QUANTIFYING THE POTENTIAL ACCURACY OF THE INCOME APPROACH IN PUBLIC UTILITY AND RAILROAD PROPERTY VALUATION

by

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I. Introduction

This paper explores the application of quantitative methods in the appraisal or public utility and railroad properties. Multiple regression analysis and other statistical techniques have been used successfully for some twenty years in the United States and elsewhere in the appraisal of locally assessed properties. Use of such techniques has been particularly boosted in recent years by reduced computer costs and the availability of powerful microcomputers and general purpose data management and statistical software. Although most of the early work focused on residential properties, attention has turned to commercial and income properties. This paper concludes that quantitative methods have a potential role in the valuation of public service properties as well.

Multiple regression analysis (MRA) is a statistical technique for estimating unknown parameters based on an analysis of known and available data. In property valuation, equations are estimated to predict the probable selling prices of

properties based on recent sales and current property data. The technique and related methods have two formidable advantage. First, they are objective, being directly rooted in market data. By nature of the technique, the average predicted value equals the average sale price and the sum of the prediction errors is minimized. Second, the techniques produce a number of statistics that document the reliability of the results. Successful applications, however, require sufficient and accurate data.

Although public services companies are not often sold, they regularly report income and other financial data and their securities are traded on the open market. The capitalization of a public service company consists of debt and equity. Valuation of the equity portion is the more difficult because of its junior position and greater volatility. By nature, property valuation seeks to determine a stabilized value and thus, in the case of publicly traded companies, cannot be based simply on the latest market quotes. This paper concentrates specifically on valuation of the equity portion of public service companies. If this portion can be estimated reliably, the value of the liabilities can be added.

Much research has been done and many excellent articles written on the valuation theory of public service properties. Several authors have addressed the choice of the income level to be capitalized, as well as proper capitalization methods. James

W. Martin's articles of the 1940s and 1950s laid the groundwork, followed later by Doering, Fisher, Christy, Goodwin, Ifflander, and others. Many authors have also addressed the theory and application of the stock and debt approach. The National Tax Journal and the proceedings of the Workshops on Public Utility Valuation held annually at Wichita State University contain many of the leading articles.

The financial textbooks also address the subject of income capitalization and valuation theory as applied to publicly traded companies. Weston and Brigham's classic, Managerial Finance, describes the markets for stocks, bonds, and other assets, and how investors analyze them and make buy/sell decisions. It also describes how regression analysis can be used in financial analysis. Fisher and Jordan's Security Analysis and Portfolio Management and similar textbooks concentrate more specifically on appraisal techniques, particularly "fundamental" approaches based on income and financial analysis.

Little empirical work, however, has been done to develop valuation models for public service companies. That is, emphasis has been on what methods are conceptually appropriate rather than what specific formulations actually give good results. Building on the conceptual work of others, this paper explores the use of statistical techniques to formulate models

for the valuation of public service companies. The results are encouraging.

II. Data Base and Study Design

The income approach states that present value is a function of anticipated income in conjunction with the required rate of return on investment, that is,

$$MV = f(I, r)$$

where MV = market value, I = income, and r = required rate of return (discount rate).

Anticipated income can be expressed in terms of its current level and anticipated direction and rate of change:

$$I = f(\text{current level, anticipated change})$$

Although the direction and rate of change is not known, one can make projections based on recent trends. Important issues in this regard are the usefulness of past data in predicting future trends, the time frame to be considered, and the appropriate weighting of older periods relative to recent ones.

The required rate of return on investment is divided between a base or "safe" rate and an allowance for risk. The

former is largely a function of the rate of inflation and interest rates and is relatively fixed at any point in time, but the latter varies among industries and individual companies. Good proxies for company-specific risk include the stability of previous income figures, debt ratios, and perhaps size. Hence,

MV = f (current income, growth, industry, stability, debt, market share)

This is the basic model quantified in this paper. The market value of the equity position (MV) is based on an average of the high and low stock prices over the period in question. Market values are expressed on a per share basis to facilitate interpretation and comparisons and to prevent large capitalization companies from skewing the results.

Data used in the study were obtained from the Value Line Investment Survey and are summarized in Exhibit 1. Stock prices were recorded for 1984 through 1989 and income figures for 1983 through 1989, although 1989 figures are preliminary and reflect Value Line estimates. In all data were obtained for 177 companies as follows:

Electric	98
Gas Distribution	48
Telecommunications	23
Railroad	8

Section III summarizes and compares financial ratios and trends for these companies.

The first major issue examined is the level of income to be capitalized or utilized in a valuation model for public service companies. Section IV compares the results of models based on three income levels: revenues, cash flow, and earnings. Each model considers the level, growth, and stability of income over the six year period, 1983 through 1988. For comparison purposes, an analogous model based on book value is also developed.

Section V considers the timing and weighting of income data used in models. Initial models are developed using 1986 stock prices and average income figures for the period, 1983 through 1988. Subsequent models test alternative weighting schemes and, in some cases, use only income data for the period, 1983 - 1985, in order to evaluate the loss in predictability of using only past income data, as one must ordinarily do for appraisal purposes.

Using knowledge gained from the above analyses, Section VI turns to the estimation of 1989 stock prices. The companies are separated into a "development" and "test" group, overall and industry models are developed for the former, and the resulting models are applied against both the development and test groups. In addition to the usual MRA statistics, results are evaluated through ratio studies, long used in quality control studies for

locally assessed properties. Section VII states the conclusions.

III. Financial Analysis

Exhibits 2-A through 2-F present key financial statistics for the period, 1984 - 1989. Exhibit 2-A contains overall statistics for all 177 companies. The average price/revenue ratio is 1.51, the average price/cash flow ratio is 8.85, and the average price/earnings ratio is 22.35. On average, cash flow constituted 32 percent of revenues, earnings 28 percent of cash flow, and dividends 71 percent of earnings. The long term debt ratio averaged 47 percent and the price/book value ratio averaged 2.10. All the statistics, of course, reflect the influence of extreme values, whose range is indicated by the minimum and maximum values.

The second part of the exhibit shows total changes over the period. Price per share increased an average of 73 percent and total equity 99 percent, while book value increased only 16 percent. Revenues increased 43 percent, cash flow 34 percent, earnings 17 percent, and dividends 40 percent, although on a per share basis the corresponding figures are substantially less because of increases in the number of shares outstanding. At the same time, the long term debt ratio increased an average of

8.5 percent. The lower third of the exhibit shows the same figures on on annual basis.

Figures 2-B through 2-E present similar statistics by industry and Exhibit 3 compares industry averages. Of the three price/income ratios, price/cash flow ratios are most consistent among industries, ranging from 7.67 in the telecommunications industry to 10.96 in the gas distribution industry, while price/revenue and price/earnings ratios exhibit wider percentage variations. Dividend (yield) rates average between 3 and 5 percent and are highest in the electric industry. Price/book value ratios are highest in the telecommunications industry (2.66).

An examinations of the growth rates shown in the second and third portions of the exhibit reveal large differences among the four industries. Price per share grew far more in the telecommunications than in the other three industries. Interestingly, this was accompanied by unusually large gains in cash flow and earnings, while revenue and dividend growth were more typical. The railroad industry, on average, suffered decreases in book value, earnings, and dividends, although share prices increased.

IV. Comparison of Income Levels

As illustrated above, the relationship between income and stock prices can be complex and irregular. Conceptually,

investors should prefer high current levels, positive growth, and minimal dispersion. Exhibits 4-A through 4-C plot average price per share with average revenue, cash flow, and earning per share over the period, 1984 - 1989. Correlation coefficients are .453, .868, and .761, respectively. At first blush, then, cash flow far outperforms gross revenues as a predictor of price per share and significantly outperforms earnings.

A series of regression models were developed to explore these relationships further. The models took the general form,

$$PPS = B0 + (B1 * I) + (B2 * \%I) + (B3 * ?I)$$

where PPS = price per share

I = income per share (revenue, cash flow, or earnings),

%I = percentage change in income

?I = average deviation about trend line

B0 is the regression constant (intercept) and B1, B2, and B3 the regression coefficients. To reduce the impact of companies experiencing atypical conditions, two regressions were run, with the second excluding those five perent of companies that most changed the coefficients from what they would othersise be (as indicated by "studentized" residual errors). Price per share and income figures were both averaged over a six year period, the objective being to evaluate long term relationships.

A gross revenue, cash flow, and earning per share model as described above were run overall and for each industry except railroads, which comprises only eight companies. Exhibits 5-A through 5-C summarize the results. As shown in Exhibit 5-A, the overall R-Square adjusted for degrees of freedom in the gross revenue model is .422, meaning that the model is able to explain only 42.2 percent of the variation in price per share among companies, although the percentages are significantly higher in the gas distribution and railroad industries. The coefficient of variation (COV), the ratio of the standard deviation to the mean, is 26.5 overall, also not impressive. In terms of the individual predictors, however, the models produced strong results. Revenue per share is highly significant, as indicated by the high t-values, and accounts for the major source of variation in price per share, as indicated by the high beta-values. Growth in revenue is also strongly significant and, as expected, is positive. Other things equal, a one dollar increase in revenue per share is associated with a more than one dollar increase in price per share. As expected, coefficients for the dispersion in revenues is negative: the larger the variation, the lower the price per share.

