BY THE U.S. GENERAL ACCOUNTING OFFICE

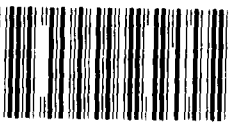
Report To The Chairman, Subcommittee On Energy Conservation And Power House Committee On Energy And Commerce

Analysis Of The Financial Health Of The Electric Utility Industry

This report analyzes the past, present, and future financial health of the investor-owned electric utility industry

The 1970's was a financially difficult period for the industry, with 1974 being a particularly poor year Since 1973, unusually high debt and large construction programs during periods of inflation and high interest rates had a negative influence on the industry's financial health Although individual regulatory factors were not found to have a significant relationship to the industry's overall financial health, regulation's influence is reflected in the industry's stable profit picture After 1981, such indicators of financial health as the market-to-book-value ratio of common stock and the rate of return improved

Industry is acting to reduce debt and construction If inflation and interest rates stay below previous levels, the industry's financial prospects should be more favorable during the 1980's as compared with the 1970's



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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES COMMUNITY
AND ECONOMIC DEVELOPMENT
DIVISION

B-211952

The Honorable Richard L. Ottinger
Chairman, Subcommittee on Energy
Conservation and Power
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In accordance with your December 2, 1982, request, this report discusses the financial health of the electric utility industry. The report specifically looks at the industry's financial indicators, analyzes its financial condition, identifies the key variables that affect its health, and assesses its future outlook.

Sincerely yours,

J. Dexter Peach
Director

REPORT BY THE UNITED STATES
GENERAL ACCOUNTING OFFICE

ANALYSIS OF THE FINANCIAL HEALTH OF THE ELECTRIC UTILITY INDUSTRY

D I G E S T

In the 1970's, the investor-owned electric utility industry faced declining sales growth, unusually high interest and inflation rates, and rapidly increasing costs. These conditions, among others, have affected the industry's financial health and raised questions about its financial viability.

To better respond to legislative proposals aimed at improving the industry's financial health, the Chairman, Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce, asked GAO to

--identify the financial indicators that are key to the the industry,

--analyze the industry's present financial state,

--determine the key factors affecting the industry's health, and

--assess the industry's future financial prospects.

To respond to the subcommittee's request, GAO examined the financial indicators of over 100 investor-owned electric utilities that produce about 70 percent of the electricity in the United States. GAO analyzed trends and changes in several financial indicators for the period 1970-82.

Of the indicators examined, GAO found the rate of return on common stock, the ratio of stock market price-to-book value of common stock, and corporate bond ratings to be appropriate measures of the industry's financial health.

Because utility rates generally are regulated in a way designed to provide a reasonable rate of return on investment, the utility industry has not been subject to the extreme fluctuations in rates of return that other industries experienced during the 1970's and early 1980's. Since 1973, inflation, rising interest rates,

debt, and construction have had adverse impacts on the industry's financial well being. However, given the more recent, positive changes in these factors, GAO believes the industry's financial outlook appears to be more favorable than in the 1970's.

FINANCIAL INDICATORS

To determine appropriate indicators for analyzing the industry, GAO first researched and examined the concept of financial health. Although this is a subjective concept, GAO nevertheless found electric utility financial health to be associated with the ability to raise debt and equity funds and earn a return that investors find acceptable.

With this as a conceptual basis, GAO identified 17 indicators commonly used by the industry, financial institutions, and public utility commissions to monitor and analyze utilities' financial performance. From these 17, GAO selected 3 for its analysis:

--the rate of return on common equity,

--the ratio of market price-to-book value of common stock, and

--the corporate bond rating.

These indicators were selected because they collectively provide both current and longer term assessments on how the industry is doing financially. For example, rate of return reflects present earnings' performance, while the corporate bond rating looks to the more distant future (15 to 30 years) by assessing the likelihood that firms can repay long-term debt.

Although other indicators might be effectively used, experts GAO contacted agreed that the ones selected are generally acceptable barometers of financial performance. (See pp. 6 to 9.)

FINANCIAL STATUS

GAO found that the utility industry's financial status was poorer in the 1970's than it was in the 1950's and 1960's. But since mid-1981, financial indicators have shown that the

industry's health has been improving. Also, the industry has managed to avoid the boom and bust that have characterized many other industries' performance. (See pp. 10 to 18.)

Overall, fluctuations in the industry's performance have been moderate. For example, the average rate of return increased from 10.7 percent in 1974 to 11.5 percent in 1975, and the industry's market-to-book value ratio increased from 0.76 to 1.01. The next few years brought further modest recovery; however, the 1978-80 period saw financial decline similar to that experienced in 1974. The financial picture has recently improved. The industry's market-to-book value ratio is again near 1, a reasonable level, and the rate of return (over 13 percent) exceeded Standard & Poor's index of 400 large industrial companies in 1982. This was last achieved in 1972. (See pp. 12 to 17.)

Some individual utilities, of course, fared considerably worse than average. For example, in 1980 seven companies recorded profit rates under 4 percent. Three of these companies were owned by the holding company that owns the Three Mile Island nuclear plant. (See p. 13.) More recently, several privately and publicly owned utilities have experienced problems because of their financial commitments to nuclear powerplants facing construction and/or licensing difficulties. (See p. 19.)

Measured against a selection of 34 other industries (see p. 18), GAO found that the health of the electric utility industry has been relatively stable. For example, during the period 1970-81, the electric utility industry's rate of return on common equity ranged from only 10.7 percent at its lowest point to 12.4 percent at its highest point. Similar figures for the other industries showed an average range of 6.2 to 20.8 percent, with extremes from -40 to 35 percent. (See pp. 17 to 18.)

FACTORS AFFECTING FINANCIAL HEALTH

As previously stated, inflation and rising interest rates adversely affected the industry since 1973.

GAO found that as electricity prices increased, demand growth rates declined. At the same time, the industry continued to pursue an ambitious construction program to meet a demand growth which unfortunately did not materialize. Inflation and rising interest rates added considerable and unexpected costs to the industry's construction programs and production costs. This helped push up electricity prices, lower the industry's demand growth and, as construction projects finished, increased the industry's excess capacity.

Outside of general economic conditions, several other factors influenced the industry's financial health over the 1973-81 period. Although the industry cannot control national inflation and interest rates, it can respond to these conditions and, therefore, limit financial problems. Specifically, GAO's analysis found that:

--Companies with large debt and construction levels had lower financial indicators than companies with less debt. GAO models showed that firms having a high ratio of debt-to-assets, high interest costs, and large construction programs have lower corporate bond ratings, market-to-book value ratios, and rates of return. When the utility industry's new debt and construction levels declined, its financial indicators improved. (See pp. 21 to 24.)

--With respect to operating factors, companies which relied heavily on coal for fuel enjoyed a higher bond rating than firms using oil or gas. This is a reasonable result since coal supplies were more stable and less subject to price fluctuations during this period. Also, GAO found that very large firms earned a lower rate of return than smaller firms. (See p. 24.)

--Companies that had earnings increase relative to their interest expense experienced higher bond ratings and market-to-book value ratios. Higher indicators improved a firm's ability to attract new capital at lower costs--a vital necessity in time of high inflation and interest rates. (See pp. 24 and 25.)

The influence of regulation seems to be reflected in the industry's ability to maintain

a relatively stable profit picture. As noted earlier, other industries experienced extreme fluctuations in their rates of return. To see if any regulatory factor particularly influences the industry's financial health, GAO analyzed several regulatory factors that have been cited as contributing to the industry's problems. For example, the willingness of public utility commissions to grant increased rates or how they treat tax benefits were examined.

GAO did not find any statistical evidence showing that these regulatory factors, taken individually, significantly affected the financial indicators on an industry-wide basis. This is not to say that regulation is not important, since it clearly affects factors influencing financial health. For example, regulation determines electric rates and affects other factors which influence profits. How the individual regulatory factors interact and work in combination, however, could not be measured in the analysis. (See pp. 25 and 26.)

INDUSTRY PROSPECTS FOR THE FUTURE

Although it is not possible to predict the industry's financial future with certainty, it is possible to make qualitative judgments based on GAO's analysis. As stated earlier, the industry's financial outlook appears to be more favorable than it was in the 1970's. Important national economic factors--inflation and interest rates--have improved considerably. The industry's rate of return and market-to-book value indicators have improved. Also improving are several other factors which GAO found had a historically significant impact on the financial indicators. For example, utility managements have initiated actions to reduce construction and debt and are looking more closely at lower cost alternatives for providing power. Also, a contributing factor is a more favorable federal tax policy. The Economic Recovery Tax Act of 1981 encourages utility investors to reinvest their dividends, which should help ease the industry's need for debt. Public utility commissions have acted to increase rates. (See pp. 26 to 30.)

If these actions and trends continue, the industry's financial prospects should be favorable. However, this does not mean that

individual electric utilities will not have financial difficulties. Other uncertainties may affect the industry such as the supply and demand for electricity in the 1990's. Analysts have examined the supply and demand issue and reached widely differing points of view. GAO will be examining this issue in its future work.

AGENCY COMMENTS

Agency comments were not obtained on this report because GAO did not evaluate any particular agency program. GAO, however, did discuss the methodology and results of the review with experts from the electric utility industry, financial community, consumer groups, and regulatory commissions. Their comments were included in the report where appropriate.

