROUP
DCF Growth Rate Analysis

RETURN ON EQUITY CALCULATION
COMPARISON GROUP

	(1) Value Line Dividend Gr.	(2) Value Line Earnings Gr.	(3) Zack's Earning Gr.	(4) Retention Earning Gr.	(5) Average of All Gr. Rates
Dividend Yield	4.35%	4.35%	4.35%	4.35%	4.35%
Growth Rate	3.96%	4.86%	4.65%	4.49%	4.49%
Expected Div. Yield	4.44%	4.46%	4.46%	4.45%	4.45%
DCF Return on Equity	8.40%	9.32%	9.11%	8.94%	8.94%

SOUTHWESTERN ELECTRIC POWER COMPANY
Capital Asset Pricing Model Analysis
Comparison Group

20-Year Treasury Bond

Line No.		Value Line
1	Market Required Return Estimate	
2	Expected Dividend Yield	1.20%
3	Expected Growth	12.18%
4	Required Return	13.38%
5	Risk-free Rate of Return, 20-Year Treasury Bond	
6	Average of Last Six Months	5.21%
8	Risk Premium	
9	@ 6 Month Average RFR (Line 4 minus Line 6)	8.17%
10	Comparison Group Beta	0.76
11	Comparison Group Beta * Risk Premium	
12	@ 6 Month Average RFR (Line 10 * Line 9)	6.24%
13	CAPM Return on Equity	
14	@ 6 Month Average RFR (Line 12 plus Line 6)	11.45%

5-Year Treasury Bond

Line No.		Value Line
1	Market Required Return Estimate	
2	Expected Dividend Yield	1.20%
3	Expected Growth	12.18%
4	Required Return	13.38%
5	Risk-free Rate of Return, 5-Year Treasury Bond	
6	Average of Last Six Months	3.62%
8	Risk Premium	
9	@ 6 Month Average RFR (Line 4 minus Line 6)	9.76%
10	Comparison Group Beta	0.76
11	Comparison Group Beta * Risk Premium	
12	@ 6 Month Average RFR (Line 9 * Line 10)	7.46%
13	CAPM Return on Equity	
14	@ 6 Month Average RFR (Line 12 plus Line 6)	11.08%

SOUTHWESTERN ELECTRIC POWER COMPANY
Capital Asset Pricing Model Analysis
Comparison Group

Supporting Data for CAPM Analyses

20 Year Treasury Bond Data

	Avg. Yield
April-04	5.16%
May-04	5.46%
June-04	5.45%
July-04	5.24%
August-04	5.07%
September-04	4.89%
6 month average	5.21%

5 Year Treasury Bond Data

	Avg. Yield
April-04	3.39%
May-04	3.85%
June-04	3.93%
July-04	3.69%
August-04	3.47%
September-04	3.36%
6 month average	3.62%

Value Screen III Growth Rate Data:

Forecasted Data:

Earnings	15.91%
Book Value	10.43%
Dividends	10.20%
Average	12.18%

Source: Value Line Investment Survey for Windows, October 2004

Value Line Betas
Comparison Group:

Avista Corp.	0.85
Central Vermont Public Service	0.50
CH Energy Group	0.80
CINergy Corp.	0.80
Cleco Corporation	1.05
Consolidation Edison	0.65
Empire District Electric	0.65
Energy East Corporation	0.80
Entergy Corp.	0.75
Exelon Corp.	0.70
FirstEnergy Corp.	0.75
Green Mountain Power	0.65
Hawaiian Electric Industries	0.65
Northeast Utilities	0.75
NSTAR	0.70
Pinnacle West Capital Corp.	0.80
PPL Corporation	0.95
Progress Energy	0.85
Public Service Enterprise Group	0.85
Sempra Energy	0.90
Southern Company	0.65
Average	0.76

Source: Value Line Investment Reports, August 13, September 3, and October 1, 2004

SOUTHWESTERN ELECTRIC POWER COMPANY
Capital Asset Pricing Model Analysis

Historic Market Premium

	Geometric Mean	Arithmetic Mean
Long-Term Annual Return on Stocks	10.40%	12.40%
Long-Term Annual Income Return on Long-Term Government Bond	5.20%	5.20%
Historical Market Risk Premium	5.20%	7.20%
Comparison Group Beta	0.76	0.76
Beta * Market Premium	3.97%	5.50%
Current 20-Year Tresury Bond Yield	5.21%	5.21%
CAPM Cost of Equity	9.19%	10.71%

Source: *Stocks, Bonds, Bills, and Inflation 2004 Yearbook,* Ibbotson Associates

AFFIDAVIT

STATE OF GEORGIA)

COUNTY OF FULTON)

RICHARD A. BAUDINO, being duly sworn, deposes and states: that the attached are his sworn Testimony and Exhibits and that the statements contained are true and correct to the best of his knowledge, information and belief.

Richard A. Baudino

Richard A. Baudino

Sworn to and subscribed before me on this
22nd day of October 2004.

Barbara J. Trojanowski

Barbara J. Trojanowski
Notary Public
Cobb County
State of Georgia
My comm. expires 01/26/05

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of: GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY	CASE NO. 2005-00341

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 37

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S&P MidCap 400
S&P SmallCap 600
S&P Composite 1500
S&P 1000
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S&P 100
S&P REIT Composite
S&P European Indices
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S&P 500 Global Industry Classification Standard (GICS) Sectors
As of November 30, 2005

	Number of Cos.	% of Market Capitalization
Consumer Discretionary	89	10.9 %
Consumer Staples	37	9.5 %
Energy	29	9.3 %
Financials	84	21.2 %
Health Care	57	12.8 %
Industrials*	53	11.3 %
Information Technology	78	15.6 %
Materials	32	3.0 %
Telecommunication Services	8	3.1 %
Utilities	33	3.3 %
Industrials (Composite)**	375	73.7 %

*S&P 500 Industrials Sector is part of the Global Industry Classification Standard (GICS).
**S&P 500 Industrials Composite is a continuation of the Industrials that have been published by Standard & Poor's for over 40 years, and is provided in recognition of the fact that it is used by analysts and has a long history. It is not the same as the GICS Industrials Sector.

S&P 500 Exchange Representation
As of November 30, 2005

	Number of Cos.	% of Market Capitalization
NYSE	426	85.6 %
NASDAQ	74	14.4 %
AMEX	0	0.0 %

S&P 500 Statistics
As of November 30, 2005

Total Market Value ($ Billion)	11,298
Mean Market Value ($ Million)	22,595
Median Market Value ($ Million)	10,702
Weighted Ave. Market Value ($ Million)	86,707
Largest Cos. Market Value ($ Million)	378,661
Smallest Cos. Market Value ($ Million)	290
Median Share Price ($)	41.960
P/E Ratio	18.72
Indicated Dividend Yield (%)	1.84

At month-end, the S&P 500 Index represented approximately 73% and the S&P MidCap 400 represented 7% and the S&P SmallCap 600 represented 3% of the market value of S&P's internal database of over 6985 equities. Combined, the S&P Equity Indices represented 84%.