As illustrated in Exhibit 5-B, however, the cash flow models give far better results. The overall adjusted R-square is .845 and the COV is 14.8. Coefficients for average cash flow per share are particularly strong. The dispersion of cash flows

is only significant in the electric industry, suggesting that the market is more tolerant of variations in cash flow than in revenue.

Exhibit 5-C presents the results for the earnings per share models. The results are strong, but fall short of the cash flow models. In some cases the coefficients for growth and dispersion in earnings per share run counter to what one would expect (special situations probably account for much of such occurrences). In short, then, although level, growth, and variation in earnin gs per share are able to account for some three-fourths of the variation is stock prices (as indicated by the R-Square), cash flow models produce better results.

Finally, for comparison purposes, Exhibit 5-D presents a similar model based on the level, growth, and dispersion in book values. Results are better than those produced by the revenue and earnings models but fall somewhat short of those produced by the cash flow models.

V. Timing and Weighting of Income Periods

The above income models were only evaluate on a simple basis the long run relationship between price per share and income data. Other variables will now be considered and alternative weighting schemes compared. The dependent variable in this series of models is average price per share for 1986.

Both 1983 - 1988 and 1983 - 1985 income periods are tested in order to evaluate the loss in predictability of having only prior income figures available at the time of appraisal.

Because various income levels are combined and a number of ratio variables (e.g., earnings and dividend ratios) are employed, the simple additive MRA models used above no longer suffice. Instead, multiplicative or "nonlinear" models, which make use of multipliers and percentage adjustment, are appropriate. Such models begin with a base rate, such as price per dollar of revenue, and then apply appropriate upward and downward adjustment. A simple model of this type might appear as follows:

$$PPS = B0 * REV^{B1} * (1 + CF/REV)^{B2} * (1 + E/CF)^{B3} * B4^{TELE}$$

where PPS= price per share, REV = revenue per share, CF/REV = ratio of cash flow to revenue, E/CF = ratio of earnings to cash flow, and TELE = telecommunications industry (0 = no, 1 = yes). Substituting some hypothetical numbers:

$$PPS = .60 * REV^{.80} * (1 + CF/REV)^{.90} * (1 + E/CF)^{1.15} * 1.25^{TELE}$$

Note that B0 and B4 are multipliers and that B1, B2, and B3 are exponents. Multipliers greater than 1.00 increase the result; multipliers below 1.00 decrease the result. Exponents above

1.00 expand the variable to which they apply; exponents below 1.00 contract the variable: exponents less than zeros reverse a relationship. Some examples follow:

$$2^{1.5} = 2.83 \qquad 2^{.5} = 1.41 \qquad 2^{-.5} = .71$$

$$4^{1.5} = 8.00 \qquad 4^{.5} = 2.00 \qquad 4^{-.5} = .50$$

Assume that in the above example, REV = 50, CF = 20, E = 10, and TELE = 1 (yes). Then,

$$PPS = .60 * 50^{.80} * (1.40)^{.90} * (1.50)^{1.15} * 1.25^{1}$$

$$PPS = .60 * 22.87 * 1.26 * 1.35 * 1.25 = 36.82$$

As in the simple example above, the variables in a multiplicative model are usually initialized or centered close to 1.00 (this is the reason for adding 1.00 to the cash flow and earnings ratios).

Multiplicative models cannot be solved directly with MRA. However, they can be solved by taking logarithms of both sides, which yields an additive model, applying MRA in the usual manner, and then converting the result back to original units through antilogarithms. While more complex, multiplicative models have the important advantage that they will accommodate

ratio terms and percentage adjustments, which are important in income properties, particularly public service companies.

Exhibit 6 presents the variables used in the models that follow. Notice that the income and dividend terms generally take three forms: one for level, one for change, and one for dispersion. Except for revenue or cash flow itself, which serves as the "lead" term in the model, the other terms either begin at or are centered on 1.00. In addition to income and dividend variables, variables are included for debt ratios, industry, and size. In general the models presented use a stepwise procedure that selects only significant variables (95 percent confidence level) for inclusion. As before, a two stage approach is employed, with the second regression excluding those five percent of cases that most adversely impact stability in the first model. The first model of this type is a gross revenue model based on 1986 price per share and 1983 - 1988 income data with each year accorded equal weight. Candidate variables include all those in Exhibit 6 except variables 7, 8, an 9. Exhibit 7 shows the results and format of the model. The adjusted R-square is .922 and the coefficient of dispersion (COD), which measures the average percent error, is 9.2. The COD can be gauged against appraisal performance standards adopted by the International Association of Assessing Officers (IAAO), which recommend a standard of 15.0 for income properties. In terms of the individual predictors, the model is

dominated by the revenue and cash flow variables, although the other variables make significant contributions as well. As expected, high dividend rates and a history of dividend increases are associated with higher stock prices; wide dispersion in dividend payments is associated with lower prices. As also expected, higher debt ratios imply lower stock prices. Heavy reliance on nuclear energy as a revenue source by electric companies tends also to be reflected in lower prices.

Exhibit 8-A through 8-D present cash flow models designed to compare the effect of different income periods and weighting schemes. The model in Exhibit 8-A is the same as that in Exhibit 7 except that it excludes revenue data. Candidate variables are all those in Exhibit 6 except 1 through 6. The results are similar to those obtained in the prior model, suggesting that one can exclude revenue data, thus simplifying the modeling process, with little loss in predictive accuracy.

On the hypothesis that recent income data are more important than older data, the model was rerun using a 1-2-3-3-2-1 weighting structure: 1/12 of the weight is given to 1983 income figures, 2/12 to 1984 figures, 3/12 to 1985 figures, and so forth. Exhibit 8-B summarizes the results. The predictive results, as indicated by the R-Square and COD are slightly better, and terms significant in the model are similar.

Next, to evaluate the loss in predictive ability from not having present and future income data, the model was rerun using

average income figures for the years 1983 - 1986 only. The results (Exhibit 8-C) should be compared with those in Exhibit 8-A, which uses average income over the six year period, 1983 - 1989. Importantly, although the results have slipped, they still achieve a high level of accuracy. Thus, while one like to know future incomes, reliable models can still be developed from past figures alone.

Finally, this model was rerun using a 1-2-3 income weighting scheme: 1/6 weight given to 1983, 2/6 to 1984, and 3/6 to 1985. The results are slightly better than when each year is given equal weight. Perhaps equally important, the number of variables falls from twelve in Exhibit 8-C to only eight, suggesting that an appropriate income weighting scheme may give simpler models.

VI. Valuation Models

Appraisers must estimate value as of a given date based on currently available data. Accordingly, a final set of models was developed to estimate average 1989 stock prices based on 1984 through 1989 income data. As a quality control measure, the 177 companies wre divided into a "development" and "test" group as follows:

	Development	Test
Electric companies	98	10
Gas distribution	48	5
Telecommunications	23	3
Railroads	8	2
Total	157	20

The models were developed on the larger, development group only but applied against both groups. The smaller, test group thus serves as an independent group for demonstrating application of the models and further checking their reliability. As before, the models were run in two stages, with the 5 percent most extreme cases from the first model excluded in the second model. Similarly, one case (again 5 percent) is deleted from the control group in quality control analysis. The models are of the cash flow variety, that is, they exclude revenue data and consider the variables listed in Exhibit 6 except for items 1 through 6.

Exhibit 9 shows the overall results when income figures from each of the five years is accorded equal weight. Although the results fall short of the excellent results shown in Exhibit 8-A, which is a comparable model using 1986 stock prices, the COD of 14.1. The model itself is simple, with value as a function of cash flow per share adjusted upward for an

increasing dividend rate and adjusted downward for high or increasing debt ratios. Companies in the telecommunications industry command premium price/cash flow multiples and reliance on nuclear enrgy as a revenue source exerts a negative impact.

Exhibit 9-B presents a similar model using a 1-2-3-4-5 income weighting sceme: 1/15 of the weight is given to 1983 income figures, 2/15 to 1984 icome figures, and so forth. The results improve modestly.

This model is then repeated separately by industry. Exhibit 10-A shows the results for the electric industry. The COD is a very impressive 10.0. The model states that price is a function of cash flow adjusted upward for high or increasing earnings and dividend ratios and downward for increasing debt ratios.

Exhibits 10-A through 10-D present comparable results for the gas distribution, telecommunications, and railraod industries. Results for the gas distribution industry are very good, with a COD of 9.7. The model is simple, stating that price is a function of cash flow adjusted downward for higher debt ratios and upward for size. The models for the telecommunications and railroad industries consist only of a constant and single variable, cash flow (because of the small sample size, this was the only candidate variable used in the railroad industry).