Contents

ABBREVIATIONS

AFUDC	allowance for funds used during construction
CONSTR	construction expenditures
CWIP	construction work-in-progress
DA	debt-asset ratio
DOE	Department of Energy
EMBEDI	embedded interest rate
GAO	General Accounting Office
GNP	gross national product
kwh	kilowatt hour
LSDV	least square dummy variables
MBR	market-to-book ratio
OPINC	operating income
RATING	bond rating
ROE	rate of return on common equity
SOLIDPCT	solid fuel percentage
S&P	Standard and Poor's Corporation
TIE	times interest earned

GLOSSARY

Allowance for funds used during construction (AFUDC)	An accounting technique that represents the cost of capital paid to investors (both debt and equity) during the construction phase of a powerplant. Although AFUDC is counted as income, it represents noncash income.
Allowed rate of return	The profit allowed on a utility's rate base, expressed as a percentage, determined by a regulatory authority.
Attrition	Difference between allowed and earned rates of return.
Capacity	Maximum power output, expressed in kilowatts or megawatts.
Central station powerplant	A large powerplant that generates a significant amount of electricity from one location.
Construction work-in-progress (CWIP)	A subaccount in the utility plant section of the balance sheet representing investments in a utility plant under construction.
Cost of capital	The return asked by investors for the use of their money committed to investment in utility companies, expressed as percentages of the capital funds (debt, preferred stock, and common equity).
Demand	The rate at which electric energy is delivered to or by a system, expressed in kilowatts or megawatts over any designated period.
Economies of scale	Economies of scale exist when, for a given level of technology and set of prices, relatively larger production facilities have lower unit costs than relatively smaller facilities.
Earned rate of return	The profit obtained through operations over a specified 12-month period, expressed as a percentage of common equity.

Investor-owned utility	A utility which is organized under state laws as a corporation for the purpose of earning a profit for its stockholders.
Kilowatt hour (kWh)	A basic unit of electric energy that equals 1 kilowatt of power applied for 1 hour.
Load	The amount of electric power delivered to a given point on a system.
Load management	Techniques influencing the electric demand pattern over time so that demand conforms to current supply situations and long-run objectives and constraints.
Megawatt (MW)	The electrical unit of power that equals 1 million watts, or 1,000 kilowatts.
Peak load	The maximum electrical load consumed or produced in a stated period of time. It may be the maximum instantaneous load (or the maximum average load) within a designated interval of time.
Rate base	The value (generally the amount of property used and useful in public service) established by a regulatory authority, upon which a utility is permitted to earn a specified rate of return.
Rate relief	The amount by which a utility company's operating revenues are increased on an annual basis, as a result of rate case proceedings before a regulatory commission.
Regulatory lag	The lapse of time between a petition for rate relief filed by a utility company and the effective date of the implementation of new rates as authorized by a public utility commission. Also, the time elapsed between regulatory decisions.
Reliability	A utility system's ability to continue operations while some transmission lines or powerplants are out of service.

Reserve margin	The difference between installed capacity and peak load.
Revenue requirements	The sum of the estimated operation and maintenance expenses, depreciation, taxes, and a return on rate base to cover the cost of capital invested in a utility company.
Test year	The representative year normally selected as an analytical base for a rate case. The period may reflect the actual results of operations (historical), or the anticipated results of operations (projected), or a combination of both.

CHAPTER 1

INTRODUCTION

The financial health of the electric utility industry has concerned both the public and private sectors for the last 10 years. In the 1970's, electric utilities had to operate in an environment considerably less stable and favorable than in previous decades. For the first time, electric utilities were simultaneously faced with inflation, changing patterns of demand growth, escalating interest rates, and fuel supply uncertainties. Regulatory issues concerning environmental conditions, nuclear powerplants, and fuel switching became more pronounced.

While prices of electricity increased significantly, the industry maintained that public utility commissions were not allowing sufficient rate increases to cover costs, provide a fair return to owners, and ultimately assure the adequacy and reliability of electric power. Consumers, feeling the pinch of higher electric rates, did not agree and resisted the industry's efforts to obtain rate relief and improve its financial picture. The confluence of these events made utilities' financial health a major issue.

OVERVIEW OF FINANCIAL HEALTH ISSUES

The issues concerning the industry's financial health have focused on the magnitude of the problems and their causes, consequences, and solutions. The industry has pointed to historical financial indicators to demonstrate its plight and has argued that it has been especially hard hit by inflation, high interest rates, unstable capital markets, and regulations. In 1981 and 1982, the industry continually stressed that its financial problems seriously weakened its ability to finance needed capital investments and that the nation could be faced with future power shortages unless financial health improved. To help resolve its financial problems, the industry has supported proposals over the years to

--allow for deregulation and diversification,

--reduce federal taxes,

--reduce regulatory lag, and

--increase electric rates.

Others, such as consumer advocates, opposed these proposals, contending that utilities have financial problems because they were built to meet future demand growth that did not materialize. Furthermore, they argued that utilities did not adequately respond to changing conditions by implementing innovative low-cost strategies, that is, load management, conservation, and alternative energy sources, and that even round after round of rate increases has not prevented financial deterioration.

OBJECTIVES, SCOPE, AND METHODOLOGY

The Chairman, Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce, requested that we review the electric utility industry's financial health, its load forecasting, and the status of electric energy-related efficiency improvement programs. (See app. IX.) Our work on load forecasting and electric energy-related efficiency improvement programs is addressed in separate reports. This report discusses the industry's financial health and addresses the subcommittee's following questions:

--What are appropriate indicators of the industry's financial health?

--What is the present financial condition of the electric utility industry?

--What are the key variables that will affect electric utility financial health in the future?

--What is the outlook for electric utility financial health?

Our approach to answering each of these questions is discussed separately below.

We made our review in accordance with generally accepted government auditing standards, but we did not obtain official agency comments since this was not an evaluation of an agency program. We did, however, discuss our methodology and the results of our work with experts on the utility industry and modified the report where appropriate. The experts represented the utility industry, financial community, consumer groups, and regulatory commissions. We conducted our review work from January through May 1983. We examined electric utility financial data covering the years 1970 to 1981 in detail and considered 1982 data which were available during the course of review.

Financial indicators

Our initial objective was to identify useful and meaningful indicators of financial health. To do this, we reviewed literature discussing the financial health of the electric utility industry to identify indicators used by consumer groups, government, industry, and the investment community. Recognizing that no single indicator can perfectly measure the industry's health, we evaluated 17 indicators that are commonly used to assess the industry's financial performance. To determine the most appropriate ones for our evaluation, each indicator was assessed to see if it provided a broad perspective of the industry's financial health, if it duplicated another indicator, or if it was incorporated in a broader measurement.

We also solicited written comments from representatives of 15 organizations with knowledge of the industry's financial operations. The organizations are listed in appendix I. Specifically, we asked what criteria should be used to measure and evaluate the industry's financial health. In addition, we held a conference to obtain, first hand, views on the most appropriate indicators of the industry's financial health and to discuss their merits and limitations. The conference members were representatives from the National Association of Regulatory Utility Commissioners, Edison Electric Institute, Electricity Consumers Resource Council, Department of Energy (DOE), National Economic Research Associates, Inc., and Standard and Poor's Corporation (S&P). Complementing this work, we also contacted representatives and officials of consumer organizations to obtain their views. These included Friends of the Earth and the Natural Resources Defense Council.

From this review, we selected three indicators to assess the industry's financial condition--rate of return on common equity, the ratio of the market price-to-book value of common stock, and the corporate bond rating. These were selected because they provide a broad perspective of the industry's financial condition, represent a quantifiable assessment, and reflect many factors that can affect the industry's health. The majority of experts and organizations we contacted also agreed that these were acceptable indicators. What these indicators show and the specific rationale for their selection is discussed in chapter 2. Other indicators that we considered are included in appendix II.

Financial condition

Our second objective was to examine the industry's financial performance. To do this, we utilized several analytical techniques. Our initial work focused on identifying and analyzing literature on the subject to determine how observers viewed the industry's health. Specifically, we reviewed publications of financial institutions which constantly monitor the industry's health. We also reviewed DOE's and the Edison Electric Institute's reports and analyses. We reviewed numerous technical papers addressing the issue of financial health and discussed the matter with representatives of organizations playing an active role in the issue.

As a second step, we examined the financial performance and condition of the industry by using the indicators we selected in the first phase of our work. For this portion of the project, we statistically analyzed the performance of investor-owned electric utility companies since 1970. The data used for this analysis were mainly from S&P's Utility Compustat data base. This data base contains financial, operating, market, and statistical data on 160 large investor-owned electric utilities including both holding and subsidiary companies. It accounts for 70 percent of the nation's electric generation and is used by securities analysts, researchers, public utility commissions, and federal agencies to analyze the industry. We did not audit S&P's data.

We also compared the financial performance of the electric utility industry with other industries over the same period. Although the electric utility industry is not strictly comparable to any particular industry it, nevertheless, must operate under the same economic conditions and compete in the capital and financial markets with other firms. Therefore, comparing its performance with others' helps to provide a balanced perspective. In this aspect of the assignment, we reviewed and analyzed existing studies and made our own analysis using the same indicators selected in the first phase of the assignment. We were able to make this analysis by using the rate-of-return on common equity and market-to-book value indicators, but could not directly compare performance using the bond indicator. Because the data for this latter indicator were not readily available to us, we did not attempt to obtain and develop it.

We did not examine or assess the financial status of municipally, cooperatively, or federally owned electric utilities because the laws and conditions under which they operate and their financial measures are different. For example, many are eligible for and receive federal financing and are not subject to state regulation.

Factors affecting financial health

Our third objective was to identify and determine what factors significantly influence the indicators of the electric utility industry's financial health. Our first task was to identify factors that are commonly believed to affect financial condition. To do this, we reviewed the relevant literature. Our search in this area included the review of industry-related reports and studies, testimony before congressional committees, journal articles, and industry publications. As noted previously, we held a conference to help design the assignment's approach and identified and discussed what key variables affect financial health and why. To further help design the approach, we obtained comments from individuals knowledgeable about the electric utility industry and its financial condition. We also contacted and interviewed representatives from government, public utility commissions, industry, and other groups interested in the financial health issue.

After identifying factors often advanced as being important, our next task was to determine their significance. We studied and analyzed the rationale and logic supporting the contentions regarding the industry's health. Using this as the basis for analysis, we proceeded to assess the significance of these arguments by employing statistical techniques in our analysis.

In this portion of the review, we utilized data from S&P's Compustat Services, Inc. Specifically, we compared the industry's financial performance with the trend in inflation and interest rates. We also utilized regression analysis to examine the relationships between the indicators of health and the industry-

specific factors which have been said to influence the industry. Although the financial community uses these techniques to identify and forecast how utility firms will fare for investment purposes, our approach was to use these tools to estimate how much the identified factors influence the industry's overall financial health. The specifics of our methodology and models are presented in appendix III.