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Quotes & Info

Cleco Corp. (CNL)

At 10:59AM ET: **20.91**

Analyst Estimates

Earnings Est	Current Qtr Dec-05	Next Qtr Mar-06	Current Year Dec-05	Next Year Dec-06
Avg. Estimate	0.18	0.24	1.56	1.31
No. of Analysts	6	2	5	6
Low Estimate	0.13	0.23	1.50	1.10
High Estimate	0.21	0.26	1.61	1.49
Year Ago EPS	0.28	0.18	1.33	1.56

Revenue Est	Current Qtr Dec-05	Next Qtr Mar-06	Current Year Dec-05	Next Year Dec-06
Avg. Estimate	N/A	N/A	776.25M	769.95M
No. of Analysts	0	0	2	2
Low Estimate	N/A	N/A	725.00M	729.00M
High Estimate	N/A	N/A	827.50M	810.90M
Year Ago Sales	N/A	172.12M	N/A	776.25M
Sales Growth (year/est)	N/A	N/A	N/A	-0.8%

Earnings History	Dec-04	Mar-05	Jun-05	Sep-05
EPS Est	0.20	0.26	0.32	0.53
EPS Actual	0.28	0.18	0.40	0.82
Difference	0.08	-0.08	0.08	0.29
Surprise %	40.0%	-30.8%	25.0%	54.7%

EPS Trends	Current Qtr Dec-05	Next Qtr Mar-06	Current Year Dec-05	Next Year Dec-06
Current Estimate	0.18	0.24	1.56	1.31
7 Days Ago	0.20	0.26	1.52	1.44
30 Days Ago	0.21	0.26	1.52	1.44
60 Days Ago	0.26		1.36	1.41
90 Days Ago	0.26		1.37	1.40

EPS Revisions	Current Qtr Dec-05	Next Qtr Mar-06	Current Year Dec-05	Next Year Dec-06

Up Last 7 Days	0	0	1	0
Up Last 30 Days	0	0	1	0
Down Last 30 Days	2	0	1	2
Down Last 90 Days	2	0	1	2

Growth Est	CNL	Industry	Sector	S&P 500
Current Qtr.	-35.7%	5.7%	5.7%	12.3%
Next Qtr.	33.3%	8.3%	8.4%	11.9%
This Year	17.3%	12.5%	11.9%	13.2%
Next Year	-16.0%	14.7%	13.6%	13.1%
Past 5 Years (per annum)	N/A	N/A	N/A	N/A
Next 5 Years (per annum)	4.9%	5.62%	5.76%	10.50%
Price/Earnings (avg. for comparison categories)	13.3	16.65	16.60	16.52
PEG Ratio (avg. for comparison categories)	2.71	2.96	2.88	1.57

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COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY

CASE NO. 2005-00341

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 38

REQUEST NO. K+A33b
PSC/K+A Second SET
INTERROGATORIES
CASE NO. 91-410-EL-AIR

The Risk Premium Approach to Measuring a Utility's Cost of Equity

Eugene F. Brigham, Dilip K. Shome, and Steve R. Vinson

Eugene F. Brigham and Dilip K. Shome are faculty members of the University of Florida and the Virginia Polytechnic Institute and State University, respectively; Steve R. Vinson is affiliated with AT&T Communications.

■ In the mid-1960s, Myron Gordon and others began applying the theory of finance to help estimate utilities' costs of capital. Previously, the standard approach in cost of equity studies was the "comparable earnings method," which involved selecting a sample of unregulated companies whose investment risk was judged to be comparable to that of the utility in question, calculating the average return on book equity (ROE) of these sample companies, and setting the utility's service rates at a level that would permit the utility to achieve the same ROE as comparable companies. This procedure has now been thoroughly discredited (see Robichek [15]), and it has been replaced by three market-oriented (as opposed to accounting-oriented) approaches: (i) the DCF method, (ii) the bond-yield-plus-risk-premium method, and (iii) the CAPM, which is a specific version of the generalized bond-yield-plus-risk-premium approach.

Our purpose in this paper is to discuss the risk-premium approach, including the market risk premium that is used in the CAPM. First, we critique the various procedures that have been used in the past to estimate risk premiums. Second, we present some data on estimated risk premiums since 1965. Third, we examine the relationship between equity risk premiums and the level of interest rates, because it is important, for purposes of estimating the cost of capital, to know just how stable the relationship between risk premiums and interest rates is over time. If stability exists, then one can estimate the cost of equity at any point in time as a function of interest rates as reported in *The Wall Street Journal*, the *Federal Reserve Bulletin*, or some similar source.[1] Fourth, while we do not discuss the CAPM directly, our analysis does have some important implications for selecting a market risk premium for use in that model. Our focus is on utilities, but the methodology is applicable to the estimation of the cost of

[1] For example, the Federal Energy Regulatory Commission's Staff recently proposed that a risk premium be estimated every two years and that, between estimation dates, the last-determined risk premium be added to the current yield on ten-year Treasury bonds to obtain an estimate of the cost of equity to an average utility (Docket RM 80-36). Subsequently, the FCC made a similar proposal ("Notice of Proposed Rulemaking," August 13, 1984, Docket No. 84-800). Obviously, the validity of such procedures depends on (i) the accuracy of the risk premium estimate and (ii) the stability of the relationship between risk premiums and interest rates. Both proposals are still under review.

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equity for any publicly traded firm, and also for non-traded firms for which an appropriate risk class can be assessed, including divisions of publicly traded corporations.[2]

Alternative Procedures for Estimating Risk Premiums

In a review of both rate cases and the academic literature, we have identified three basic methods for estimating equity risk premiums: (i) the *ex post*, or historic, yield spread method; (ii) the survey method; and (iii) an *ex ante* yield spread method based on DCF analysis.[3] In this section, we briefly review these three methods.

Historic Risk Premiums

A number of researchers, most notably Ibbotson and Sinquefield [12], have calculated historic holding period returns on different securities and then estimated risk premiums as follows:

$$\text{Historic Risk Premium} = \begin{pmatrix}\text{Average of the}\\ \text{annual returns on}\\ \text{a stock index for}\\ \text{a particular}\\ \text{past period}\end{pmatrix} - \begin{pmatrix}\text{Average of the}\\ \text{annual returns on}\\ \text{a bond index for}\\ \text{the same}\\ \text{past period}\end{pmatrix}. \quad (1)$$

Ibbotson and Sinquefield (I&S) calculated both arithmetic and geometric average returns, but most of their risk-premium discussion was in terms of the geometric averages. Also, they used both corporate and Treasury bond indices, as well as a T-bill index, and they analyzed all possible holding periods since 1926. The I&S study has been employed in numerous rate cases in two ways: (i) directly, where the I&S historic risk premium is added to a company's bond yield to obtain an estimate of its cost of equity, and (ii) indirectly, wher[illegible] I&S data are used to estimate the market risk premiu[illegible] in CAPM studies.

There are both conceptual and measurement prob[illegible]lems with using I&S data for purposes of estimatin[illegible] the cost of capital. Conceptually, there is no compe[illegible]ling reason to think that investors expect the sam[illegible] relative returns that were earned in the past. Indee[illegible] evidence presented in the following sections indicate[illegible] that relative expected returns should, and do, var[illegible] significantly over time. Empirically, the measured hi[illegible]toric premium is sensitive both to the choice of estima[illegible]tion horizon and to the end points. These choices ar[illegible] essentially arbitrary, yet they can result in significa[illegible] differences in the final outcome. These measureme[illegible] problems are common to most forecasts based on tim[illegible] series data.

The Survey Approach

One obvious way to estimate equity risk premium[illegible] is to poll investors. Charles Benore [1], the seni[illegible] utility analyst for Paine Webber Mitchell Hutchins, [illegible] leading institutional brokerage house, conducts such [illegible] survey of major institutional investors annually. Hi[illegible] 1983 results are reported in Exhibit 1.