Exhibit 11 shows application of both the overall model (Exhibit 9-B) and industry models (Exhibits 10-A through 10-D) to the test test froup. The median ratios of the predicted to actual prices per share are .965 and .949 respectively. The CODs are 12.5 and 13.6. The slightly better results obtained by the industry models on both the development and test groups suggest that predicability can be improved through industry models when adequate data are available.

VII. Conclusions

Quantitative methods can be used to develop accurate valuation models for many public service companies. Although exploratory in nature, the price per share models presented here achieve a high level of accuracy and compare favorably with professional standards for locally assessed properties. When the value of liabilities, which can usually be estimated more easily, is added, the combined results should be at least equally as accurate. Some specific conclusions follow:

1. The objectivity of quantitative technqiues is a formidable advantage, as evidenced by the fact that median ratios consistently near 100 percent. That is, at least on average, the models neither under- or overvalue.
2. In addition to goodness-of-fit measures, such as R-Square and the COV, ratio study statistics are useful in

evaluating the accuracy of models, particularly since professional standards exist for such measures.

3. Models can but need not consider revenue data. Cash flow provides an equally good starting point. Disregard of cash flow in favor of only earning will lower predictability.
4. Models can be enhanced through appropriate income weighting stategies and stratification, at least in the case of the electric and gas distribution industries.
5. In addition to income levels, models should consider past changes and variations in income trends. A history of increasing cash flow and dividends, in particlar, tends to command market premiums.

Exhibit 1
Data Used in Analysis

Company Symbol and Name

Industry (electric, gas distribution, telecommunications, or RR)

1984 - 1989 Stock Price per Share: low and high

1983 - 1989 Revenue per Share

1983 - 1989 Cash Flow per Share

1983 - 1989 Earnings per Share

1983 - 1989 Dividends per Share

1983 - 1989 Book Value per Share

1983 - 1989 Common Shares Outstanding

1983 - 1989 Long Term Debt Ratio

Percent of electric utility revenues derived from nuclear energy

Source: Value Line

Exhibit 2-A

Descriptive Statistics - All Industries (177 Companies)

Financial Ratios:	Mean	Std Dev	Minimum	Maximum
Equity Value ($mil)	2003.24	3370.61	61.51	28045.92
Price per Share	24.94	9.88	4.26	62.03
Price/Revenue	1.51	.78	.27	5.81
Price/Cash Flow	8.85	6.75	4.40	92.10
Price/Earnings	22.35	11.55	8.02	127.33
Dividend Rate	.05	.02	.00	.15
Cash Flow/Revenue	.32	.08	.08	.48
Earnings/Cash Flow	.28	.10	-.15	.51
Dividends/Earnings	.71	.34	.00	3.36
Long Term Debt Ratio	.47	.08	.00	.67
Price/Book Value	2.10	.59	.73	5.30

% Growth (84 - 89):	Mean	Std Dev	Minimum	Maximum
Price per Share	73.09	92.13	-64.85	640.40
Shares Outstanding	15.61	25.06	-33.14	174.83
Total Equity	99.33	121.33	-64.26	975.86
Book Value	16.06	36.47	-85.25	311.26
Price/Book Value	51.52	66.92	-81.08	535.47
Revenue	42.68	352.86	-74.60	4672.19
Revenue per Share	12.35	128.64	-77.55	1636.43
Cash Flow	34.47	51.82	-88.23	391.54
Cash Flow per Share	16.79	35.87	-88.17	205.19
Earnings	17.32	70.54	-237.41	564.82
EPS	3.82	59.10	-150.00	521.62
Dividends	40.24	146.80	-100.00	1844.95
Dividends per Share	22.38	127.28	-100.00	1613.60
Long Term Debt Ratio	8.51	32.16	-69.12	265.47

Annual Growth:	Mean	Std Dev	Minimum	Maximum
Price per Share	9.91	9.35	-18.87	49.24
Shares Outstanding	2.63	3.92	-7.74	22.41
Total Equity	12.77	10.25	-18.60	60.82
Book Value	2.27	6.38	-31.80	32.69
Price/Book Value	7.41	8.10	-28.32	44.75
Revenue	3.10	10.81	-11.79	116.64
Revenue per Share	.82	8.32	-12.17	76.98
Cash Flow	5.33	6.84	-13.48	37.50
Cash Flow per Share	2.80	5.53	-13.48	25.00
Earnings	2.43	8.61	-27.54	46.06
EPS	.38	7.55	-20.11	44.11
Dividends	5.23	9.30	-14.87	81.04
Dividends per Share	2.80	8.22	-14.87	76.52
Long Term Debt Ratio	1.14	4.86	-20.94	29.59

Exhibit 2-B

Descriptive Statistics - Electric Companies (98 Companies)

Financial Ratios:	Mean	Std Dev	Minimum	Maximum
Equity Value	1482.48	1561.16	78.98	7069.16
Price per Share	23.47	6.60	10.41	46.27
Price/Revenue	1.64	.62	.60	4.85
Price/Cash Flow	7.97	1.89	4.40	17.11
Price/Earnings	17.78	3.27	8.02	28.84
Dividend Rate	.05	.02	.01	.15
Cash Flow/Revenue	.34	.05	.21	.48
Earnings/Cash Flow	.33	.06	.19	.48
Dividends/Earnings	.72	.25	.08	2.52
Long Term Debt Ratio	.48	.05	.37	.58
Price/Book Value	1.89	.42	.73	3.49

% Growth (84 - 89):	Mean	Std Dev	Minimum	Maximum
Price per Share	58.20	44.04	-64.85	313.76
Shares Outstanding	12.04	17.76	-14.47	100.36
Total Equity	75.82	49.93	-64.26	260.70
Book Value	14.28	18.29	-62.55	51.98
Price/Book Value	37.64	39.45	-81.08	277.02
Revenues	20.34	32.50	-25.77	198.83
Revenue per Share	7.84	23.49	-37.93	84.99
Cash Flow	30.02	30.74	-26.33	185.49
Cash Flow per Share	16.58	22.00	-43.32	71.36
Earnings	12.07	38.17	-88.42	122.36
EPS	1.35	35.41	-91.29	139.02
Dividends	41.16	191.00	-100.00	1844.95
Dividends per Share	25.47	166.66	-100.00	1613.60
Long Term Debt Ratio	2.09	11.10	-28.02	42.86

Annual Growth:	Mean	Std Dev	Minimum	Maximum
Price per Share	8.93	6.27	-18.87	32.85
Shares Outstanding	2.13	2.90	-3.08	14.91
Total Equity	11.21	6.58	-18.60	29.25
Book Value	2.46	3.68	-17.83	8.73
Price/Book Value	5.96	5.97	-28.32	30.40
Revenues	3.34	4.79	-4.69	24.48
Revenues per Share	1.33	4.04	-6.64	13.09
Cash Flow	5.02	4.58	-4.79	23.34
Cash Flow per Share	2.93	3.79	-7.46	11.37
Earnings	1.95	6.03	-13.51	17.33
EPS	.17	5.59	-13.85	19.04
Dividends	4.52	10.32	-14.87	81.04
Dividends per Share	2.47	9.47	-14.87	76.52
Long Term Debt Ratio	.32	2.17	-6.36	7.39

Exhibit 2-C

Descriptive Statistics - Gas Distribution (48 Companies)

Financial Ratios:	Mean	Std Dev	Minimum	Maximum
Equity Value ($mil)	714.93	1043.17	61.51	6295.03
Price per Share	22.88	9.20	4.26	45.48
Price/Revenue	.93	.51	.27	3.19
Price/Cash Flow	10.96	12.31	5.27	92.10
Price/Earnings	26.83	10.03	16.96	60.14
Dividend Rate	.04	.01	.00	.05
Cash Flow/Revenue	.23	.06	.08	.44
Earnings/Cash Flow	.18	.09	-.15	.38
Dividends/Earnings	.73	.33	.00	1.63
Long Term Debt Ratio	.46	.08	.31	.67
Price/Book Value	2.19	.40	1.28	3.49

% Growth (1984 - 89)	Mean	Std Dev	Minimum	Maximum
Price per Share	44.55	50.50	-59.85	195.06
Shares Outstanding	29.02	34.85	-12.67	174.83
Total Equity	86.57	81.12	-60.04	338.57
Book Value	15.47	55.42	-55.50	311.26
Price/Book Value	33.50	41.96	-61.62	135.09
Revenues	88.30	677.23	-74.60	4672.19
Revenue per Share	7.76	242.62	-77.55	1636.43
Cash Flow	36.23	78.77	-88.23	391.54
Cash Flow per Share	3.69	44.54	-88.17	205.19
Earnings	12.60	82.48	-237.41	377.53
EPS	-9.77	53.02	-150.00	196.49
Dividends	43.35	53.68	-88.01	180.98
Dividends per Share	13.64	35.28	-87.95	74.07
Long Term Debt Ratio	12.66	35.70	-69.12	170.59