Future outlook

Our fourth and final objective was to develop information on the industry's financial future. Although we did not attempt to predict the industry's future in using our analysis of the industry's past and current financial performance, we were able to examine the industry's future prospects and assess possible outcomes.

To answer this question, we examined recent publications, technical papers, and studies addressing the industry's future prospects to make a qualitative assessment of the industry's future. We also solicited and analyzed the comments of others with respect to the industry's financial future. Using this information, coupled with our analysis of the industry's financial condition, we were able to make several qualitative judgments regarding the industry's future.

In the context of this analysis, we did not forecast the industry's financial health on the basis of future demand for electricity or the industry's ability to meet demand. These are highly complex subjects, with no clear-cut answers at this time. From one perspective, electricity will face stiff competition from other alternatives (i.e., energy efficiency improvements and solar energy). Consequently, electric demand growth will not repeat the pattern of the past. From the opposite perspective, demand for electric power will continue to grow, and the industry cannot raise capital at reasonable costs to build the powerplants necessary to meet electric demand growth.

Any judgment on which perspective best portrays the future requires answers to a number of complex questions. What will be the demand for electricity? Will existing and planned capacity be sufficient? What will be the most effective means for meeting demand? What will be the industry's capital requirements? What are reasonable capital costs? These questions were beyond the scope of our analysis and could not be resolved in this report. The questions, however, are being considered as part of our on-going analysis of the electric supply and demand issue.

CHAPTER 2

ELECTRIC UTILITY INDUSTRY'S FINANCIAL INDICATORS

Any judgment on what indicators best reflect the industry's financial health must consider what the concept means. Such an approach avoids the tendency to concentrate on financial ratios and statistics as ends in themselves. Although extensive financial and operational information on the industry's performance exists, there have been divergent views regarding the industry's financial health. Different views arise, first, because there is no universally accepted definition of what constitutes financial health. Second, various special interest groups have different perspectives and interests.

In our analysis, we researched and examined the concept of financial health. Recognizing that various degrees of health are possible and any final determination is a matter of judgment, we nevertheless found a number of characteristics fundamental to good financial health. These include the ability to

--survive adversity,

--attract capital, and

--maintain solvency and profitability.

In essence, the electric utility industry's overall health relates to its ability to meet adversities in financial markets, raise debt and equity funds, and earn a return that investors find acceptable in carrying out its operations.

FINANCIAL INDICATORS

Using this as a basis, we examined 17 indicators commonly used by the investment community and others to analyze the industry's financial health. Our objective was to identify indicators having the following characteristics. First, we wanted to identify indicators which reflected current and longer term prospects. Second, the indicators had to be broad and comprehensive in nature--reflecting many factors which could affect the industry's financial health. With these as our criteria, we identified three principal indicators for analyzing the industry's financial health--rate of return on common equity, market price-to-book value ratio of common stock, and the corporate bond rating. Other indicators which we considered but did not use because they did not meet the criteria or were duplicative are discussed in appendix II.

Rate of return on common equity

The rate of return on common equity[1] is one of the most frequently and commonly used financial health indicators in the electric utility and other industries. Simply, the indicator shows the profitability on the capital supplied by common stockholders and is computed by dividing the utility's earnings after taxes by the average amount of such capital. For example, if a utility's earnings for the year were $1 million and its average investor-supplied capital for the year amounted to $10 million, the firm's rate of return would be 10 percent ($1 million/$10 million).

As an indicator, rate of return on equity has several favorable characteristics which make it a useful gauge of financial health. Most importantly, it provides an annual and current measure of how well the firm has done with the investment dollars provided by owners. It reflects the bottom-line performance of the utility by taking into account all factors that determine net income. This includes such factors as current demand for electricity, regulation, operating efficiency, and production costs. Just as important, the indicator provides a means to compare economic performance from year to year and between industries. Rate of return on equity is also generally accepted by most analysts, plays a prominent role in testimony in regulatory hearings, and captures a fundamental characteristic of short-term financial health--profitability. Finally, the indicator is based on accounting practices and principles followed consistently from year to year and, although not strictly uniform from company to company, are comparable.

Market-to-book value ratio

The market price-to-book value ratio of common stock is also a commonly used gauge of financial soundness. It compares the market price of the company's common stock with its book value[2]. For example, if a firm's stock is selling at $10 per share and the book value of each share is $5, then the market-to-book value ratio would be 2.

The market-to-book ratio can be thought of as an indicator of how the financial community evaluates the electricity industry's future rate of return, compared with returns expected on alternative financial investments (stocks, bonds, etc.). If the financial community believes that the future returns on utility industry common equity will be comparable to returns available on alternative investments, it will set market prices roughly equivalent to the book values of utility stocks, and the market-to-book value ratios will be about 1. If the financial community

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[1]Common equity represents the capital provided by common stockholders and the retained earnings available to them.

[2]Common equity divided by common stock outstanding.

expects future returns on utility common equity to be substantially less than returns on alternative investments, the stock market will establish market prices below the book values of the stocks, and the market-to-book ratios will be less than 1.

The ratio as an indicator has a number of favorable characteristics, which makes it a good gauge of future financial health. First, it reflects the collective and independent views of investors and provides a measure of worth that the investment community attaches to a firm in relation to its historical cost value. Second, because it is a market-oriented ratio, it provides on indication of how investors view the future financial prospects of a firm and how much investors value the expected future cash flow from the utility. Third, because the market price is determined by investors, it inherently considers all factors which financially influence utilities. Consequently, it captures the influences of general economic conditions as well as specific industry factors. For example, investors obviously consider the influence that inflation and interest rates have on the industry relative to other businesses. Also, industry-specific factors such as dividends, earnings, construction, debt, cash flow, operating efficiency, and regulatory environment are considered against the background of economic conditions.

Bond rating

The corporate bond rating is the third indicator we identified as appropriate for our evaluation.[3] Whereas the other two indicators address the financial condition as viewed by prospective equity investors, this measure focuses on the financial condition as viewed by those who would loan money to the firm. The bond rating is developed--usually on an annual basis--by independent rating agencies which evaluate the credit worthiness of electric utility companies and other firms. The ratings reflect the assessment of specialists who are independent of the electric utility industry. They are comprehensive assessments of each electric utility's ability to pay the interest and principal on its bonds, taking into account: operating efficiency, fuel/power supply, regulation, management, competition, long-term demand, construction, earnings, debt, cash flow, financial flexibility, and accounting quality.

The bond rating is a valuable tool for gauging the financial prospects of the industry for a variety of reasons. Overall, corporate bond ratings indicate credit strength (ability to attract debt-financed capital) and solvency (the ability to repay creditors). Consequently, they reflect several fundamental characteristics of financial soundness as previously discussed.

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[3]We utilized the ratings of S&P's Corporation where investment grade ratings range from AAA (the best rating) to BBB, and speculative grade ratings range from BB+ to D.

More specifically, the rating provides a way of measuring financial prospects for the industry on a long-term basis from the lender's perspective. They are judgments on the degree of risk on long-term debt issues (15 to 30 years) and are made against the backdrop of economic, financial, social, and political trends affecting the industry. For example, future economic conditions are considered as part of the assessment process for each individual firm. Also considered are firm-specific factors such as earnings, electric demand, construction, and so forth. Furthermore, utilities are evaluated on their financial prospects considering past performance, present problems, and how they plan to deal with their problems.

CHAPTER 3

THE FINANCIAL STATUS OF THE ELECTRIC UTILITY INDUSTRY

During the past decade, the electric utility industry's overall financial health declined. However, our review found that not all electric utilities have done badly, and recent trends in the financial indicators show that the industry's financial health is improving. Also, changes in the financial health of the electric utility industry have not been out of line with changes in the financial health of many other industries over this time period. In relation to other industries, the electric utility industry's financial performance has consistently remained at or near the middle range and has not experienced the wide financial fluctuations faced by many other industries.

ECONOMIC OVERVIEW OF THE ELECTRIC UTILITY INDUSTRY

Until 1970, the industry generally experienced declining production cost while electric demand grew steadily and predictably. Electricity prices (in current dollars) declined by more than 60 percent between 1907 and 1944. This pattern was repeated over the next 25 years. Technological improvements allowing more efficient and cheaper production with each new addition of generating plant accounted for the majority of this price decline.

In concert with these dramatic price declines, electricity evolved as an important source of energy, and the industry prospered. In a setting where each incremental unit of electricity cost less to produce and purchase than the former, efforts to promote increased usage proved quite successful. Between 1945 and 1970, total per-customer electric usage increased 235 percent, with usage per residential customer increasing 475 percent. Electricity growth rates far exceeded growth rates for both overall economic activity and other fuels.

Rates of return on common equity improved steadily, averaging 10 percent from 1945 to 1950, 10.7 percent from 1951 to 1960, and 12.2 percent from 1961 to 1970. Investors also expressed increasing confidence as market-to-book value ratios steadily rose over the 25 years from an average of 1.06 between 1945 and 1950 to 1.97 between 1961 and 1970. In 1970, 96 percent of all utility bond ratings were A or better.

A turning point for the industry occurred around 1970. The per-unit costs of adding capacity began to increase as did the average cost to produce electricity. In the 1970's, as shown in table 1, the price of electricity began to increase; the rate of residential sales growth per customer slowed, and sales actually declined in 1974, 1979, and 1981.

Table 1

1 dollars) and Sales
(Residential Customers), 1945-81

Year	Price (¢/kWh)		Sales (kWh/customer)	
1945	17.23		1,229	
1950	10.88		1,830	
1955	8.97	-71%	2,751	475%
1960	7.59	(-4.9%/yr)	3,854	(7.2%/yr)
1965	6.48		4,933	
1970	4.92		7,066	
1971	4.92		7,380	
1972	4.98		7,691	
1973	4.87		8,079	
1974	5.22	20%	7,907	25%
1975	5.42	(1.6%/yr)	8,176	(2.1%/yr)
1976	5.51		8,360	
1977	5.67		8,693	
1978	5.62		8,849	
1979	5.55		8,843	
1980	5.65		9,025	
1981	5.89		8,863	

Source: Leonard S. Hyman, The Development and Structure of the Electric Utility Industry, Merrill, Lynch, Pierce, Fenner, & Smith, Inc., Dec. 1980, the Edison Electric Institute, Statistical Yearbook, 1982; and the Economic Report of the President, 1983.