Exhibit 1. Results of Risk Premium Survey, 1983*

Assuming a double A, long-term utility bond currently yields 12½[illegible] the common stock for the same company would be fairly priced relat[illegible] to the bond if its expected return was as follows:

Total Return	Indicated Risk Premium (basis points)	Percent of Respondents
over 20½%	over 800	
20½%	800	
19½%	700	
18½%	600	10%
17½%	500	8%
16½%	400	29%
15½%	300	35%
14½%	200	16%
13½%	100	0%
under 13½%	under 100	1%
Weighted average	358	100%

*Benore's questionnaire included the first two columns, while his th[illegible] column provided a space for the respondents to indicate which [illegible] premium they thought applied. We summarized Benore's response[illegible] the frequency distribution given in Column 3. Also, in his questionna[illegible] each year, Benore adjusts the double A bond yield and the total retu[illegible] (Column 1) to reflect current market conditions. Both the quest[illegible] above and the responses to it were taken from the survey conducted [illegible] April 1983.

[2]The FCC is particularly interested in risk-premium methodologies, because (i) only eighteen of the 1,400 telephone companies it regulates have publicly-traded stock, and hence offer the possibility of DCF analysis, and (ii) most of the publicly-traded telephone companies have both regulated and unregulated assets, so a corporate DCF cost might not be applicable to the regulated units of the companies.

[3]In rate cases, some witnesses also have calculated the differential between the yield to maturity (YTM) of a company's bonds and its concurrent ROE, and then called this differential a risk premium. In general, this procedure is unsound, because the YTM on a bond is a *future expected* return on the bond's *market value*, while the ROE is the *past realized* return on the stock's *book value*. Thus, comparing YTMs and ROEs is like comparing apples and oranges.

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Benore's results, as measured by the average risk premiums, have varied over the years as follows:

Year	Average RP (basis points)
1978	491
1979	475
1980	423
1981	349
1982	275
1983	358

The survey approach is conceptually sound in that it attempts to measure investors' expectations regarding risk premiums, and the Benore data also seem to be carefully collected and processed. Therefore, the Benore studies do provide one useful basis for estimating risk premiums. However, as with most survey results, the possibility of biased responses and/or biased sampling always exists. For example, if the responding institutions are owners of utility stocks (and many of them are), and if the respondents think that the survey results might be used in a rate case, then they might bias upward their responses to help utilities obtain higher authorized returns. Also, Benore surveys large institutional investors, whereas a high percentage of utility stocks are owned by individuals rather than institutions, so there is a question as to whether his reported risk premiums are really based on the expectations of the "representative" investor. Finally, from a pragmatic standpoint, there is a question as to how to use the Benore data for utilities that are not rated AA. The Benore premiums can be applied as an add-on to the own-company bond yields of any given utility only if it can be assumed that the premiums are constant across bond rating classes. *A priori*, there is no reason to believe that the premiums will be constant.

DCF-Based *Ex Ante* Risk Premiums

In a number of studies, the DCF model has been used to estimate the *ex ante* market risk premium, RP_M. Here, one estimates the average expected future return on equity for a group of stocks, k_M, and then subtracts the concurrent risk-free rate, R_f, as proxied by the yield to maturity on either corporate or Treasury securities:[4]

$$RP_M = k_M - R_F. \tag{2}$$

Conceptually, this procedure is exactly like the I&S approach except that one makes direct estimates of future expected returns on stocks and bonds rather than assuming that investors expect future returns to mirror past returns.

The most difficult task, of course, is to obtain a valid estimate of k_M, the expected rate of return on the market. Several studies have attempted to estimate DCF risk premiums for the utility industry and for other stock market indices. Two of these are summarized next.

Vandell and Kester. In a recently published monograph, Vandell and Kester [18] estimated *ex ante* risk premiums for the period from 1944 to 1978. R_F was measured both by the yield on 90-day T-bills and by the yield on the Standard and Poor's AA Utility Bond Index. They measured k_M as the average expected return on the S&P's 500 Index, with the expected return on individual securities estimated as follows:

$$k_i = \left(\frac{D_1}{P_0}\right)_i + g_i, \tag{3}$$

where,

D_1 = dividend per share expected over the next twelve months,
P_0 = current stock price,
g = estimated long-term constant growth rate, and
i = the i^{th} stock.

To estimate g_i, Vandell and Kester developed fifteen forecasting models based on both exponential smoothing and trend-line forecasts of earnings and dividends, and they used historic data over several estimating horizons. Vandell and Kester themselves acknowledge that, like the Ibbotson-Sinquefield premiums, their analysis is subject to potential errors associated with trying to estimate expected future growth purely from past data. We shall have more to say about this point later.

---

[4] In this analysis, most people have used yields on long-term bonds rather than short-term money market instruments. It is recognized that long-term bonds, even Treasury bonds, are not risk free, so an RP_M based on these debt instruments is smaller than it would be if there were some better proxy to the long-term riskless rate. People have attempted to use the T-bill rate for R_F, but the T-bill rate embodies a different average inflation premium than stocks, and it is subject to random fluctuations caused by monetary policy, international currency flows, and other factors. Thus, many people believe that for cost of capital purposes, R_f should be based on long-term securities.

We did test to see how debt maturities would affect our calculated risk premiums. If a short-term rate such as the 30-day T-bill rate is used, measured risk premiums jump around widely and, so far as we could tell, randomly. The choice of a maturity in the 10- to 30-year range has little effect, as the yield curve is generally fairly flat in that range.

Malkiel. Malkiel [14] estimated equity risk premiums for the Dow Jones Industrials using the DCF model. Recognizing that the constant dividend growth assumption may not be valid, Malkiel used a nonconstant version of the DCF model. Also, rather than rely exclusively on historic data, he based his growth rates on Value Line's five-year earnings growth forecasts plus the assumption that each company's growth rate would, after an initial five-year period, move toward a long-run real national growth rate of four percent. He also used ten-year maturity government bonds as a proxy for the riskless rate. Malkiel reported that he tested the sensitivity of his results against a number of different types of growth rates, but, in his words, "The results are remarkably robust, and the estimated risk premiums are all very similar." Malkiel's is, to the best of our knowledge, the first risk-premium study that uses analysts' forecasts. A discussion of analysts' forecasts follows.

Security Analysts' Growth Forecasts

Ex ante DCF risk premium estimates can be based either on expected growth rates developed from time series data, such as Vandell and Kester used, or on analysts' forecasts, such as Malkiel used. Although there is nothing inherently wrong with time series-based growth rates, an increasing body of evidence suggests that primary reliance should be placed on analysts' growth rates. First, we note that the observed market price of a stock reflects the consensus view of investors regarding its future growth. Second, we know that most large brokerage houses, the larger institutional investors, and many investment advisory organizations employ security analysts who forecast future EPS and DPS, and, to the extent that investors rely on analysts' forecasts, the consensus of analysts' forecasts is embodied in market prices. Third, there have been literally dozens of academic research papers dealing with the accuracy of analysts' forecasts, as well as with the extent to which investors actually use them. For example, Cragg and Malkiel [7] and Brown and Rozeff [5] determined that security analysts' forecasts are more relevant in valuing common stocks and estimating the cost of capital than are forecasts based solely on historic time series. Stanley, Lewellen, and Schlarbaum [16] and Linke [13] investigated the importance of analysts' forecasts and recommendations to the investment decisions of individual and institutional investors. Both studies indicate that investors rely heavily on analysts' reports and incorporate analysts' forecast information in the formation of their expectations about stock returns. A representative listing of other work supporting the use of analysts' forecasts is included in the References section. Thus, evidence in the current literature indicates that (i) analysts' forecasts are superior to forecasts based solely on time series data, and (ii) investors do rely on analysts' forecasts. Accordingly, we based our cost of equity, and hence risk premium estimates, on analysts' forecast data.[5]

Risk Premium Estimates

For purposes of estimating the cost of capital using the risk premium approach, it is necessary either that the risk premiums be time-invariant or that there exists a predictable relationship between risk premiums and interest rates. If the premiums are constant over time, then the constant premium could be added to the prevailing interest rate. Alternatively, if there exists a stable relationship between risk premiums and interest rates, it could be used to predict the risk premium from the prevailing interest rate.