Annual Growth:	Mean	Std Dev	Minimum	Maximum
Price per Share	6.58	7.77	-16.68	24.16
Shares Outstanding	4.72	5.08	-2.67	22.41
Total Equity	11.63	9.87	-16.76	34.40
Book Value	1.61	7.99	-14.95	32.69
Price/Book Value	5.00	7.38	-17.43	18.64
Revenues	.50	18.32	-11.79	116.64
Revenue per Share	-3.09	12.91	-12.17	76.98
Cash Flow	4.83	9.71	-13.48	37.50
Cash Flow per share	.45	6.63	-13.48	25.00
Earnings	1.70	10.46	-27.54	36.71
EPS	-1.63	7.78	-20.11	24.28
Dividends	6.65	7.96	-13.46	22.95
Dividends per Share	2.43	5.86	-13.45	11.72
Long Term Debt Ratio	1.70	6.07	-20.94	22.03

Exhibit 2-D

Descriptive Statistics - Telecommunications (23 Companies)

Financial Ratios:	Mean	Std Dev	Minimum	Maximum
Equity Value ($mil)	6500.97	7034.12	168.64	28045.92
price per Share	30.08	14.67	10.05	62.03
Price/Revenue	2.01	.96	1.13	5.81
Price/Cash Flow	7.67	2.55	5.56	17.09
Price/Earnings	26.54	11.25	18.86	70.79
Dividend Rate	.03	.01	.00	.04
Cash Flow/Revenue	.41	.04	.30	.45
Earnings/Cash Flow	.25	.08	.11	.50
Dividends/Earnings	.59	.18	.00	.96
Long Term Debt Ratio	.45	.09	.31	.63
Price/Book Value	2.66	.74	1.60	4.86

% Growth (1984 - 89):	Mean	Std Dev	Minimum	Maximum
Price per Share	212.48	170.92	20.43	640.40
Shares Outstanding	9.78	17.84	-11.85	53.69
Total Equity	254.84	248.07	23.83	975.86
Book Value	35.76	33.52	-11.76	152.45
Price/Book Value	127.98	78.92	10.76	300.27
Revenues	57.91	57.66	-12.76	231.74
Revenue per Share	44.08	49.84	-11.04	210.18
Cash Flow	64.29	45.05	-27.61	219.54
Cash Flow per Share	50.74	40.82	-18.15	198.78
Earnings	65.96	120.27	-77.44	564.82
EPS	51.51	110.65	-74.49	521.62
Dividends	46.85	34.64	-36.88	120.84
Dividends per Share	34.95	31.18	-40.00	115.38
Long Term Debt Ratio	2.46	18.72	-32.37	38.66

Annual Growth:	Mean	Std Dev	Minimum	Maximum
Price per Share	23.28	11.90	3.79	49.24
Shares Outstanding	1.70	3.12	-2.49	8.98
Total Equity	25.48	14.12	4.37	60.82
Book Value	5.89	4.70	-2.47	20.35
Price/Book Value	16.92	7.77	2.07	31.97
Revenues	8.64	7.13	-2.43	27.10
Revenue per Share	6.82	6.27	-2.12	25.41
Cash Flow	9.91	5.65	-5.00	26.16
Cash Flow per Share	8.07	5.21	-3.39	24.47
Earnings	8.43	10.89	-12.15	46.06
EPS	6.63	10.35	-11.78	44.11
Dividends	7.59	5.14	-6.48	17.17
Dividends per Share	5.84	4.80	-6.96	16.59
Long Term Debt Ratio	.22	3.76	-7.52	6.75

Exhibit 2-E
Descriptive Statistics - Railroads (8 Companies)

Financel Ratios:	Mean	Std Dev	Minimum	Maximum
Equity Value ($mil)	3181.36	2414.88	218.36	6180.65
Price per Share	40.37	13.62	23.88	57.77
Price/Revenue	1.82	1.42	.67	5.13
Price/Cash Flow	10.40	2.93	7.11	16.79
Price/Earnings	39.42	36.18	19.06	127.33
Dividend Rate	.03	.03	.00	.10
Cash Flow/Revenue	.30	.07	.22	.43
Earnings/Cash Flow	.25	.14	.03	.51
Dividends/Earnings	.82	1.08	.08	3.36
Long Term Debt Ratio	.35	.18	.00	.52
Price/Book Value	2.45	1.30	1.31	5.30

% Growth (1984 - 89)	Mean	Std Dev	Minimum	Maximum
Price per Share	26.02	50.46	-38.94	86.64
Shares Outstanding	-4.35	16.84	-33.14	25.16
Total Equity	16.84	43.34	-37.02	86.23
Book Value	-15.17	46.99	-85.25	48.45
Price/Book Value	109.82	177.77	6.73	535.47
Revenues	-1.18	40.86	-56.52	66.33
Revenue per Share	3.93	39.15	-51.28	47.03
Cash Flow	-7.35	33.95	-66.11	35.65
Cash Flow per Share	.24	42.60	-61.34	50.65
Earnings	-29.89	54.08	-115.84	30.65
EPS	-21.41	59.42	-112.66	45.10
Dividends	-7.01	65.47	-100.00	94.58
Dividends per Share	.53	67.12	-100.00	95.00
Long Term Debt Ratio	89.72	90.83	-31.06	265.47

Annual Growth:	Mean	Std Dev	Minimum	Maximum
Price per share	3.46	8.82	-9.40	13.29
Shares Outstanding	-1.11	3.56	-7.74	4.59
Total Equity	2.17	7.62	-8.83	13.24
Book Value	-6.45	14.33	-31.80	8.22
Price/Book Value	12.29	14.33	1.31	44.75
Revenues	-.19	6.84	-9.37	10.71
Revenue per Share	.74	6.69	-8.63	8.01
Cash Flow	-1.16	5.78	-10.68	6.29
Cash Flow per Share	.12	7.25	-10.04	8.54
EarningsS	-4.44	8.41	-16.63	5.49
Earnings per share	-3.00	9.34	-16.29	7.73
Dividends	-.79	9.93	-14.87	14.24
Dividends per Share	.58	10.20	-14.87	14.29
Long Term Debt Ratio	11.86	11.03	-7.17	29.59

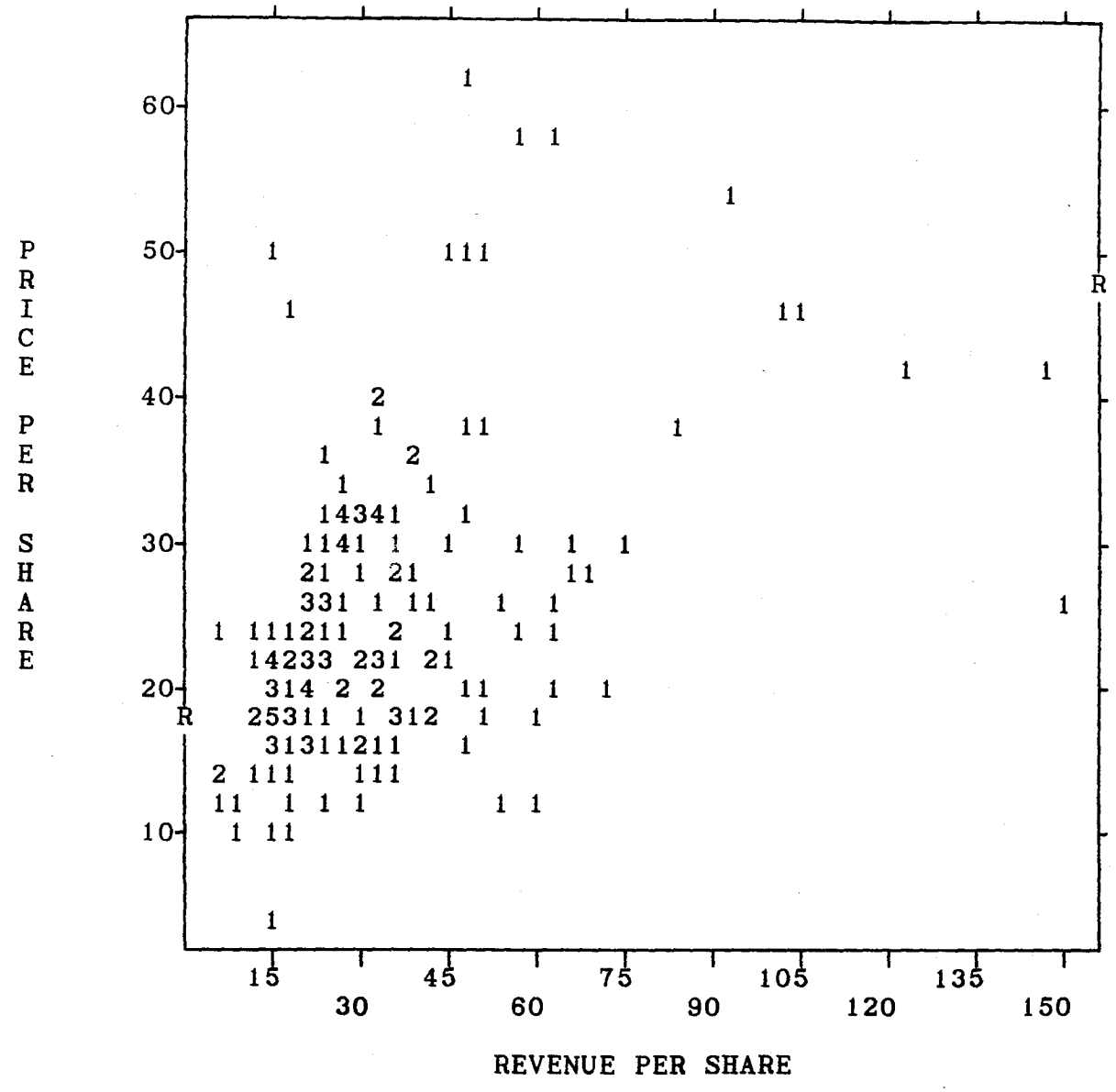
Exhibit 3
Descriptive Statistics: Industry Comparisons