A combination of factors contributed to the industry's cost reversal. Concerns over (1) supply reliability and the need to increase reserve margins, (2) environmental issues, and (3) a shift by the industry to more expensive and capital-intensive generating facilities, such as nuclear plants, all led to significant increases in capital requirements without a corresponding increase in technological improvements that lowered costs.

By 1974, cost pressures that began several years earlier were accentuated by new events. The 1973 oil embargo resulted in sharply higher fuel costs, and inflation and high interest rates increased the incremental costs of new generating facilities. Moreover, increased social and environmental concerns, government regulations, longer lead times for plant construction, and demand uncertainties added to the costs confronting the industry. By 1981, residential electricity prices had increased at an annual real growth rate of about 1.6 percent since 1970 compared with annual price declines of -4.9 percent between 1945 and 1970. As prices increased, there was a dramatic decline in the average annual growth rate of electric consumption to only 2.1 percent between 1970 and 1981, compared with a previous 25-year average annual growth rate of 7.2 percent.

THE INDUSTRY'S FINANCIAL PERFORMANCE

It is clear from our study and other analyses we examined that the electric utility industry's financial performance has deteriorated on the average since the early 1970's. In our analysis of over 100 companies, we examined the industry's financial health from 1970 to 1982 using the financial criteria previously discussed for trends and individual company performance.

In summary, we found that

--the industry had its sharpest financial decline in 1973 and 1974 and, in terms of rate of return and the market-to-book value ratio, hit its lowest point (10.66 percent and 0.76, respectively) in 1974;

--in 1975, the industry recovered much of the ground it lost in 1974, with rate of return and the market-to-book value ratio increasing to 11.54 percent and 1.01, respectively;

--all three of the industry's financial indicators declined from 1978 to 1980, with rate of return just over 11 percent, market-to-book value hitting the 1974 low, and corporate bond ratings reaching a new low;

--the industry started to improve in some respects in 1981 and, on the basis of financial literature, continued this trend in 1982, with earnings estimated at 13.8 percent and market-to-book value estimated at 0.94; and

--Bond ratings were still depressed, but factors which tend to influence them are improving.

Details regarding these overall statistics are contained in appendix IV and discussed later in our comparison of the electric utility's performance to other industries.

In analyzing individual company indicators, we found that some companies have not done badly under adverse economic circumstances. In examining how the makeup and complexion of the industry has changed throughout the 1970's and into the 1980's, we found that

--out of 67 companies with AAA and AA corporate bond ratings, 24 were able to maintain their ratings throughout the 1970's and

--3 companies were able to improve their S&P ratings to AAA or AA, and 6 other firms were able to improve their ratings to A+.

Regarding earnings on common equity, we found that most companies maintained earnings between 10 to 14 percent. The industry's decline in earnings from 1975-76 levels occurred primarily because a

few firms did relatively poorly. (See app. VI.) Table 2 shows how a few firms had considerably lower earnings in 1980, the worst year since 1975, while the same number of firms ranked in the middle earnings range. More specifically, the bottom seven firms had earnings ranging from -5.7 to 3.4 percent; three of these are owned by the holding company that owns the Three Mile Island nuclear plant.

Table 2

Industry Earnings

Rate of return range	1975	1980
Less than 0	-	3
0 to 2	-	1
2 to 4	-	3
		(7)
4 to 6	3	3
6 to 8	10	10
8 to 10	27	17
10 to 12	46	52
12 to 14	52	46
	(98)	(98)
14 to 16	18	18
16 to 18	3	4
18 to 20	-	3
20 and over	-	-
Total	[a]159	160

[a]Data not available for one firm.

Source: GAO

Over the industry's worst period--1973 to 1981--the same firms were consistently ranked in the top 20, while the utilities doing relatively poorly switched more frequently. We found, using the three financial indicators over 3 year-intervals, that 17

companies always ranked in the top 20.[1] For the bottom 20,[2] company rankings changed more often, with only 8 companies doing relatively poorly on a regular basis.

INTERINDUSTRY FINANCIAL COMPARISON

The financial deterioration of the industry also appears moderate when viewed in relation to other industries. Although the utility industry has unique characteristics, it is important to compare its performance with other industries for several reasons. First, it operates under the same overall economic conditions as other industries. If changes in the financial condition of electrical industries track fairly closely to changes in other industries, the basic causes of these changes may be due to economy-wide development, which is not unique to electrical utilities. If little correspondence exists between trends in the electric utility industry and other industries, the major causes may be developments unique to electrical utilities. Second, the electrical utility industry must compete with other industries for capital and resources. For example, recent estimates indicate that utilities account for about one-fifth of all new construction, one-third of all corporate financing, and one-half of all new common stock for nonfinancial companies.

Our analysis illustrates that some of the financial trends in the industry are similar to trends in other industries over the 1970-82 time period. However, the electrical utility industry has not experienced the degree of profit fluctuations that many other industries have and thus has not been subjected to the positive or negative extremes faced by other industries. Overall, the electrical utility industry has consistently remained at or near the middle range of the industries we examined.

We found that the financial difficulties experienced by the industry since 1970 appear moderate when examined against other industries' record. The electric industry did not significantly changed its relative economic position on either rate of return or the market-to-book value ratio attained by many other industries. They have not been subjected to wide swings in economic performance.

From 1970 through 1982, the economy experienced two recessions along with very high inflation and interest rates. This turbulent period represented a major challenge to all industries to operate in such uncharted economic conditions. During the 1970-72 preembargo period, the utility industry ranked above average in terms of rates of return on common equity, outperforming the S&P 400 index of large industrial companies in each of these year. (See fig. 1.) Over an 8-year period (1973 thru 1980), the

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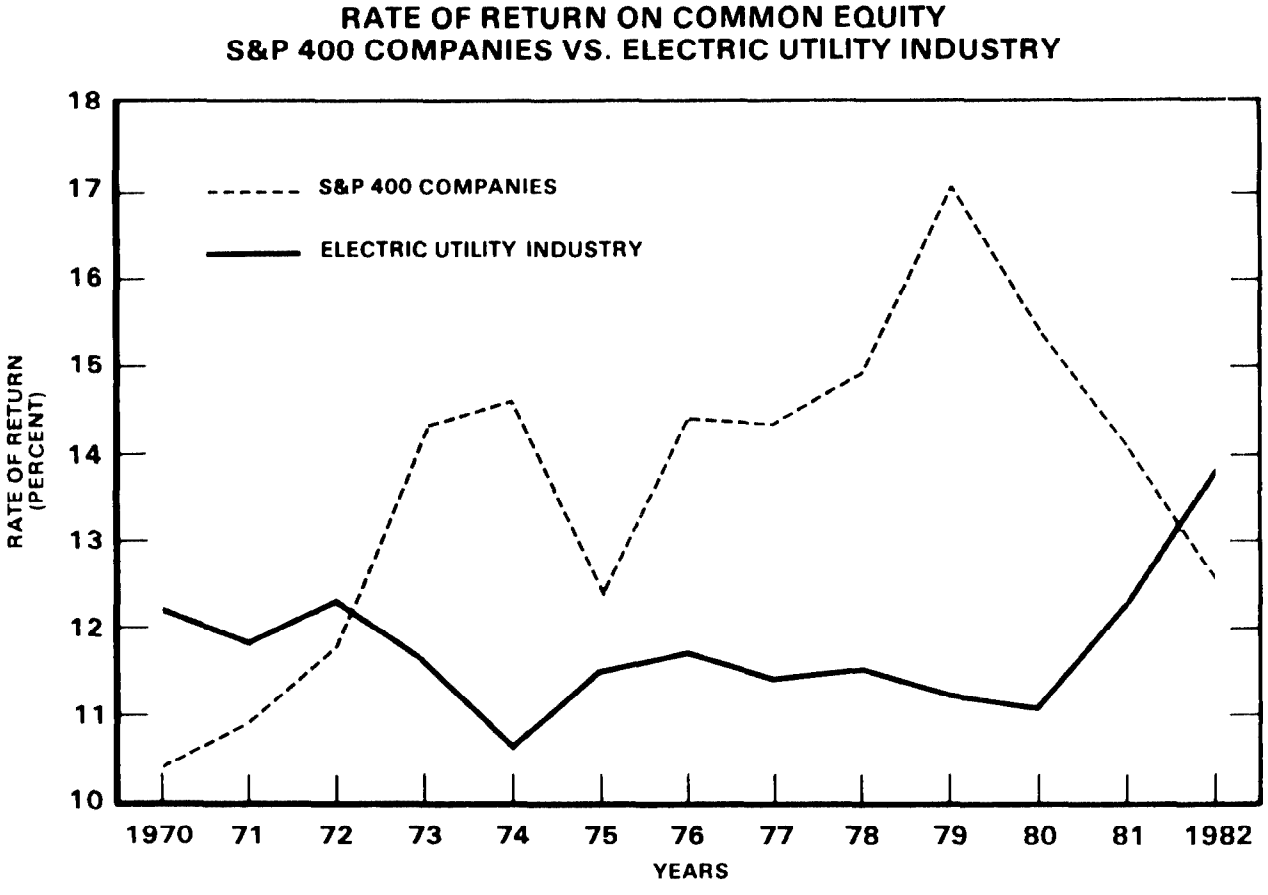
[1]Companies having at least two of its indicators in the top 20.

[2]Companies having at least two of its indicators in the bottom 20.