To test for stability, we obviously need to calculate risk premiums over a fairly long period of time. Prior to 1980, the only consistent set of data we could find came from Value Line, and, because of the work involved, we could develop risk premiums only once a year (on January 1). Beginning in 1980, however, we began collecting and analyzing Value Line data on a monthly basis, and in 1981 we added monthly estimates from Merrill Lynch and Salomon Brothers to our data base. Finally, in mid-1983, we expanded our analysis to include the IBES data.

Annual Data and Results, 1966–1984

Over the period 1966–1984, we used Value Line data to estimate risk premiums both for the electric utility industry and for industrial companies, using the companies included in the Dow Jones Industrial and Utility averages as representative of the two groups. Value Line makes a five-year growth rate forecast, but it also gives data from which one can develop a longer term forecast. Since DCF theory calls for a truly long term (infinite horizon) growth rate, we concluded that it was better to develop and use such a forecast than to

[5]Recently, a new type of service that summarizes the key data from most analysts' reports has become available. We are aware of two sources of such services, the Lynch, Jones, and Ryan's Institutional Brokers Estimate System (IBES) and Zack's Icarus Investment Service. IBES and the Icarus Service gather data from both buy-side and sell-side analysts and provide it to subscribers on a monthly basis in both a printed and computer-readable format.

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Exhibit 2. Estimated Annual Risk Premiums, Nonconstant (Value Line) Model, 1966–1984

January 1 of the Year Reported	Dow Jones Electrics			Dow Jones Industrials			
	k_{Avg}	R_f	RP	k_{Avg}	R_f	RP	(3) ÷ (6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1966	8.11%	4.50%	3.61%	9.56%	4.50%	5.06%	0.71
1967	9.00%	4.76%	4.24%	11.57%	4.76%	6.81%	0.62
1968	9.68%	5.59%	4.09%	10.56%	5.59%	4.97%	0.82
1969	9.34%	5.88%	3.46% −	10.96%	5.88%	5.08%	0.68
1970	11.04%	6.91%	4.13%	12.22%	6.91%	5.31%	0.78
1971	10.80%	6.28%	4.52%	11.23%	6.28%	4.95%	0.91
1972	10.53%	6.00%	4.53%	11.09%	6.00%	5.09%	0.89
1973	11.37%	5.96%	5.41%	11.47%	5.96%	5.51%	0.98
1974	13.85%	7.29%	6.56%	12.38%	7.29%	5.09%	1.29
1975	16.63%	7.91%	8.72% +	14.83%	7.91%	6.92%	1.26
1976	13.97%	8.23%	5.74%	13.32%	8.23%	5.09%	1.13
1977	12.96%	7.30%	5.66%	13.63%	7.30%	6.33%	0.89
1978	13.42%	7.87%	5.55%	14.75%	7.87%	6.88% +	0.81
1979	14.92%	8.99%	5.93%	15.50%	8.99%	6.51%	0.91
1980	16.39%	10.18%	6.21%	16.53%	10.18%	6.35%	0.98
1981	17.61%	11.99%	5.62%	17.37%	11.99%	5.38%	1.04
1982	17.70%	14.00%	3.70%	19.30%	14.00%	5.30%	0.70
1983	16.30%	10.66%	5.64%	16.53%	10.66%	5.87%	0.96
1984	16.03%	11.97%	4.06%	15.72%	11.97%	3.75% −	1.08

use the five-year prediction.* Therefore, we obtained data as of January 1 from Value Line for each of the Dow Jones companies and then solved for k, the expected rate of return, in the following equation:

$$P_0 = \sum_{t=1}^{n} \frac{D_t}{(1 + k)^t} + \left(\frac{D_n(1 + g_n)}{k - g_n}\right)\left(\frac{1}{1 + k}\right)^n. \quad (4)$$

Equation (4) is the standard nonconstant growth DCF model; P_0 is the current stock price; D_t represents the forecasted dividends during the nonconstant growth period; n is the years of nonconstant growth; D_n is the first constant growth dividend; and g_n is the constant, long-run growth rate after year n. Value Line provides D_t values for t = 1 and t = 4, and we interpolated to obtain D_2 and D_3. Value Line also gives estimates for ROE and for the retention rate (b) in the terminal year, n, so we can forecast the long-term growth rate as g_n = b(ROE). With all the values in Equation (4) specified except k, we can solve for k, which is the DCF rate of return that would result if the Value Line forecasts were met, and, hence, the DCF rate of return implied in the Value Line forecast.[7]

Having estimated a k value for each of the electric and industrial companies, we averaged them (using market-value weights) to obtain a k value for each group, after which we subtracted R_f (taken as the December 31 yield on twenty-year constant maturity Treasury bonds) to obtain the estimated risk premiums shown in Exhibit 2. The premiums for the electrics are plotted in Exhibit 3, along with interest rates. The following points are worthy of note:

1. Risk premiums fluctuate over time. As we shall see in the next section, fluctuations are even wider when measured on a monthly basis.
2. The last column of Exhibit 2 shows that risk premi-

*This is a debatable point. Cragg and Malkiel, as well as many practicing analysts, feel that most investors actually focus on five-year forecasts. Others, however, argue that five-year forecasts are too heavily influenced by base-year conditions and/or other nonpermanent conditions for use in the DCF model. We note (i) that most published forecasts do indeed cover five years, (ii) that such forecasts are typically "normalized" in some fashion to alleviate the base-year problem, and (iii) that for relatively stable companies like those in the Dow Jones averages, it generally does not matter greatly if one uses a normalized five-year or a longer-term forecast, because these companies meet the conditions of the constant-growth DCF model rather well.

[7]Value Line actually makes an explicit price forecast for each stock, and one could use this price, along with the forecasted dividends, to develop an expected rate of return. However, Value Line's forecasted stock price builds in a forecasted *change* in k. Therefore, the forecasted price is inappropriate for use in estimating current values of k.