Financial Ratios:	Electric	Gas Dist.	Telecom.	Railroad
Equity Value	1482.48	714.93	6500.97	3181.36
Price per Share	23.47	22.88	30.08	40.37
Price/Revenue	1.64	.93	2.01	1.82
Price/Cash Flow	7.97	10.96	7.67	10.40
Price/Earnings	17.78	26.83	26.54	39.42
Dividend Rate	.05	.04	.03	.03
Cash Flow/Revenue	.34	.23	.41	.30
Earnings/Cash Flow	.33	.18	.25	.25
Dividends/Earnings	.72	.73	.59	.82
Long Term Debt Ratio	.48	.46	.45	.35
Price/Book Value	1.89	2.19	2.66	2.45

% Growth (84 - 89):	Electric	Gas Dist.	Telecom.	Railroad
Price per share	58.20	44.55	212.48	26.02
Shares Outstanding	12.04	29.02	9.78	-4.35
Total Equity	75.82	86.57	254.84	16.84
Book Value	14.28	15.47	35.76	-15.17
Price/Book Value	37.64	33.50	127.98	109.82
Revenues	20.34	88.30	57.91	-1.18
Revenue per Share	7.84	7.76	44.08	3.93
Cash Flow	30.02	36.23	64.29	-7.35
Cash Flow per Share	16.58	3.69	50.74	.24
Earnings	12.07	12.60	65.96	-29.89
EPS	1.35	-9.77	51.51	-21.41
Dividends	41.16	43.35	46.85	-7.01
Dividends per Share	25.47	13.64	34.95	.53
Long Term Debt Ratio	2.09	12.66	2.46	89.72

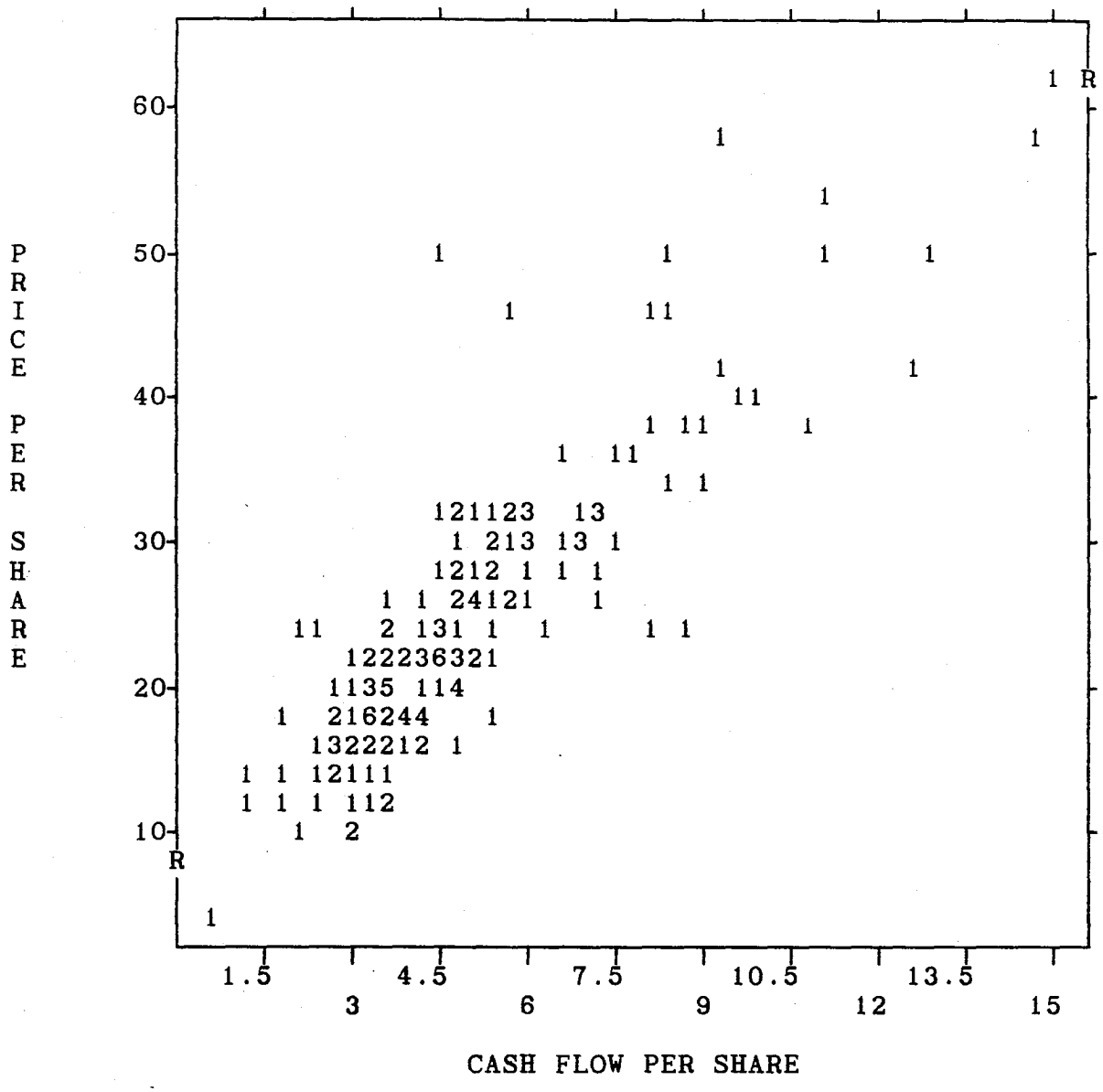
Annual Growth:	Electric	Gas Dist.	Telecom.	Railroad
Price per Share	8.93	6.58	23.28	3.46
Shares Outstanding	2.13	4.72	1.70	-1.11
Total Equity	11.21	11.63	25.48	2.17
Book Value	2.46	1.61	5.89	-6.45
Price/Book Value	5.96	5.00	16.92	12.29
Revenues	3.34	.50	8.64	-.19
Revenues per Share	1.33	-3.09	6.82	.74
Cash Flow	5.02	4.83	9.91	-1.16
Cash Flow per Share	2.93	.45	8.07	.12
Earnings	1.95	1.70	8.43	-4.44
EPS	.17	-1.63	6.63	-3.00
Dividends	4.52	6.65	7.59	-.79
Dividends per Share	2.47	2.43	5.84	.58
Long Term Debt Ratio	.32	1.70	.22	11.86