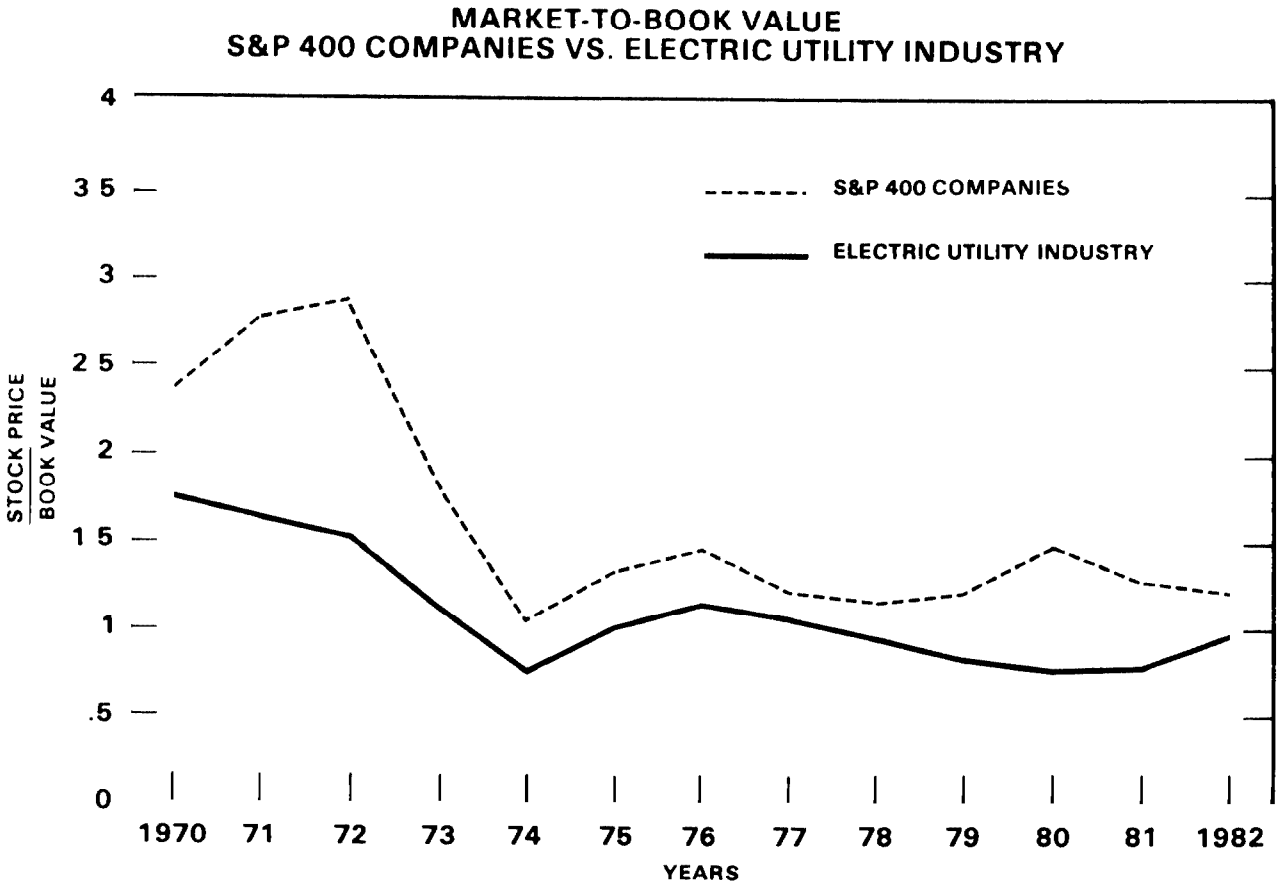
utility industry's profit rate was below the average rates experienced by other industries. Since 1980, however, dramatic improvement has occurred. In 1982, the electric industry rate of return was higher than ever before and outperformed the S&P 400 index of large industrial companies. Moreover, a 1982 comparison of earned rates of return illustrates that the electric industry ranked 14 out of 39. (See app. VII.)

Figure 1



The electric utility industry's market-to-book value ratio has been consistently below S&P 400 companies. With the industry's recent recovery, the difference in performance has narrowed. The industry's market-to-book ratio (see fig. 2) advanced from 0.76 in 1980 to 0.94 in 1982. During the same period, the S&P 400 companies' market-to-book indicator declined from 1.48 to 1.21.

Figure 2



Source: GAO

We also compared the electric industry's performance with 50 industry groups[3] representing a wide spectrum of our economy. Thirty-four of these groups had attained a rate of return of at least 17 percent sometime during the 1970-81 time frame.[4] As illustrated in table 3, 22 out of the best 34 performer groups had experienced dramatic fluctuations in their rates of return, while only 5 groups were able to consistently maintain high profit levels.[5] During the period, the electric industry avoided either extreme and varied only between 10.7 and 12.4 percent, while the average profit range was 6.2 to 20.8 percent for the other

[3]See appendix VIII for detailed listing.

[4]Data unavailable for 1982.

[5]For our analysis, we defined dramatic fluctuations as at least a 10-percent point difference between high and low rates of return.

industries. Table 3 also illustrates that the industry's market-to-book value ratio has followed the trend of other industries, generally maintaining the relative position of utilities to these other industry groups.

On the basis of this analysis, it is evident that the utility industry has been somewhat insulated from market conditions. More significantly, it has roughly maintained its market position relative to other industries during difficult economic times. The industry has not experienced the "feast or famine" extremes common to many industries able to earn high rates of return.

Table 3

Interindustry Economic Performance, 1970-81

	Earned rates of return on common equity		Market to book		
	Highest	Lowest	1970	1974	1981
	(percent)				
Electric utilities	12 4	10 7	1 75	0 76	0 79
Widely variable profit performers					
1 Oil and gas	35 0	3 1	[d]	1 30	1 97
2 Lumber	26 8	5 7	3 92	1 68	1 06
3 Coal mining	24 5	-0 4	[d]	0 91	1 05
4 Construction machinery	23 9	11 8	2 27	1 71	1.18
5 Oil refining	23 1	9.8	1.31	0.94[f]	1.01
6 Security brokers[a]	22 8	5 2	2 47[e]	0 65	1 36
7 Ship building	22 7	-40 0	1 00	0 41	1 18
8 Oil and gas drilling	21 7	4 7	2 55[e]	1.20	2 18
9 Operative builders	21 6	8 0	3 90[e]	0.65	0 97
10. Aircraft	21 4	6 8	0 82	0 43	0 88
11 Oil machinery	21 4	8 6	[d]	1 55[f]	1 97
12 Motion pictures	21 1	7 2	0 73	0 65	0 78
13 Aluminum	21 0	4 4	0 98	0 54	0 59
14 Home builders	20 4	-2.1	4 29[e]	0.35	0 92
15 Metalworking machinery	19 6	6 2	1 64	1 10	1 30
16 Automobile	18 8	-11 6	1 64	0 58	0 65
17 Air transport	18 8	-5 2	1 14	0 45	0 64
18 Toys and amusements	18 0	7 6	2 82	0 48	1 08
19 Publishing	17 6	5.1	2.09	0 59	1 68
20 Metals and mining	17 5	3 6	2 02	0 85	0 88
21 Paper	17 0	4.2	[d]	0 72	0 30
22 Steel	17 0	2 2	[d]	0 47	0 65
Moderately variable profit performers					
1 Newspapers	21 3	13 0	3 21[e]	1 05	2 10
2 Natural gas--transportation[b]	20 5	14 7	[d]	0 91	1 62
3 Trucking	19 7	11 9	1.99	[d]	1 60
4 Electrical machinery	18 8	11 2	2 52	1 16	1 34
5 Financial services[c]	18 4	8 7	[d]	[d]	0 98
6 Chemical	18 0	9 2	1 50	1 02	0 83
7 Natural gas--transportation-distribution	17 4	12 3	1 46	0.97	[d]
Consistent profit performers					
1 Cosmetics	22 3	17.7	7 66	2.40	1 56
2 Soft drinks	22 3	18 2	6 06	2 39	1 93
3 Drugs	20 9	18 1	5 11	3 60	2 31
4 Cigarettes	18 9	14 8	1 70	1 24	1 12
5 Restaurants	18.7	15.1	[d]	[d]	1.69
Mean	20 8	6 2	2 57	1 06	1 27

[a] 1972-81

[b] 1974-81

[c] 1971-81

[d] Not applicable

[e] 1971

[f] 1975

Source: Chase Econometrics and Standard and Poor's Utility Compustat, Inc.

CHAPTER 4

FACTORS AFFECTING THE INDUSTRY'S FINANCIAL HEALTH AND ITS PROSPECTS

The questions concerning what influences the utility industry's present and future financial health have received considerable attention in recent years. The industry's financial troubles have been attributed to an array of causes. Regulation has been advanced as an important reason for the industry's financial problems. Other reasons quoted include changing electric demand, low earnings, weather conditions, ambitious construction programs, restricted cash flow, poor operating efficiency, environmental requirements, and overall economic conditions.

In summary, our analysis found that since 1973, inflation and interest rates played a key role in the industry's financial status. Under the adverse economic conditions of the 1970's, our models indicated that incurring large debt and pursuing ambitious construction programs had an adverse impact on the industry's financial indicators. Today, national economic conditions have improved, debt acquisition and construction trends are falling, and earnings are better. Although the future is uncertain and there is no assurance that these conditions will continue, nevertheless, the industry's financial prospects look more promising compared with conditions in the 1970's. Of course, this does not mean that unforeseen conditions will not affect the industry's financial well-being or that individual electric utilities will be immune from financial problems. In fact, a number of utilities which have borrowed large sums to construct nuclear powerplants are having particularly severe financial problems which have little prospects for immediate relief.

HOW GENERAL ECONOMIC CONDITIONS AND INDUSTRY ACTIONS AFFECT FINANCIAL HEALTH

Historically, demand for electricity has been closely coupled with economic activity. Moreover, because of the large investments needed to produce, transport, and distribute electric power to customers, the industry has been one of the nation's most capital-intensive industries. Consequently, one would expect both the general economic environment and conditions in the capital markets to play an important role in the industry's financial health.

In examining this possibility, we compared the industry's performance with some specific economic indicators. As part of our analysis, we developed an index of the market-to-book value indicator and compared it with inflation and interest rates. Our objective in doing this was to determine if the industry's financial performance varies with changes in inflation and interest rates.

This analysis, as illustrated in table 4, supports the viewpoint that economic conditions impact strongly on the industry. In 1974, rates of inflation and interest rose to their highest levels in 27 years while our economy was in a serious recession. The decline in the 1974 market-to-book value index indicates the negative influence of these economic conditions. As the rates of inflation and interest generally declined over the next 2 years, the market-to-book value index improved. However, as inflation and interest rates started to rise in 1977, performance deteriorated until 1981, when inflation and later interest rates began to decline and financial health as represented by the index began to rise.