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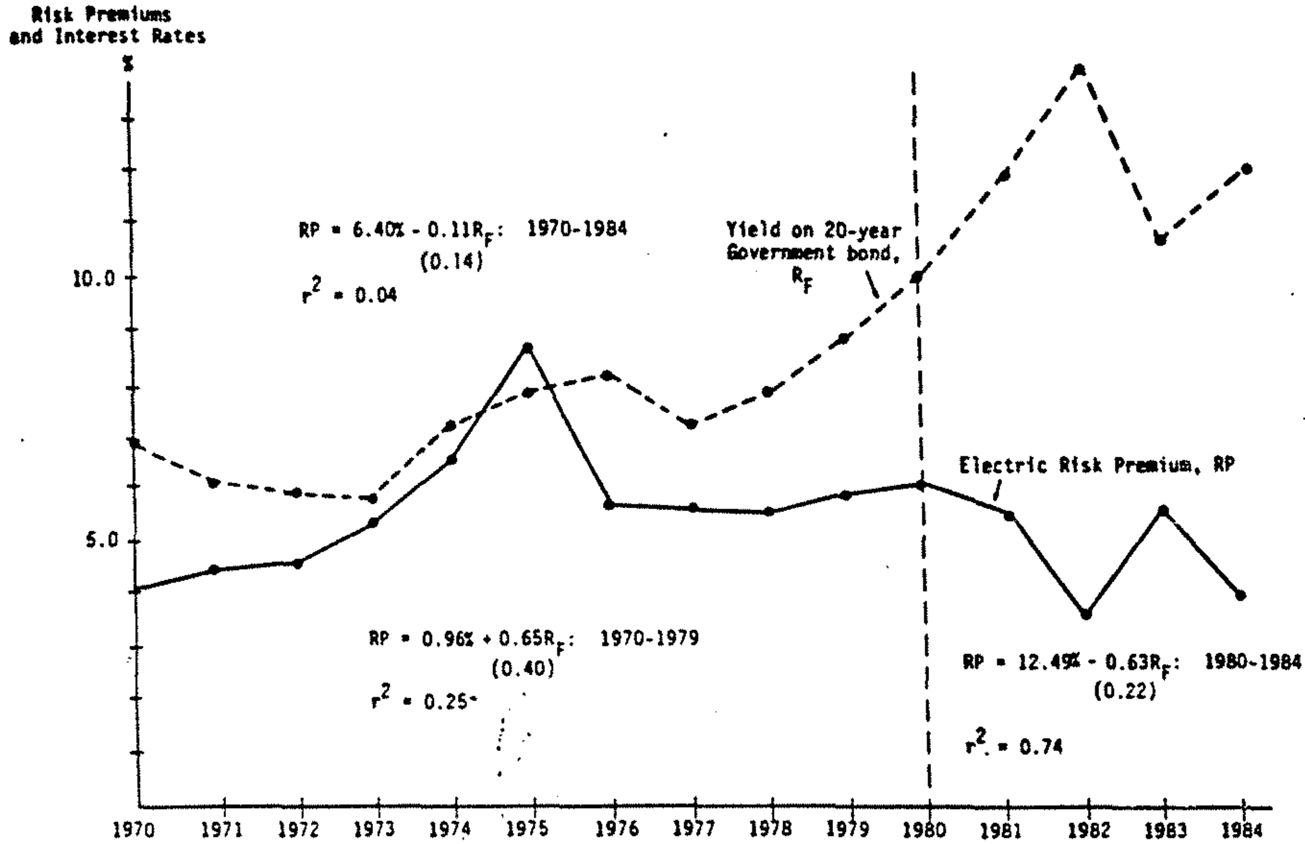
Exhibit 3. Equity Risk Premiums for Electric Utilities and Yields on 20-Year Government Bonds, 1970–1984*



*Standard errors of the coefficients are shown in parentheses below the coefficients

ums for the utilities increased relative to those for the industrials from the mid-1960s to the mid-1970s. Subsequently, the perceived riskiness of the two groups has, on average, been about the same.

3. Exhibit 3 shows that, from 1970 through 1979, utility risk premiums tended to have a positive association with interest rates: when interest rates rose, so did risk premiums, and vice versa. However, beginning in 1980, an inverse relationship appeared: rising interest rates led to declining risk premiums. We shall discuss this situation further in the next section.

Monthly Data and Results, 1980–1984

In early 1980, we began calculating risk premiums on a monthly basis. At that time, our only source of analysts' *forecasts* was Value Line, but beginning in 1981 we also obtained Merrill Lynch and Salomon Brothers' data, and then, in mid-1983, we obtained IBES data. Because our focus was on utilities, we restricted our monthly analysis to that group.

Our 1980–1984 monthly risk premium data, along with Treasury bond yields, are shown in Exhibits 4 and 5 and plotted in Exhibits 6, 7, and 8. Here are some comments on these Exhibits:

1. Risk premiums, like interest rates and stock prices, are volatile. Our data indicate that it would not be appropriate to estimate the cost of equity by adding the current cost of debt to a risk premium that had been estimated in the past. Current risk premiums should be matched with current interest rates.
2. Exhibit 6 confirms the 1980–1984 section of Exhibit 3 in that it shows a strong inverse relationship between interest rates and risk premiums; we shall discuss shortly why this relationship holds.
3. Exhibit 7 shows that while risk premiums based on Value Line, Merrill Lynch, and Salomon Brothers

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Exhibit 4. Estimated Monthly Risk Premiums for Electric Utilities Using Analysts' Growth Forecasts, January 1980–June 1984

Beginning of Month	Value Line	Merrill Lynch	Salomon Brothers	Average Premiums	20-Year Treasury Bond Yield, Constant Maturity Series
Jan 1980	6.21%	NA	NA	6.21%	10.18%
Feb 1980	5.77%	NA	NA	5.77%	10.86%
Mar 1980	4.73%	NA	NA	4.73%	12.59%
Apr 1980	5.02%	NA	NA	5.02%	12.71%
May 1980	4.73%	NA	NA	4.73%	11.04%
Jun 1980	5.09%	NA	NA	5.09%	10.37%
Jul 1980	5.41%	NA	NA	5.41%	9.86%
Aug 1980	5.72%	NA	NA	5.72%	10.29%
Sep 1980	5.16%	NA	NA	5.16%	11.41%
Oct 1980	5.62%	NA	NA	5.62%	11.75%
Nov 1980	5.09%	NA	NA	5.09%	12.33%
Dec 1980	5.65%	NA	NA	5.65%	12.37%
Annual Avg.	5.35%			5.35%	11.31%
Jan 1981	5.62%	4.76%	5.63%	5.34%	11.99%
Feb 1981	4.82%	4.87%	5.16%	4.95%	12.48%
Mar 1981	4.70%	3.73%	4.97%	4.47%	13.10%
Apr 1981	4.24%	3.23%	4.52%	4.00%	13.11%
May 1981	3.54%	3.24%	4.24%	3.67%	13.51%
Jun 1981	3.57%	4.04%	4.27%	3.96%	13.39%
Jul 1981	3.61%	3.63%	4.16%	3.80%	13.32%
Aug 1981	3.17%	3.05%	3.04%	3.09%	14.23%
Sep 1981	2.11%	2.24%	2.35%	2.23%	14.99%
Oct 1981	2.83%	2.64%	3.24%	2.90%	14.93%
Nov 1981	2.08%	2.49%	3.03%	2.53%	15.27%
Dec 1981	3.72%	3.45%	4.24%	3.80%	13.12%
Annual Avg.	3.67%	3.45%	4.07%	3.73%	13.62%
Jan 1982	3.70%	3.37%	4.04%	3.70%	14.00%
Feb 1982	3.05%	3.37%	3.70%	3.37%	14.37%
Mar 1982	3.15%	3.28%	3.75%	3.39%	13.96%
Apr 1982	3.49%	3.61%	4.29%	3.80%	13.69%
May 1982	3.08%	4.25%	3.91%	3.75%	13.47%
Jun 1982	3.16%	4.51%	4.72%	4.13%	13.53%
Jul 1982	2.57%	4.21%	4.21%	3.66%	14.48%
Aug 1982	4.33%	4.83%	5.27%	4.81%	13.69%
Sep 1982	4.08%	5.14%	5.58%	4.93%	12.40%
Oct 1982	5.35%	5.24%	6.34%	5.64%	11.95%
Nov 1982	5.67%	5.95%	6.91%	6.18%	10.97%
Dec 1982	6.31%	6.71%	7.45%	6.82%	10.52%
Annual Avg.	4.00%	4.54%	5.01%	4.52%	13.09%
Jan 1983	5.64%	6.04%	6.81%	6.16%	10.66%
Feb 1983	4.68%	5.99%	6.10%	5.59%	11.01%
Mar 1983	4.99%	6.89%	6.43%	6.10%	10.71%
Apr 1983	4.75%	5.82%	6.31%	5.63%	10.84%
May 1983	4.50%	6.41%	6.24%	5.72%	10.57%
Jun 1983	4.29%	5.21%	6.16%	5.22%	10.90%
Jul 1983	4.78%	5.72%	6.42%	5.64%	11.12%
Aug 1983	3.89%	4.74%	5.41%	4.68%	11.78%
Sep 1983	4.07%	4.90%	5.57%	4.85%	11.71%
Oct 1983	3.79%	4.64%	5.38%	4.60%	11.64%
Nov 1983	2.84%	3.77%	4.46%	3.69%	11.90%
Dec 1983	3.36%	4.27%	5.00%	4.21%	11.83%
Annual Avg.	4.30%	5.37%	5.86%	5.17%	11.22%
Jan 1984	4.06%	5.04%	5.65%	4.92%	11.97%
Feb 1984	4.25%	5.37%	5.96%	5.19%	11.76%
Mar 1984	4.73%	6.05%	6.38%	5.72%	12.12%
Apr 1984	4.78%	5.33%	6.32%	5.48%	12.51%
May 1984	4.36%	5.30%	6.42%	5.36%	12.78%
Jun 1984	3.54%	4.00%	5.63%	4.39%	13.60%