Exhibit 4-A
Plot of Price per Share with Revenue per Share



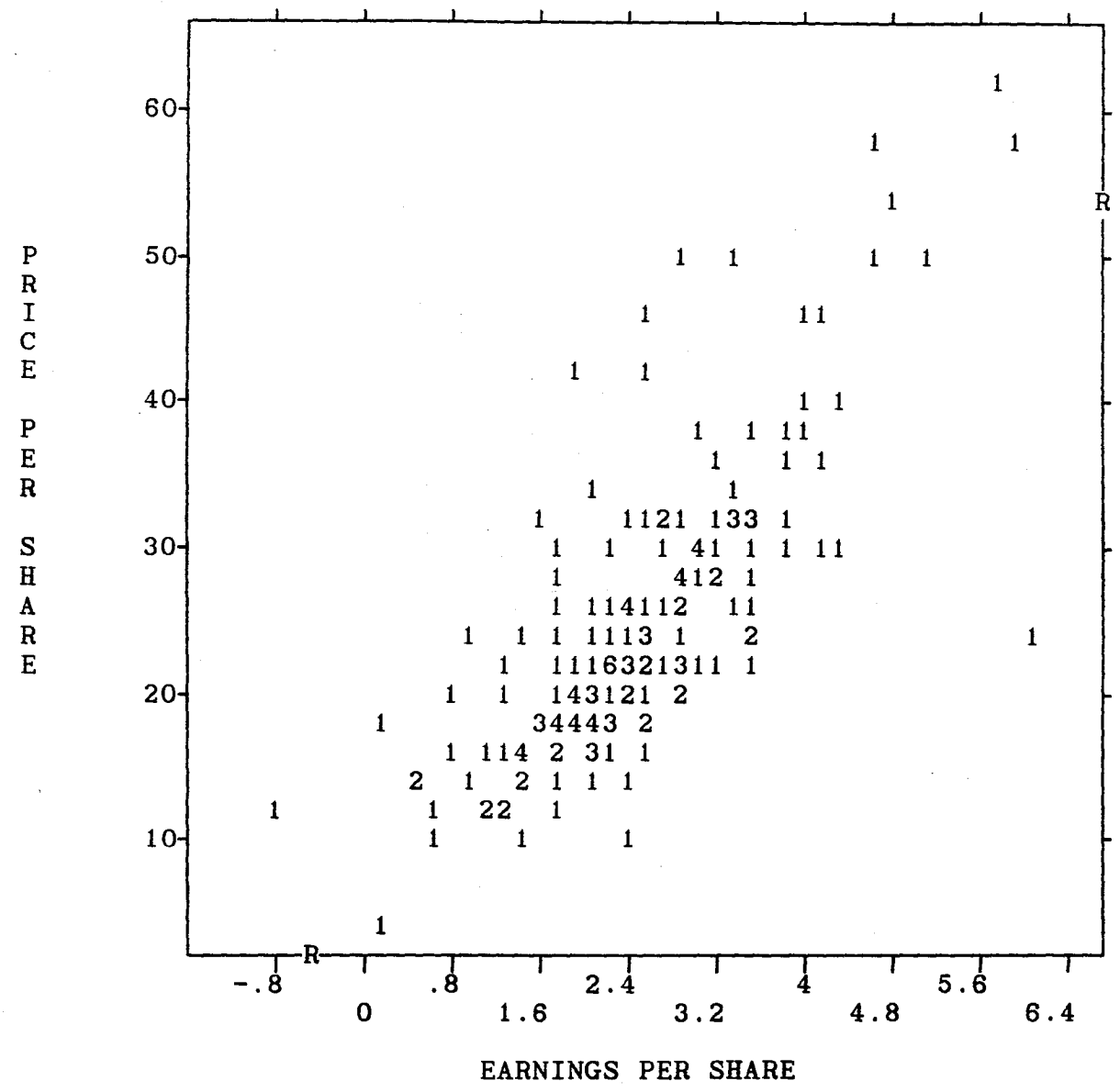
177 cases plotted. Regression statistics of PPS on REVPS:
Correlation = .453 R-Squared = .205 S.E. of Est = 8.832
Sig = .0000 Intercept = 18.27 (1.19) Slope = .199 (.030)

Exhibit 4-B
Plot of Price per Share with Revenue per Share



177 cases plotted. Regression statistics of PPS on CFPS:
Correlation = .868 R-Squared = .753 S.E. of Est = 4.920
Sig = .0000 Intercept = 6.868 (.865) Slope = 3.599 (.156)

Exhibit 4-C
Plot of Price per Share with Revenue per Share



177 cases plotted. Regression statistics of PPS on EPS:
Correlation = .761 R-Squared = .579 S.E. of Est = 6.426
Sig = .0000 Intercept = 7.161 (1.243) Slope = 7.182 (.463)

Exhibit 5-A
Comparative Income Level Models: Gross Revenues

	Total	Excl. RR	Electric	Gas Dist.	Telecom.
Companies	169	162	92	45	22
Adj R-Square	.422	.401	.384	.636	.810
COV	26.5	25.5	19.4	24.5	20.1
Constant	15.42	15.29	14.28	8.84	9.70
(std. error)	.990	.948	1.31	1.75	2.40
Ave. Revenue					
Coefficient	.310	.322	.452	.306	.634
t-value	8.47	9.16	7.64	8.06	6.32
Beta-value	.818	.910	.782	.979	.689
Growth Revenue					
Coefficient	1.22	1.23	1.35	Not Sig.	1.24
t-value	7.70	7.27	2.90		3.18
Beta-value	.526	.536	.248		.347
Disp. Revenue					
Coefficient	-.222	-.364	-1.63	-.373	Not Sig.
t-value	1.59	2.68	3.74	2.55	
Beta-value	-.139	-.232	-.376	-.310	

Exhibit 5-B
Comparative Income Level Models: Cash Flow

	Total	Excl. RR	Electric	Gas Dist.	Telecom.
Companies	169	160	93	45	21
Adj. R-Square	.845	.853	.775	.848	.972
COV	14.8	14.1	12.5	14.7	8.3
Constant	5.32	5.88	7.78	6.64	9.70
(std. error)	.717	.708	1.15	1.19	2.40
Ave. Cash Flow					
Coefficient	3.96	3.77	3.67	3.68	3.29
t-value	26.75	24.58	14.23	13.35	13.92
Beta-value	.890	.862	.791	.276	.765
Growth Cash Flow					
Coefficient	1.05	1.692	5.80	Not Sig.	3.42
t-value	2.05	3.28	3.01		5.06
Beta-value	.068	.115	.171		.278
Disp. Cash Flow					
Coefficient	Not Sig.	Not Sig.	-6.46	Not Sig.	Not Sig.
t-value			4.44		
Beta-value			-.234		

Exhibit 5-C
Comparative Income Level Models: EPS

	Total	Excl. RR	Electric	Gas Dist.	Telecom.
Companies	167	161	94	44	22
Adj. R-Square	.756	.750	.875	.913	.948
COV	18.0	17.9	12.9	11.8	11.5
Constant	5.81	5.99	5.98	4.03	7.30
(std. error)	.923	.957	1.24	1.07	1.42
Ave. EPS					
Coefficient	6.34	6.32	6.91	8.12	8.53
t-value	17.71	17.32	15.81	17.09	11.13
Beta-value	.670	.706	.812	.781	.819
Growth EPS					
Coefficient	5.67	6.74	11.05	-7.53	Not Sig.
t-value	4.66	5.33	5.48	4.52	
Beta-value	.182	.217	.812	-.250	
Disp. EPS					
Coefficient	7.97	7.07	-3.86	5.71	6.15
t-value	8.90	7.12	2.52	5.68	2.73
Beta-value	.346	.284	-.140	.311	.201

Exhibit 5-D
Comparative Income Level Models: Book Value Per Share

	Total	Excl. RR	Electric	Gas Dist.	Telecom.
Companies	162	157	92	45	22
Adj. R-Square	.824	.816	.727	.856	.951
COV	15.3	15.1	12.9	10.9	11.1
Constant	5.66	6.30	5.85	2.46	7.28
(std. error)	.827	.844	1.28	1.34	1.41
Ave. Value PS					
Coefficient	.915	.877	.921	1.22	1.21
t-value	20.37	18.68	13.13	16.20	12.75
Beta-value	.757	.710	.801	1.04	.856
Growth Value PS					
Coefficient	1.51	1.59	2.19	1.03	Not Sig.
t-value	11.60	12.21	4.13	6.33	
Beta-value	.438	.466	.249	.406	
Disp. Value PS					
Coefficient	.490	.452	-1.73	Not Sig.	.614
t-value	4.82	4.52	4.20		2.46
Beta-value	.201	.186	-.412		.165

Exhibit 6
Nonlinear Regression Variables

1.	REV	Average annual revenue per share
2.	1 + %REV	One + total % change in revenue per share
3.	1 + ?REV	One + average absolute deviation about revenue trend line
4.	CF/REV/.18	Ratio of cash flow to revenue centered on .18 (approx industry average)
5.	1 + %CF/REV	One + total % change in cash flow ratio
6.	1 + ?CF/REV	One + average absolute deviation about cash flow ratio trend line
7.	CF	Average annual cash flow per share
8.	1 + %CF	One + total % change in cash flow per share
9.	1 + ?CF	One + average absolute deviation about cash flow trrend line
10.	1 + E/CF	One + average ratio of earnings to cash flow
11.	1 + %E/CF	One + total % change in earnings ratio
12.	1 + ?E/CF	One + average absolute deviation about cash earnings ratio trend line
13.	1 + DIV/E	One + average ratio of dividends to earnings
14.	1 + %DIV	One + total % change in annual dividends
15.	1 + ?DIV	One + average absolute deviation about dividend trend line
16.	DBTRATIO/.5	Average debt ratio centered on .50 (approx. industry average)
17.	1 + %DBTRATIO	One + total % change in debt ratio
18.	GAS	Dummy variable for gas industry (0, 1)
19.	TELE	Dummy variable for telecom. industry (0, 1)
20.	RR	Dummy variable for railroad industry (0, 1)
21.	NUCLEAR	One + percent of electric revenues derived from nuclear energy
22.	SIZE	SQRT (average total annual revenue/$1 bil.