Table 4

Comparison of Trends in the Market-to-Book Value Index to Inflation and Interest Rates

Year	Market-to-book value index	Inflation (CPI)[a]	Interest rate[a,c]
1973[b]	100	6.2	8.7
1974	69	11.0	10.5
1975	91	9.1	5.8
1976	104	5.8	5.0
1977	97	6.5	5.5
1978	83	7.7	7.9
1979	75	11.3	11.2
1980	69	13.5	13.4
1981	72	10.4	16.4
1982	86	6.1	12.3

[a]Economic Report of the President February, 1983, and the Statistical Abstract of the U.S., 1982-83 Edition, Department of Commerce.

[b]1973 is the base year.

[c]Federal funds, effective rate.

We did not find a strong relationship between economic conditions, the industry's rate of return, and bond rating indicators. As pointed out in chapter 3, the industry's rate of return since 1973 has been relatively stable, while other industry's rates of return have varied considerably. One would expect this since regulation helped insulate the industry. With respect to the bond indicator, ratings fell following the 1973 embargo and have remained low since. The industry's electric demand growth rates have fallen off in a similar fashion. Since this is a factor in determining bond ratings, it seems to indicate that bond raters adjusted their view of the industry after 1973, seeing lower growth in light of large construction programs as a negative long-term influence. This seems reasonable since demand affects earnings and, ultimately, lender safety.

High inflation and interest rates affected the industry's financial health in several ways. As real electricity prices increased, a dramatic downward shift occurred in the growth rate of demand for electric power. The industry was in the midst of an ambitious construction program because of its desire to meet hoped-for demand increases, achieve economies of scale, and avoid uncertainties surrounding gas and oil supplies. However, inflation added unexpected costs and pushed rates up quicker than anticipated. The adverse effects of inflation were futher compounded by long lead times associated with capital-intensive construction projects. Unusually high interest rates had similar effects. Together, both added to the price of electricity by increasing costs. This futher contributed to lower electric demand growth rates while increasing the industry's need to raise new capital to finish existing construction programs. Unfortunately, the construction programs were intended to meet levels of demand which were higher than actually realized.

While interest rates and inflation have important implications, electric utilities cannot control them. However, utilities can respond to these conditions to limit financial problems. To examine what other factors influenced electric utility financial health in this economic environment, we developed models of what influences the rate of return on common equity, the market-to-book value, and corporate bond ratings indicators.[1] The models were designed to statistically measure the relationship between the industry's financial health and the factors which affected it financially over the 1973-81 period. Specifically, we examined variables associated with the financial, operational, and regulatory aspects of the industry which have been cited as having an impact on financial health.

Impact of debt and construction

Overall, our analysis indicates that large debt and construction programs had a significantly negative relationship to one or more of the financial indicators. Specifically, our bond rating model indicates that high debt/asset ratios[2] and embedded interest rates[3] were viewed negatively by bond raters, and the rate of return model also showed that high embedded interest rates had a negative influence. Our market-to-book value model suggested that investors viewed firms with large construction expenditures in a less favorable light.

These findings are consistent with financial thinking that as a firm's debt and construction leverage increase, so does financial risk and thus the interest rates and costs it must pay.

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[1]See appendix III for specific details.

[2]Total debt as a percentage of assets.

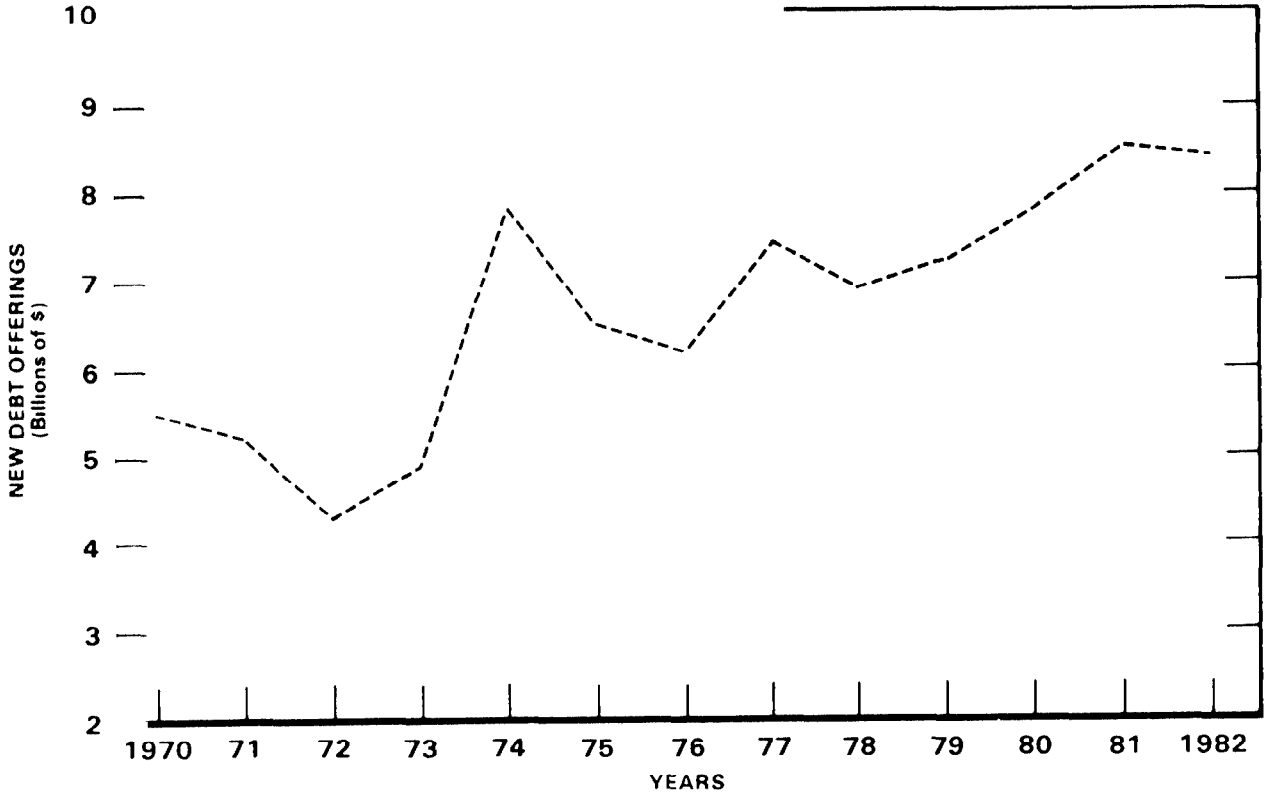
[3]The average cost of a firm's previous loans.

These influences are obviously exacerbated when large new debts and construction programs are undertaken just before or during periods of high interest rates and falling electric demand growth, as was the case between 1973 and 1981.

Comparing industry's new debt financing trends with its general financial performance over the period lends weight to these findings. Our examination revealed that when the volume of new debt issues decreased, general financial performance improved; when it increased, financial performance usually suffered. Figure 3 shows that new debt offerings declined by about $1.2 billion in 1975. As discussed in chapter 3, that was a year of financial improvement for the industry. It also shows new debt issues began to increase from 1978 until 1982 and then leveled off. Correspondingly, the industry's financial performance began to decline, and as new debt leveled off in 1982, the industry's performance improved. (See ch. 3.)