Exhibit 5. Monthly Risk Premiums Based on IBES Data

Beginning of Month	Average of Merrill Lynch, Salomon Brothers, and Value Line Premiums for Dow Jones Electrics	IBES Premiums for Dow Jones Electrics	IBES Premiums for Entire Electric Industry
Aug 1983	4.68%	4.10%	4.16%
Sep 1983	4.85%	4.43%	4.27%
Oct 1983	4.60%	4.31%	3.90%
Nov 1983	3.69%	3.36%	3.36%
Dec 1983	4.21%	3.86%	3.54%
Jan 1984	4.92%	4.68%	4.18%
Feb 1984	5.19%	5.00%	4.36%
Mar 1984	5.72%	5.35%	4.45%
Apr 1984	5.48%	5.33%	4.23%
May 1984	5.36%	5.26%	4.30%
Jun 1984	4.39%	4.47%	3.40%
Average Premiums	4.83%	4.56%	4.01%

Exhibit 6. Utility Risk Premiums and Interest Rates, 1980–1984

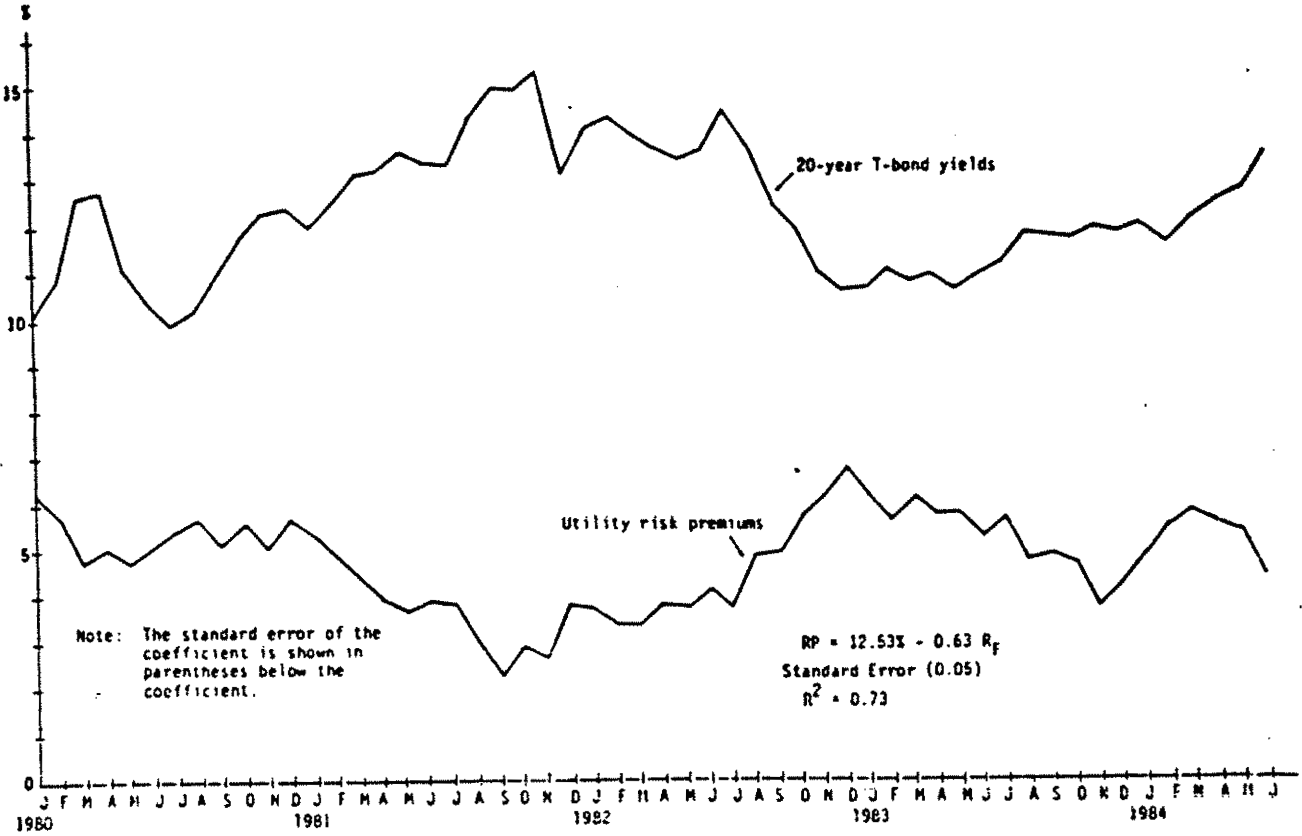

Exhibit 7. Monthly Risk Premiums, Electric Utilities, 1981–1984 (to Date)