Exhibit 7
1986 Price Per Share Model: Based on Revenue Data

168 Companies Adj. R-Square = .922 Median = 1.007 COD = 9.2

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	.610	3.89	N/A	Multiplier
REV	.912	32.49	1.24	Exponent
CF/REV/.18	.908	26.52	1.03	Exponent
1 + E/CF	1.188	7.82	.24	Exponenet
1 + %E/CF	-.055	2.71	-.06	Exponent
1 + DIV/E	.552	6.33	.22	Exponent
1 + %DIV	.161	3.90	.10	Exponent
1 + ?DIV	-.448	6.33	-.16	Exponent
DBTRATIO/.5	-.202	4.14	-.11	Exponent
TELE	.880	3.07	-.10	Multiplier
RR	1.158	2.41	.07	Multiplier
NUCLEAR	-.265	3.15	-.08	Exponent
SIZE	-.037	1.84	-.05	Exponent

$$PPS = .61 * REV^{.91} * (CF/REV/.18)^{.91} * (1 + E/CF)^{1.19}$$
$$* (1 + \%E/CF^{-.05} * (1 + DIV/E)^{.55} * (1 + \%DIV)^{.16}$$
$$* (1 + ?DIV)^{-.45} * (DBTRATIO/.5)^{-.20} * .88^{TELE} * 1.16^{RR}$$
$$* NUCLEAR^{-.26} * SIZE^{-.03}$$

EXAMPLE: REV = 25.00 CF = 5.00 E = 2.50 DIV = 1.25
%E/CF = -.20 %DIV = .15 ?DIV = .03 DEBT = .56
TELE = 0 RR = 0 NUCLEAR = .30 SIZE = 1.40

$$PPS = .61 * 25.00^{.91} * 1.11^{.91} * 1.50^{1.19} * .80^{-.05} * 1.50^{.55}$$
$$* 1.15^{.16} * 1.03^{-.45} * 1.12^{-.20} * .88^{0} * 1.16^{0}$$
$$* (1.30)^{-.26} * 1.40^{-.03}$$
$$PPS = .61 * 18.71 * 1.10 * 1.62 * 1.011 * 1.25 * 1.022 * .987$$
$$* .978 * 1 * 1 * .934 * .99 = 23.45$$

Exhibit 8-A

1986 Price Per Share Model: Based on Cash Flow Data
Using 1983 - 88 Income Data and 1-1-1-1-1-1 Income Weights

168 Companies Adj. R-Square = .909 Median = 1.007 COD = 9.6

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	2.866	11.98	N/A	Multiplier
CF	.907	31.31	.97	Exponent
1 + E/CF	1.197	9.03	.26	Exponenet
1 + %E/CF	-.051	2.59	-.07	Exponent
1 + DIV/E	.586	9.97	.25	Exponent
1 + %DIV	.139	3.48	.10	Exponent
1 + ?DIV	-.429	6.12	-.07	Exponent
DBTRATIO/.5	-.070	3.02	-.09	Exponent
TELE	.868	2.59	-.07	Multiplier
RR	1.342	6.11	.16	Multiplier
NUCLEAR	-.232	2.94	-.08	Exponent
SIZE	-.077	3.81	-.12	Exponent

$$PPS = 1.053 * CF^{.907} * (1 + E/CF)^{1.197} * (1 + \%E/CF^{-.05}{}_1$$

$$* (1 + DIV/E)^{.586} * (1 + \%DIV)^{.139} * (1 + ?DIV)^{-.429}$$

$$* (DBTRATIO/.5)^{-.07} * .868^{TELE} * 1.342^{RR} * NUCLEAR^{-.232}$$

$$* SIZE^{-.077}$$

Exhibit 8-B
1986 Price Per Share Model: Based on Cash Flow Data
Using 1983 - 88 Income Data and 1-2-3-3-2-1 Income Weights

168 Companies Adj. R-Square = .922 Median = 1.007 COD = 9.2

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	3.823	14.68	N/A	Multiplier
CF	.863	37.24	.87	Exponent
1 + E/CF	.955	6.38	.21	Exponenet
1 + DIV/E	.432	8.82	.21	Exponent
1 + %DIV	.119	3.74	.09	Exponent
1 + ?DIV	-.455	6.48	-.16	Exponent
DBTRATIO/.5	-.229	4.54	-.13	Exponent
GAS	.935	3.08	-.08	Multiplier
TELE	.830	4.66	-.15	Multiplier
RR	1.109	1.73	.05	Multiplier
NUCLEAR	-.315	3.74	-.09	Exponent

$$PPS = 1.341 * CF^{.863} * (1 + E/CF)^{.955} * (1 + DIV/E)^{.432}$$
$$* (1 + \%DIV)^{.119} * (1 + ?DIV)^{-.455} * (DBTRATIO/.5)^{-.229}$$
$$* .935^{GAS} * .830^{TELE} * 1.109^{RR} * NUCLEAR^{-.315}$$

Exhibit 8-C
1986 Price Per Share Model: Based on Cash Flow Data
Using 1983 - 85 Income Data and 1-1-1 Income Weights

168 Companies Adj. R-Square = .881 Median = 1.009 COD = 10.9

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	3.238	10.19	N/A	Multiplier
CF	.858	29.92	.93	Exponent
1 + %CF	.262	4.17	14	Exponent
1 + E/CF	1.032	6.51	.24	Exponent
1 + %E/CF	-.082	2.78	-/09	Exponent
1 + DIV/E	.602	7.66	.25	Exponent
1 + %DIV	.514	5.84	.20	Exponent
DBTRATIO/.5	-.316	6.85	-.20	Exponent
1 + %DBTRATIO	-.210	2.32	-.07	Exponent
GAS	.876	4.45	-.15	Multiplier
TELE	.903	2.46	-.09	Multiplier
NUCLEAR	-.292	3.07	-.10	Exponent
SIZE	-.039	1.73	-.06	Exponent

Exhibit 8-D
1986 Price Per Share Model: Based on Cash Flow Data
Using 1983 - 85 Income Data and 1-2-3 Income Weights

168 Companies Adj. R-Square = .888 Median = 1.009 COD = 11.3

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	3.911	14.18	N/A	Multiplier
CF	.816	31.91	.86	Exponent
1 + E/CF	.989	6.59	.22	Exponent
1 + DIV/E	.462	6.63	.19	Exponent
1 + %DIV	.476	5.92	.16	Exponent
DBTRATIO/.5	-.273	5.97	-.16	Exponent
GAS	.850	5.29	-.17	Multiplier
TELE	.901	2.57	-.08	Multiplier
NUCLEAR	-.333	3.43	-.10	Exponent

$$PPS = 1.364 * CF^{.816} * (1 + E/CF)^{.989} * (1 + DIV/E)^{.462} * (1 + \%DIV)^{.476} * (DBTRATIO/.5)^{-.273} * .850^{GAS} * .901^{TELE} * NUCLEAR^{-.333}$$

Exhibit 9-A

1989 Price Per Share Model: Using 1-1-1-1-1 Income Weights

149 Companies Adj. R-Square = .791 Median = 1.015 COD = 14.1

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	9.116	39.31	N/A	Multiplier
CF	.686	17.84	.75	Exponent
1 + %DIV	.176	3.02	.12	Exponent
DBTRATIO/.5	-.271	4.97	-.19	Exponent
1 + %DBTRATIO	-.362	3.78	-.15	Exponent
TELE	1.273	4.89	.20	Multiplier
NUCLEAR	-.302	2.61	-.10	Exponent

$$PPS = 9.116 * CF^{.686} * (1 + \%DIV)^{.176} * (DBTRATIO/.5)^{-.271} * * (1 + \%DBTRATIO)^{-.362} * 1.273^{TELE} * NUCLEAR^{-.302}$$

EXAMPLE: CF = 5.00 %DIV = .15 DBTRATIO = .56

%DBTRATIO = .10 TELE = 1 NUCLEAR = 0

$$PPS = 2.21 * 5.00^{.686} * 1.15^{.176} * 1.12^{-.271} * 1.10^{-.362} * 1.273$$

$$PPS = 9.116 * 3.016 * 1.025 * .970 * .966 * 1.273 = 33.62$$

Exhibit 9-B

1989 Price Per Share Model: Using 1-2-3-4-5 Income Weights

149 Companies Adj. R-Square = .797 Median = 1.014 COD = 13.5

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	8.414	31.42	N/A	Multiplier
CF	.656	17.78	.76	Exponent
1 + DIV/E	.122	1.71	.07	Exponent
1 + %DIV	.119	2.10	.08	Exponent
DBTRATIO/.5	-.312	5.78	-.22	Exponent
1 + %DBTRATIO	-.281	2.10	-.08	Exponent
GAS	1.101	2.84	.11	Multiplier
TELE	1.338	6.16	.25	Exponent

$$PPS = 8.414 * CF^{.656} * (1 + DIV/E)^{.122} * (1 + \%DIV)^{.119} * (DBTRATIO/.5)^{-.312} * (1 + \%DBTRATIO)^{-.281} * 1.101^{GAS} * 1.338^{TELE}$$