Figure 3

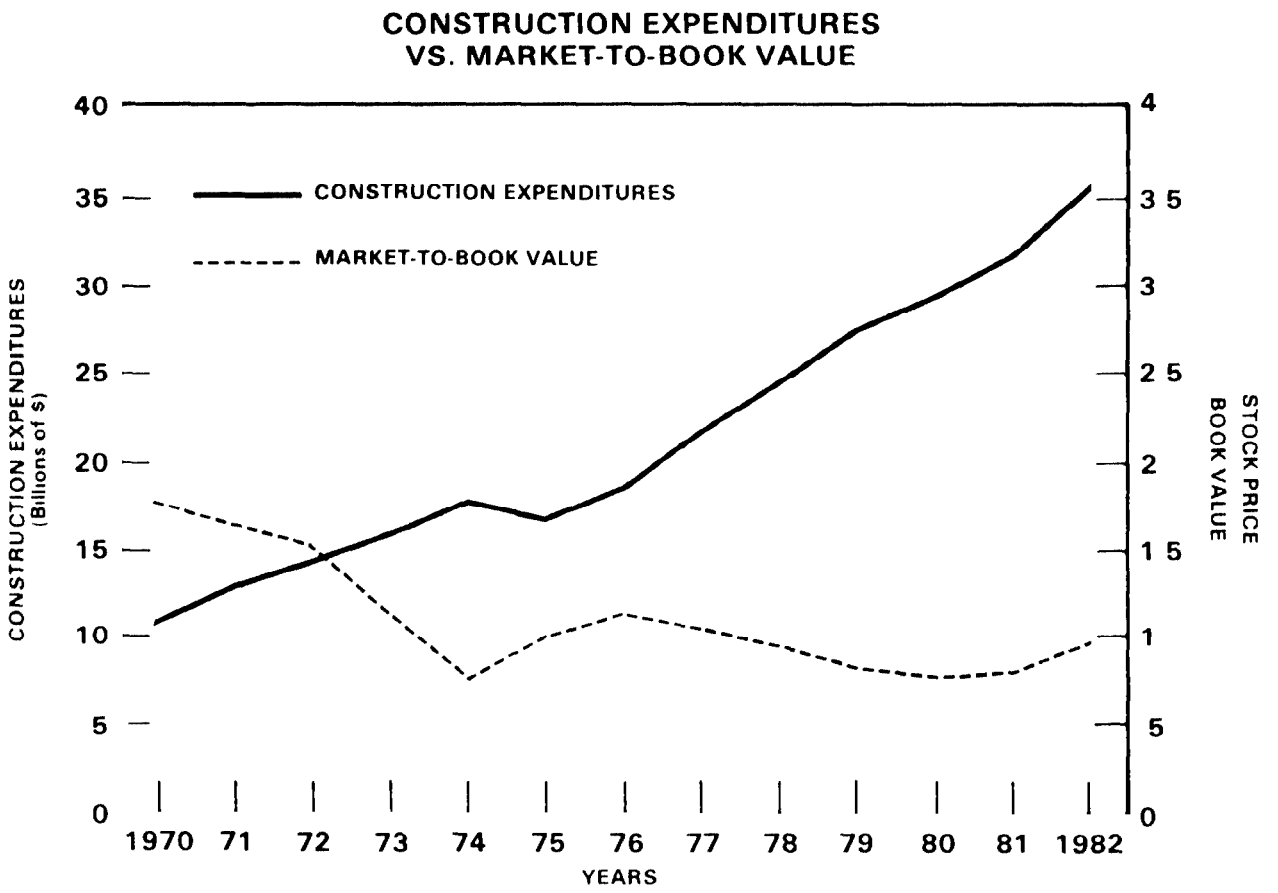
NEW LONG TERM DEBT



Source: GAO

Looking back at the industry's construction expenditures, we also found a similar pattern to the market-to-book value financial indicator. As construction expenditures rose (in both current and real dollars), this indicator generally tended to decline. For example, figure 4 shows that through the 1970's, the industry's financial health as charted by the market-to-book value indicator generally deteriorated as construction expenditures (in current dollars) rose. In 1975, the industry even achieved a market-to-book value ratio of 1 at about the time its construction expenditures were reduced by about $1.1 billion. For the remainder of the decade, construction expenditures continued to rise along with a general decline in the industry's financial performance. In 1982, the industry's financial performance did improve even though construction expenditures rose. However, this does not seem unreasonable since inflation and interest rates improved considerably in 1982.

Figure 4



Source: GAO

The relationship of debt and construction to the industry's financial health was not a coincidence. As the history of the last decade shows, the industry continued to pursue its construction programs, adding to its rate base and debt considerably faster than sales. To illustrate, the industry's reserve margin--extra generating capacity to meet unanticipated demand for electric power--increased from the industry's standard of about 20 percent in 1973 to about 37 percent at the end of the decade. Without a corresponding increase in sales to match the construction of the era, it would be unreasonable not to expect the industry to have financial problems.

Impact of operating factors

In examining factors affecting specific electric utility operations, our models indicate that financial health was influenced by how large a firm was and which fuels it used. With respect to fuel type, we found that using coal was correlated with an improved bond rating. This finding is consistent with coal's apparent advantages during this inflationary period. It was an abundant and reliable fuel, less costly, available under long-term contract, and consequently less subject to price fluctuations than gas and oil. Our rate of return model showed that large firms (measured by megawatts) do not make as high a return as smaller firms, possibly indicating diseconomies of scale.

In addition to the factors discussed above, we also tested for any effects of population density, number of customers, regional location, kilowatt hour sales, load factors, and reserve margin. Changes in population, the number of customers, and location affect a utility's business-operating environment. Changes in sales, load factors, and reserve margins are indicative of how the electric utility operated in its business environment. Our analysis did not show any of these factors to be correlated to the indicators of the industry's financial health.

Influence of earnings

Although earnings are a measure of financial performance, they are also a factor which can influence the industry's cost of capital. This appears to be especially important during periods of high interest rates when healthy earnings can lower the cost of borrowed funds or supply capital from retained earnings. It is also generally accepted that investors find earnings important, and this affects stock prices and credit ratings.

Specifically, our analysis showed that rate of return (earnings divided by common equity) had a marked impact on the market-to-book value ratio. This result confirms the fact that investors place much weight on a firm's rate of return. Our corporate bond model also supports the plausible view that earnings were important. We found bond ratings to be positively related to high interest coverage. That ratio represents earnings divided by interest, so it is obvious that earnings played an

important role. High earnings result in proportionally higher interest coverage ratios, which support a high bond rating. This improves a firm's ability to acquire debt at a lower cost. In other words, the higher the interest coverage ratio, the safer the lender's investment and, ultimately, the lower the firm's cost of capital.

While high rates of return had a positive influence on the market-to-book indicator, the amount of dividends paid out had no apparent effect. This interesting result seems to indicate that the stock market does not reward companies that maintain dividends in the face of lower profits.

REGULATION

Regulatory conditions have often been advanced by industry as a key determinant of the industry's financial health. Some have claimed that regulation's inability to deal with adverse and rapidly changing economic conditions has adversely affected the industry's financial condition. Regulatory rate lag, inadequate rate relief, and not allowing inclusion of construction-work-in-progress (CWIP) in the rate base have been advanced as specific problems. Regulatory treatment of tax benefits has also been hypothesized as an influence on utility financial health.[4] The quality of regulation--how responsive ("easy") public utility commissions are from the investors' point of view--is also cited as an important factor. Regulatory performance is seen as important to both corporate bond ratings and stock prices on the theory that commission actions influence these items and thus affect the industry's capital costs. Another problem often cited is "attrition." This is the difference between the industry's actual rate of return and the rate of return authorized by a commission. Attrition could come from the effects of inflation, growth, replacement of facilities, or regulatory lag and may contribute to the industry's financial problems.

We examined these views on the effects of regulatory practices by identifying, analyzing, and statistically testing the influence of many of these regulatory factors on the financial health indicators. The factors included revenues requested and allowed, rates of return requested and allowed, time between rate decisions, how a public utility commission treated tax benefits, and the quality of regulation. Data on revenue requested and allowed consisted of revenue increases requested by the utility and those authorized by the public utility commission. Rate of return requested and allowed data consisted of the percentage of

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[4]Public utility commissions have two methods of handling tax benefits. The first method, "normalization," allows utilities to initially retain the cash resulting from use of tax breaks and therefore is more favorable to utilities. The second, "flow through," requires the utilities to, in effect, pass the cash benefits on to customers.

return asked by the utility on its common equity and the percentage authorized by the public utility commission. Time between rate decision data consisted of the number of days between rate decisions. How public utility commissions treated tax benefits represented the extent to which public utility commissions followed "normalization" or "flow through" methods in handling tax benefits such as liberalized depreciation. With respect to quality of regulation, we obtained data on how the state public utility commissions were judged as to their regulatory policies and actions by the investment community. These and other specific regulatory factors we examined are listed in appendix III. Specific definitions for technical terms are contained in the glossary.

For the analyses, we also developed data on allowance for funds used during construction (AFUDC). In nontechnical terms, this is the costs of funds used while powerplants are being built. Because of regulatory and accounting conventions, these financing costs are not charged to the ratepayer until the plant starts operating. It is argued that electric utilities are financially hurt when a public utility commission requires AFUDC for rate-making purposes because AFUDC represents noncash income.

We did not find any statistical evidence to support that any of these factors, by themselves, significantly affected financial health on an industry-wide basis during the period 1973-81. Of course, this does not imply that any of these regulatory factors never affects the health of a specific utility. These results only indicate that these individual regulatory factors do not have a consistent negative effect across firms.

Even though regulatory factors may not have a significant effect when taken one at a time, the interaction of these factors together can have an influence. We could not examine this interaction directly. However, it is clear that regulation has an indirect influence on financial health. For example, profits are important to financial health, and the sum of all regulatory actions definitely influences them. With respect to profits, our work indicates that regulation seems to have had a stabilizing influence on the industry. As pointed out in chapter 3, the electric utility industry has not experienced the wide profit fluctuations common to many other industries.

THE INDUSTRY'S PROSPECTS

The electric utility industry experienced bad financial times during the 1970's. Today, conditions have improved, and at least for the near future, prospects appear better than those the industry has recently faced. As pointed out in chapter 3, the industry's financial indicators have improved. This has coincided with lower inflation and interest rates. Also, several favorable developments have occurred within the industry. Trends in new construction are falling, alternatives to construction seem more promising, and earnings have improved.

Alternatives to limit debt and construction

Utilities have begun to change their construction strategies. In the 1970's, although growth in demand for electric power declined and financing costs continued to escalate, utilities were reluctant to cut back on construction programs. At this point, utilities were relying on forecasts which saw demand for electricity continuing to grow. Consequently, utilities continued to raise funds to finance construction programs at higher and higher interest rates.

Eventually, industry forecasts began to reflect the new reality of lower electric demand growth and adverse financing conditions. Utilities started to delay and/or cancel major portions of their construction programs. This has begun to lower the amount of new debt acquired. In fact, the industry's future construction expenditures are projected to decrease every year from a 1982 level of $35.4 billion to $30.2 billion in 1986. This is an important development, especially when contrasted to the construction increases of the 1970's. If the past is an accurate guide, as construction programs are scaled back to accomodate a slower growth in demand, the industry's financial condition should improve. The industry's recent reserve margin has approached 40 percent, and the Congressional Research Service has noted that the industry should be able to meet electric demand under reasonable assumptions of future economic growth.[5]

Another way to keep debt and construction expenditures from growing is by implementing alternatives to conventional powerplant construction projects. Today, electric utilities are beginning to look for new ways of balancing electric supply and demand. Although progress has been slow, some electric utilities are pursuing alternatives to large generating stations before committing the extensive resources necessary to construct capital-intensive facilities. For example, several utilities in California and the Pacific Northwest Power Planning Council are using a broad range of ways to satisfy customer energy needs. Alternatives include load management, conservation, cogeneration,[6] renovation of existing facilities, and unconventional resources.

Load management--a way of reducing or delaying the need for capacity additions by reducing peak power demand--enables electric power systems to operate less expensively and more efficiently. Types of load management practices include load control and rate design. The former method allows the utility to switch certain customers' loads on or off as needed, and the latter

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[5]Do We Really Need All Those Electric Plants, Congressional Research Service, Report No. 82-147S, Aug. 1982.

[6]The combined production of power and useful thermal energy such as process steam.

structures electric rates to provide customers with an incentive to alter their use of electricity. Other demand-side opportunities include programs to provide incentives for customer end-use efficiency improvements and conservation. For example, cash rebates or low interest loans to finance the acquisition of more efficient appliances or making conservation investments are possible alternatives. Although these techniques have limitations, they are receiving increased attention. In fact, an industry trade journal, Power Engineering, recently noted that some utilities are becoming optimistic about alternatives and cited several firms around the nation exploring the options.