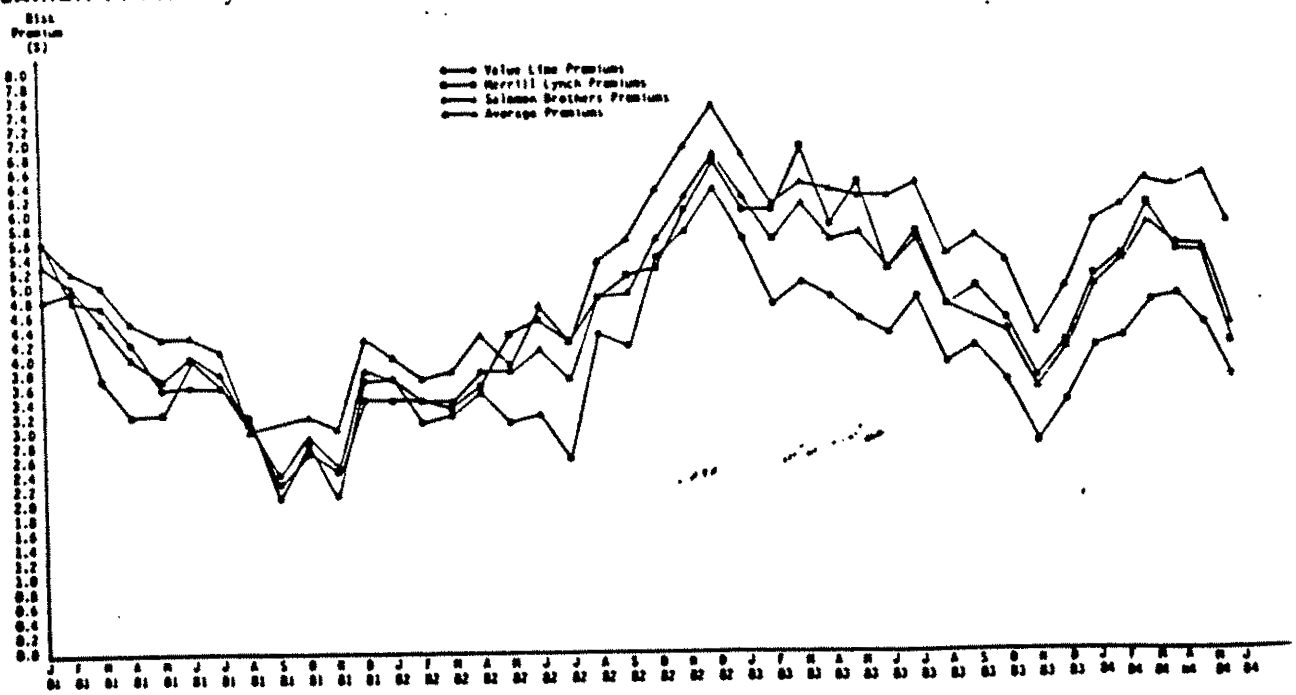

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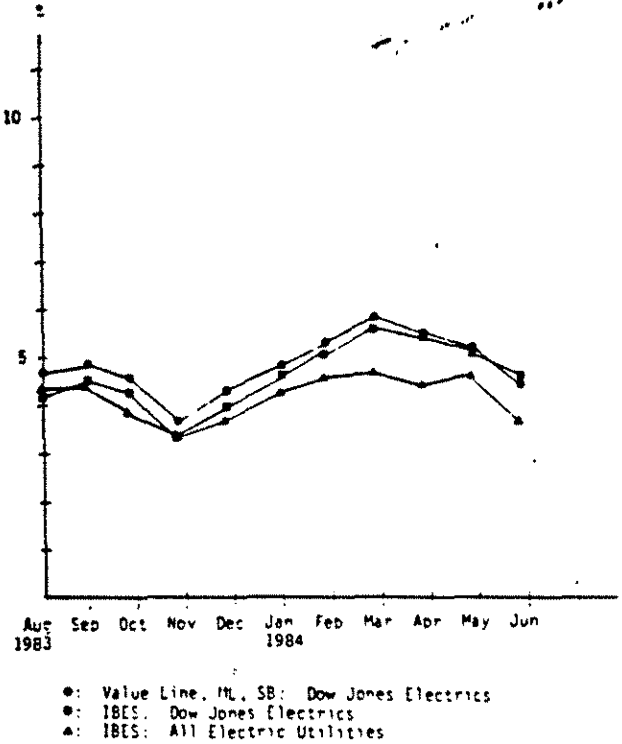
Exhibit 8. Comparative Risk Premium Data



do differ, the differences are not large given the nature of the estimates, and the premiums follow one another closely over time. Since all of the analysts are examining essentially the same data and since utility companies are not competitive with one another, and hence have relatively few secrets, the similarity among the analysts' forecasts is not surprising.

4. The IBES data, presented in Exhibit 5 and plotted in Exhibit 8, contain too few observations to enable us to draw strong conclusions, but (i) the Dow Jones Electrics risk premiums based on our three-analyst data have averaged 27 basis points above premiums based on the larger group of analysts surveyed by IBES and (ii) the premiums on the 11 Dow Jones Electrics have averaged 54 basis points higher than premiums for the entire utility industry followed by IBES. Given the variability in the data, we are, at this point, inclined to attribute these differences to random fluctuations, but as more data become available, it may turn out that the differences are statistically significant. In particular, the 11 electric utilities included in the Dow Jones Utility Index all have large nuclear investments, and this may cause them to be regarded as riskier than the industry average, which includes both nuclear and non-nuclear companies.

Tests of the Reasonableness of the Risk Premium Estimates

So far our claims to the reasonableness of our risk-premium estimates have been based on the reasonableness of our variable measures, particularly the measures of expected dividend growth rates. Essentially, we have argued that since there is strong evidence in the literature in support of analysts' forecasts, risk premiums based on these forecasts are reasonable. In the spirit of positive economics, however, it is also important to demonstrate the reasonableness of our results more directly.

It is theoretically possible to test for the validity of the risk-premium estimates in a CAPM framework. In a cross-sectional estimate of the CAPM equation,

$$(k - R_f)_i = \alpha_0 + \alpha_1\beta_i + u_i, \qquad (5)$$

we would expect

$\hat{\alpha}_0 = 0$ and $\hat{\alpha}_1 = k_M - R_f =$ Market risk premium.

This test, of course, would be a joint test of both the CAPM and the reasonableness of our risk-premium estimates. There is a great deal of evidence that questions the empirical validity of the CAPM, especially when applied to regulated utilities. Under these conditions, it is obvious that no unambiguous conclusion can be drawn regarding the efficacy of the premium estimates from such a test.*

A simpler and less ambiguous test is to show that the risk premiums are higher for lower rated firms than for higher rated firms. Using 1984 data, we classified the

*We carried out the test on a monthly basis for 1984 and found positive but statistically insignificant coefficients. A typical result (for April 1984) follows:

$$(k - R_f)_i = \underset{(0.91)}{3.1675} + \underset{(1.44)}{1.8031}\,\beta_i.$$

The figures in parentheses are standard errors. Utility risk premiums do increase with betas, but the intercept term is not zero as the CAPM would predict, and α_1 is both less than the predicted value and not statistically significant. Again, the observation that the coefficients do not conform to CAPM predictions could be as much a problem with CAPM specification for utilities as with the risk premium estimates.

A similar test was carried out by Friend, Westerfield, and Granito [9]. They tested the CAPM using expectational (survey) data rather than *ex post* holding period returns. They actually found their coefficient of β_i to be negative in all their cross-sectional tests.

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Exhibit 9. Relationship between Risk Premiums and Bond Ratings, 1984*

Month	Aaa/AA	AA	Aa/A	A	A/BBB	BBB	Below BBB
January†	—	2.61%	3.06%	3.70%	5.07%	4.90%	9.45%
February	2.98%	3.17%	3.36%	4.03%	5.26%	5.14%	7.97%
March	2.34%	3.46%	3.29%	4.06%	5.43%	5.02%	8.28%
April	2.37%	3.03%	3.29%	3.88%	5.29%	4.97%	6.96%
May	2.00%	2.48%	3.42%	3.72%	4.72%	6.64%	8.81%
June	0.72%	2.17%	2.46%	3.16%	3.76%	5.00%	5.58%
Average	2.08%	2.82%	3.15%	3.76%	4.92%	5.28%	7.84%

*The risk premiums are based on IBES data for the electric utilities followed by both IBES and Salomon Brothers. The number of electric utilities followed by both firms varies from month to month. For the period between January and June 1984, the number of electrics followed by both firms ranged from 96 to 99 utilities.
†In January, there were no Aaa/AA companies. Subsequently, four utilities were upgraded to Aaa/AA.

utility industry into risk groups based on bond ratings. For each rating group, we estimated the average risk premium. The results, presented in Exhibit 9, clearly show that the lower the bond rating, the higher the risk premiums. Our premium estimates therefore would appear to pass this *simple test of reasonableness*.