Exhibit 10-A
1989 Price Per Share Model: Using 1-2-3-4-5 Income Weights
Electric Industry

83 Companies Adj. R-Square = .794 Median = 1.008 COD = 10.0

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	4.850	6.97	N/A	Multiplier
CF	.727	12.86	.70	Exponent
1 + %CF	.283	2.69	.16	Exponent
1 + E/CF	.719	2.03	.11	Exponent
1 + %E/CF	.128	1.85	.11	Exponent
1 + DIV/E	.316	2.17	.13	Exponent
1 + %DIV	.282	3.65	.24	Exponent
1 + %DBTRATIO	-.480	3.17	-.17	Exponent

$$PPS = 4.850 * CF^{.727} * (1 + \%CF)^{.283} * (1 + E/CF)^{.719} * (1 + \%E/CF)^{.128} * (DIV/E)^{.316} * (1 + \%DIV)^{.282} * (1 + \%DBTRATIO)^{-.48}$$

Exhibit 10-B
1989 Price Per Share Model: Using 1-2-3-4-5 Income Weights
Gas Distribution Industry

83 Companies Adj. R-Square = .862 Median = 1.008 COD = 9.7

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	11.66	24.44	N/A	Multiplier
CF	.554	8.19	.65	Exponent
DBTRATIO/.5	-.505	4.19	-.25	Exponent
SIZE	.224	4.41	.36	Exponent

$PPS = 11.66 * CF^{.554} * (DBTRATIO/.5)^{-.505} * SIZE^{.224}$

Exhibit 11-C
1989 Price Per Share Model: Using 1-2-3-4-5 Income Weights
Telecommunications Industry

19 Companies Adj. R-Square = .862 Median = 1.016 COD = 13.9

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	15.87	19.50	N/A	Multiplier
CF	.548	7.62	.88	Exponent

$PPS = 15.87 * CF^{.548}$

Exhibit 10-D
1989 Price Per Share Model: Using 1-2-3-4-5 Income Weights
Railroad Industry

5 Companies Adj. R-Square = .152 Median = 1.073 COD = 31.3

Variable	Coeffficient	t-value	Beta-value	Remarks
Constant	6.66	1.54	N/A	Multiplier
CF	.813	1.31	.60	Exponent

$PPS = 6.66 * CF^{.813}$

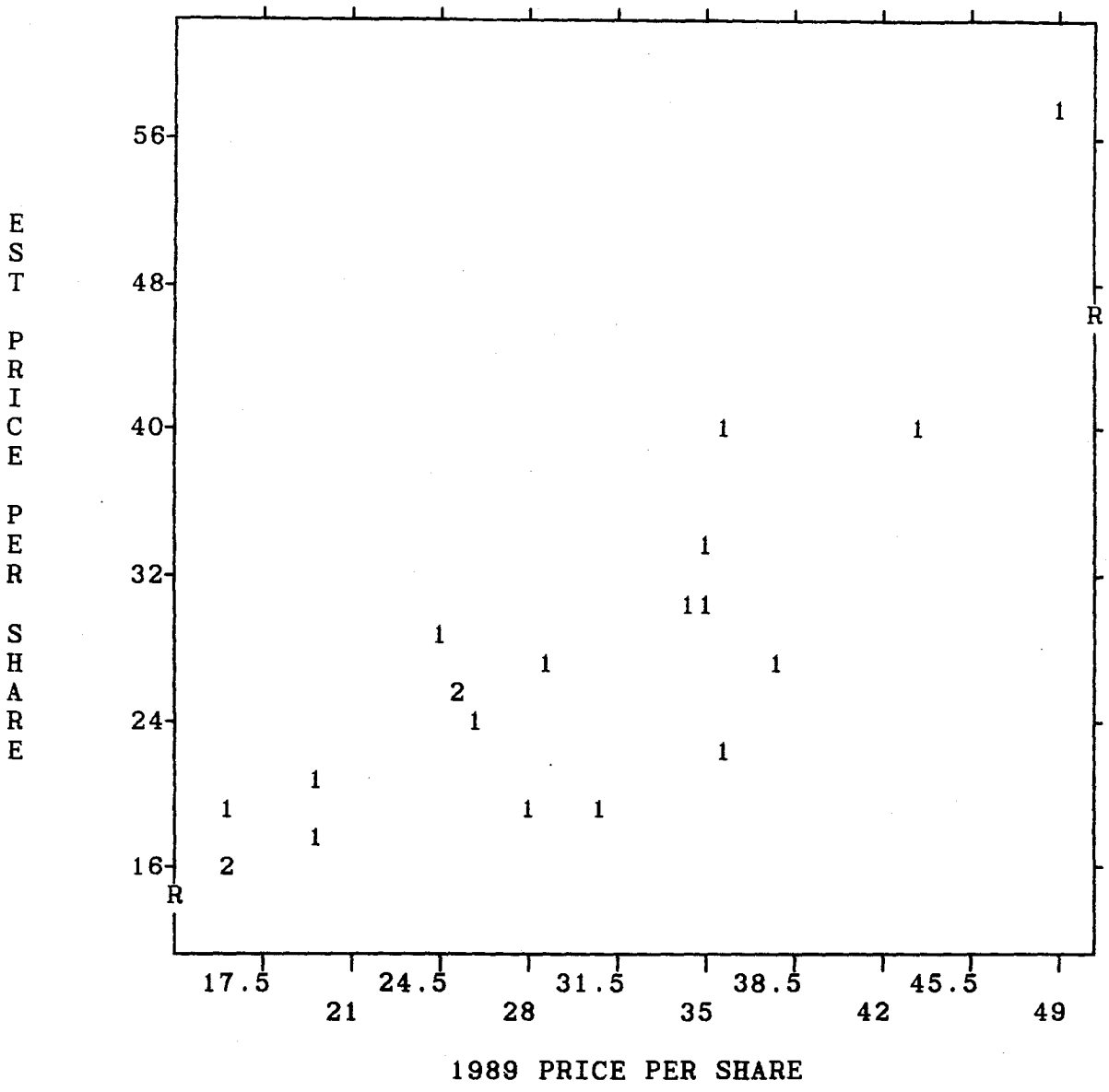
Exhibit 11
Comparison of Predicted with Actual 1989 Price Per Share

COMPANY	INDUST	89 PPS	OVERALL MODEL	RATIO	INDUSTRY MODEL	RATIO
CMS ENERGY CORP	ELEC	30.55	19.10	.625	16.40	.537
NORFOLK SOUTH	RR	35.80	39.60	1.106	22.12	.618
CITIZENS UTILS B	TELE	35.50	22.84	.643	24.70	.696
NIPSCO INDUSTRIES	ELEC	16.05	16.26	1.013	11.93	.744
L.I.LIGHTING	ELEC	15.80	15.91	1.007	11.75	.744
PENNA. P.& L.	ELEC	37.80	27.50	.727	30.23	.800
CENTURY TEL. ENT.	TELE	27.65	18.66	.675	22.89	.828
ATLANTIC ENERGY	ELEC	35.30	30.49	.864	31.54	.894
CSX	RR	34.20	29.87	.873	31.40	.918
CILCORP INC	ELEC	34.90	33.68	.965	32.69	.937
CASCADE NAT'L GAS	GAS	16.20	18.45	1.139	15.37	.949
B'KLYN UNION GAS	GAS	26.20	23.36	.892	25.30	.966
AMER. WATER WKS.	ELEC	19.30	16.97	.879	18.73	.971
AMER. ELEC.PWR.	ELEC	28.40	26.54	.935	28.38	.999
UNION ELECTRIC	ELEC	25.40	25.23	.993	26.14	1.029
PACIFIC ENTERP.	GAS	43.55	39.69	.911	45.78	1.051
S.W.BELL	TELE	48.75	56.96	1.168	51.94	1.065
MIDWEST ENERGY CO.	ELEC	19.45	20.45	1.052	21.31	1.096
PANHANDLE EAST'N	GAS	24.95	25.40	1.018	28.69	1.150
ONEOK INC.	GAS	24.50	29.07	1.186	30.16	1.231

	Overall Model	Industry Models
Cases (*)	19	19
Median	.965	.949
Mean	.950	.931
COD	12.5	13.6
COV	16.3	17.3

(*) Most extreme case (CMS Energy) is deleted.

Exhibit 12
Plot of Estimated vs. Actual Price Per Share (Overall Model)



20 cases plotted. Regression statistics of Est. PPS on Actual PPS: Correlation = .843 R-Squared = .710 S.E. of Est = 5.543 Sig. = .0000 Intercept = .274 Slope = .914 (.138) Slope(S.E.) .91437(.13760)