Risk Premiums and Interest Rates

Traditionally, stocks have been regarded as being riskier than bonds because bondholders have a prior claim on earnings and assets. That is, stockholders stand at the end of the line and receive income and/or assets only after the claims of bondholders have been satisfied. However, if interest rates fluctuate, then the holders of long-term bonds can suffer losses (either realized or in an opportunity cost sense) even though they receive all contractually due payments. Therefore, if investors' worries about "interest rate risk" versus "earning power risk" vary over time, then perceived risk differentials between stocks and bonds, and hence risk premiums, will also vary.

Any number of events could occur to cause the perceived riskiness of stocks versus bonds to change, but probably the most pervasive factor, over the 1966–1984 period, is related to inflation. Inflationary expectations are, of course, reflected in interest rates. Therefore, one might expect to find a relationship between risk premiums and interest rates. As we noted in our discussion of Exhibit 3, risk premiums were positively correlated with interest rates from 1966 through 1979, but, beginning in 1980, the relationship turned negative. A possible explanation for this change is given next.

1966–1979 Period. During this period, inflation heated up, fuel prices soared, environmental problems surfaced, and demand for electricity slowed even expensive new generating units were nearing comp tion. These cost increases required offsetting rate hik to maintain profit levels. However, political pressu combined with administrative procedures that were r designed to deal with a volatile economic envirc ment, led to long periods of "regulatory lag" tl caused utilities' earned ROEs to decline in absolı terms and to fall far below the cost of equity. The factors combined to cause utility stockholders to ex rience huge losses: S&P's Electric Index dropped fr a mid-1960s high of 60.90 to a mid-1970s low 20.41, a decrease of 66.5%. Industrial stocks also s fered losses during this period, but, on average, tl were only one third as severe as the utilities' loss Similarly, investors in long-term bonds had losses, bond losses were less than half those of utility stoc Note also that, during this period, (i) bond invest were able to reinvest coupons and maturity payme at rising rates, whereas the earned returns on equity not rise, and (ii) utilities were providing a rising sh of their operating income to debtholders versus sto holders (interest expense/book value of debt was ing, while net income/common equity was declinir This led to a widespread belief that utility commissi would provide enough revenues to keep utilities fr going bankrupt (barring a disaster), and hence to p tect the bondholders, but that they would not neces ily provide enough revenues either to permit the pected rate of dividend growth to occur or, perh even to allow the dividend to be maintained.

Because of these experiences, investors came to gard inflation as having a more negative effect *utility stocks than on bonds*. Therefore, when fear inflation increased, utilities' measured risk premi

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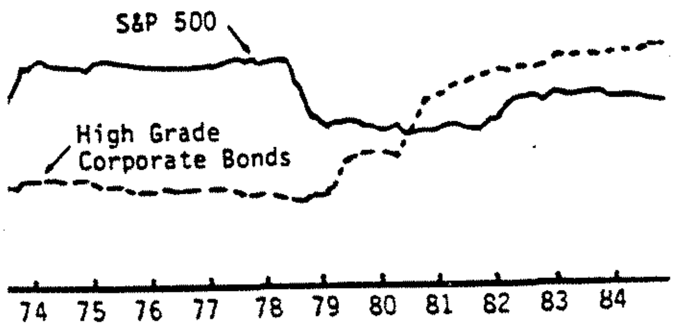
, 1965–1984



he last 5 years

on the money supply rather than on interest rates.[9]

In the 1980–1984 period, an increase in inflationary expectations has had a more adverse effect on bonds than on utility stocks. If the expected rate of inflation increases, then interest rates *will increase* and bond prices *will fall*. Thus, uncertainty about inflation translates directly into risk in the bond markets. The effect of inflation on stocks, including utility stocks, is less clear. If inflation increases, then utilities should, in theory, be able to obtain rate increases that would offset increases in operating costs and also compensate for the higher cost of equity. Thus, with "proper" regulation, utility stocks would provide a better hedge against unanticipated inflation than would bonds. This hedge did not work at all well during the 1966–1979 period, because inflation-induced increases in operating and capital costs were not offset by timely rate increases. However, as noted earlier, both the utilities and their regulators seem to have learned to live better with inflation during the 1980s.

Since inflation is today regarded as a major investment risk, and since utility stocks now seem to provide a better hedge against unanticipated inflation than do increase in equity risk premiums. However, in 1980 and thereafter, rising inflation and interest rates increased the perceived riskiness of bonds more than that of utility equities, so the relationship between interest rates and utility risk premiums shifted from positive to negative. Earlier, a 1.00 percentage point increase in interest rates had led, on average, to a 1.73% increase in the utilities' cost of equity, but after 1980 a 1.00 percentage point increase in the cost of debt was associated with an increase of only 0.37% in the cost of equity.

Our study also has implications for the use of the CAPM to estimate the cost of equity for utilities. The CAPM studies that we have seen typically use either Ibbotson-Sinquefield or similar historic holding period returns as the basis for estimating the market risk premium. Such usage implicitly assumes (i) that *ex post* returns data can be used to proxy *ex ante* expectations and (ii) that the market risk premium is relatively stable over time. Our analysis suggests that neither of these assumptions is correct; at least for utility stocks, *ex post* returns data do not appear to be reflective of *ex ante* expectations, and risk premiums are volatile, not stable.

Unstable risk premiums also make us question the FERC and FCC proposals to estimate a risk premium for the utilities every two years and then to add this premium to a current Treasury bond rate to determine a utility's cost of equity. Administratively, this proposal would be easy to handle, but risk premiums are simply too volatile to be left in place for two years.

[9]Because the standard deviations in Exhibit 10 are based on the last five years of data, even if bond returns stabilize, as they did beginning in 1982, their reported volatility will remain high for several more years. Thus, Exhibit 10 gives a rough indication of the current relative riskiness of stocks versus bonds, but the measure is by no means precise or necessarily indicative of future expectations.

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COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of: **GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY**	**CASE NO. 2005-00341**

**KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO**

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 42

Kentucky Power Company
Compution of the Gross Revenue
Conversion Factor
Test Year Twelve Months Ended 6/30/2005

Ln No (1)	Description (2)	Percent of Incremental Gross Revenues (3)
1	Operating Revenues	100.00%
2	Less: Uncollectable Accounts Expense [1/]	0.47%
3	Income Before Income Taxes	99.53%
4	Less: State Income Taxes (Ln 3 x 7.20%)[2/]	7.16%
5	Income Before Federal Income Taxes	92.36%
6	Less: Federal Income Taxes (Ln 5 x 35%)	32.33%
7	Operating Income Percentage	60.04%
8	Gross Revenue Conversion Factor (100% / Ln 7)	1.6656

[1/] Per Workpaper S-2, Page 3, Col 5, Line 5

[2/] State Income Tax Effective Rate Calculations

State Income Tax Rate - Ky	7.00%	
Apportionment Factor	100.00%	
Effective Kentucky State Income Tax Rate		7.00%
State Income Tax Rate - WVA	9.00%	
Apportionment Factor	0.47%	
Effective West Virginia State Income Tax Rate		0.04%
State Income Tax Rate - OH	8.50%	
Apportionment Factor	7.59%	
Phase-Out Factor	24.00%	
Effective Ohio State Income Tax Rate		0.15%
Total Effective State Income Tax Rate		7.20%

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

GENERAL ADJUSTMENTS IN ELECTRIC RATES OF KENTUCKY POWER COMPANY	CASE NO. 2005-00341

KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.
RESPONSE TO
KENTUCKY POWER COMPANY'S
FIRST SET OF DATA REQUESTS TO

ATTACHMENT TO

KENTUCKY POWER COMPANY'S

DATA REQUEST NO. 30