On the supply-side, electric utilities are beginning to consider and in some instances utilize unconventional resources to generate electric power. Solar, wind, geothermal, waste, small hydro, and cogeneration are several options for meeting the demand for electricity which are receiving attention by electric utilities. Finally, renovations and efficiency improvements to existing facilities and smaller and more manageable construction projects are emerging strategies.

One unknown concerning these possibilities is the potential for and costs of alternative electric utility investment. This has not been extensively researched from a national or regional perspective.[7] Two factors seem to account for this deficiency. First, the utility industry has not aggressively pursued the new options. Second, major difficulties are inherent in estimating cost and potential for these strategies because economic investments depend on local utility and site-specific conditions. For example, if wind is to be an economically feasible alternative, local conditions must be favorable. Obviously, if wind characteristics of a local area are not favorable, it will be infeasible.

Financially, the industry should benefit if electricity demand can be met without excessive new debt and construction. These factors have had negative implications for the industry in the recent past. In today's environment, the scenario of lower debt and construction has promising implications. Reduced construction means lower debt and, therefore, lower carrying costs. Also, generating facilities should be used more efficiently as excess capacity is utilized. Earnings should then increase, and this should help to improve the industry's market-to-book value and bond indicators. As these indicators improve, the cost of new debt should fall. Such an impact can be beneficial to both investors and consumers.

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[7]The Department of Energy's study, Alternative Energy Futures: A Review of Low Energy Growth Forecasts and Least Cost Planning Studies, examines the issue. The Congressional Research Service recently issued a report, A Perspective on Electrics Utility Capacity Planning examining the cost and potential associated with these strategies.

Lower interest rates and less inflation should have beneficial consequences for the industry. As inflation and interest rates decline or stay stable, construction costs should be less expensive or at least should not escalate. This should make it easier for the industry to raise capital needed to meet electric demand growth. Also, changes in federal tax laws should help keep debt down. The Economic Recovery Tax Act of 1981 encourages investors to reinvest dividends and improve the industry's cash flow. This should help reduce the industry's need for borrowing money through 1985.

Earnings are improving

Today, for the first time in recent years, the industry's profit picture is brighter, and on the regulatory, management, and economic fronts, conditions have changed for the better. The scenario for improved earnings is fairly straightforward. The industry's revenue can increase or remain high through both increased kilowatt hour (kWh) sales and higher electric rates. With improvements in economic conditions, sales should increase, and unit operating costs will most likely be relatively stable or lower. Consequently, the industry's earnings should improve. Further, the industry has been the beneficiary of significant rate increases. In 1981 and 1982, utilities received approximately $16 billion in electric rate increases from public utility commissions. This is an increase over previous annual increases and, consequently, the industry's rate of return has improved.

Utilities are also moving to lower operating costs. Industry is relying more and more on less expensive coal rather than oil. Since 1973, approximately 11,000 megawatts (MW) of capacity has been converted from oil to coal and another 6,000 MW is in process. Utility managements have been working to reduce other costs and certain utilities have established cost reduction programs to help improve earnings. This, coupled with some modest demand growth associated with economic recovery, should help to improve the industry's profit picture. Complementing these developments, the economy is in a period of less inflation. If costs stabilize or decrease, the industry will not be faced with the recent problems of trying to recover inflationary costs. Reduction in interest rates and lower oil prices stemming from plentiful supplies should yield similar results. If costs decline rapidly enough, the industry could find itself in a situation similar to the early 1960's when actual rates of return exceeded those allowed by electric utility commissions.

If the industry experiences electric demand growth--a likely possibility since the demand for electricity follows economic trends--revenues will increase. This will tend to improve profits and cash flow because it does not appear at this time that such gains would be offset by increased costs. With current reserve margins, sales growth for the next several years can be handled by existing power-production facilities.

While higher earnings are possible, they are by no means certain. Public utility commissions could lower electric rates, demand for electricity could decrease, or inflation may rebound. Such events could limit or stall financial improvements. As discussed earlier, electric utilities were severely hurt by pursuing large capital-intensive construction programs during periods of high inflation and rising interest rates. If such conditions reemerge, the industry at least in the near term should be aware of its recent history and act to limit the impacts of adverse economic conditions.

OTHER CONDITIONS THAT COULD AFFECT FUTURE PROSPECTS

Despite the improved economic outlook for the electric utility industry, the future is always uncertain. Several major uncertainties could affect the financial health of the industry, including regulatory, tax, or general economic changes and delays in the construction process.

One major issue being debated concerns the future demand for electric power and whether the industry will be able to meet this demand. A concern recently highlighted by a DOE report,[8] indicates that the industry is avoiding construction because of financial constraints. Because demand is expected to increase and utilities will need to replace existing powerplants, the industry and DOE maintain that in the 1990's, the nation will either have supply problems or be forced to use more expensive and less efficient ways of producing electricity. Whether this will happen or not depends largely on what the future demand for power will be and was beyond the scope of this study. This issue could be better understood by analyzing the electric demand/supply situation and outlook for the industry, which we plan to address in future work.

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[8]The Future of Electric Power in America: Economic Supply for Economic Growth, June 1983.

ORGANIZATIONS ASKED TO PROVIDE WRITTEN COMMENTS ON OUR ANALYTICAL APPROACH

American Public Power Association

California Public Utility Commission

Congressional Budget Office

Congressional Research Service

Duke Power Company

Energy Action

Energy and Environment Policy Center, Harvard University

Environmental Defense Fund

Federal Energy Regulatory Commission

Goldman Sachs

Lehman Brothers, Kuhn Loeb Resear

Merrill, Lynch, Pierce, Fenner and Smith, Inc.

Office of Technology Assessment

Paine, Webber, Mitchell Hutchin, Inc.

Salomon Brothers, Inc.

OTHER FINANCIAL HEALTH INDICATORS

In addition to the indicators we selected for our analysis, we considered 14 other financially related ratios used to gauge health and performance. These included interest coverage, debt to equity, internal generation of funds, load factor, dividend as a percentage of book value, return on net plant, allowance for funds used as a percentage of income, effective tax rate, price earnings ratio, capital expenditures as a percentage of total capital, construction work-in-progress as a percentage of net plant in service, capital employed per kilowatt hour (kWh), production cost per kWh, and dividend payout. While all impart useful information, we found that their usefulness as indicators was limited since they generally

--reflected only one or two factors,

--represented problem areas rather than indicators, and/or

--were considered in the indicators we selected for our analysis.

We also found that several of the ratios duplicated each other to some extent.

To illustrate these points, while debt-to-equity and interest coverage ratios impart useful information, they do not serve as the best indicators of financial health. The debt-to-equity ratio shows the percentage of funds that lenders have put up in relation to investors. The indicator's limitations are that it is historical and mainly influenced by two factors--funds actually put up by lenders and investors. If a firm has an acceptable debt-to-equity ratio, it still may not be healthy. For example, the ratio does not show if a firm had a cash flow problem. With respect to the interest coverage ratio, if a utility has had a favorable ratio, there is no assurance it does not have other financial problems.

Although we did not use these gauges as indicators, we did examine their influence on financial health. Both interest coverage and debt-to-equity ratios are considered in the corporate bond rating process. In chapter 4, we discussed the influence that these and other factors have on the financial indicators and the industry's health. The interest coverage ratio serves as another example. It measures the number of times earnings exceed interest costs and is computed by dividing earnings[1] by interest expense. The ratio shows present and prospective bond holders how adequately their interest returns are covered by a firm's earnings. While the indicator has a useful component for earnings, this

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[1]For this computation, interest costs are not deducted as an expense to arrive at earnings.

advantage is offset because the ratio is heavily influenced by debt, and consequently, by its nature is not comprehensive in assessing overall financial health.

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ECONOMETRIC ANALYSIS

The electric utility industry consumes approximately one-third of all the energy consumed in the United States and transforms about 30 percent of it into usable electricity. Because of the enormous importance of electric utilities to the energy future of the country, the industry's financial health has become a major concern to the public and their representatives. It would be a serious problem indeed if utilities were to become unable to deliver their share of the nation's energy requirements. A recent Department of Energy (DOE) study finds that the current financial health of the industry, if it persists much longer, could have serious adverse consequences on costs, prices, and service. According to the study,

> "Given the long lead times for new coal fired plants (7 to 9 years) and nuclear power plants (11 to 13 years), continued delays and cancellations could imply that sufficient capacity would not be available both to meet potential demand growth and to replace plants scheduled for retirements after 1995."

The DOE study is a scenario analysis assuming certain financial constraints and does not address the likelihood or causes of such constraints. Also, the financial health of utilities is a financial problem relating to such variables as bond ratings and stock prices, none of which are addressed in the DOE study. The present study is based on financial studies such as those by Archer (1981) and Trout (1979). However, these studies treated bond market and stock market phenomena in isolation and did not consider a potential bias due to simultaneous equations. Dubin and Navarro (1983) investigated bond and stock market measures of health on a single sample, as we do in this report, but also excluded potential simultaneous equation bias and certain omitted variables.

Utilities' financial health is of concern because of the possibility that they might be unable to raise the financing necessary to build required powerplants. There are essentially two ways to raise capital--internally and externally. Internal capital can be generated through retained earnings, and a good indicator of such ability is the firm's rate of return on equity (ROE). With respect to external capital sources, there are two primary sources--equity and debt. Capital is raised in the equity market by the issuance of new shares, either common or preferred. A generally accepted measure of the ability to raise equity capital is the market-to-book ratio (MBR). MBR is the ratio of the market value of the firm's common stock to the book value of its common equity, calculated on a per-share basis. The higher the price per share, the higher the MBR, and the fewer shares the firm must issue in order to raise a given amount of capital. The ability to raise debt capital is conveniently measured by the firm's bond rating. The bond rating is an indicator of the risk of default, the primary concern to the lender. The higher the rating, the

easier it is for a firm to attract debt financing. Also, since ratings measure risk, the higher the bond rating, the lower the required interest rate on new bond issues.

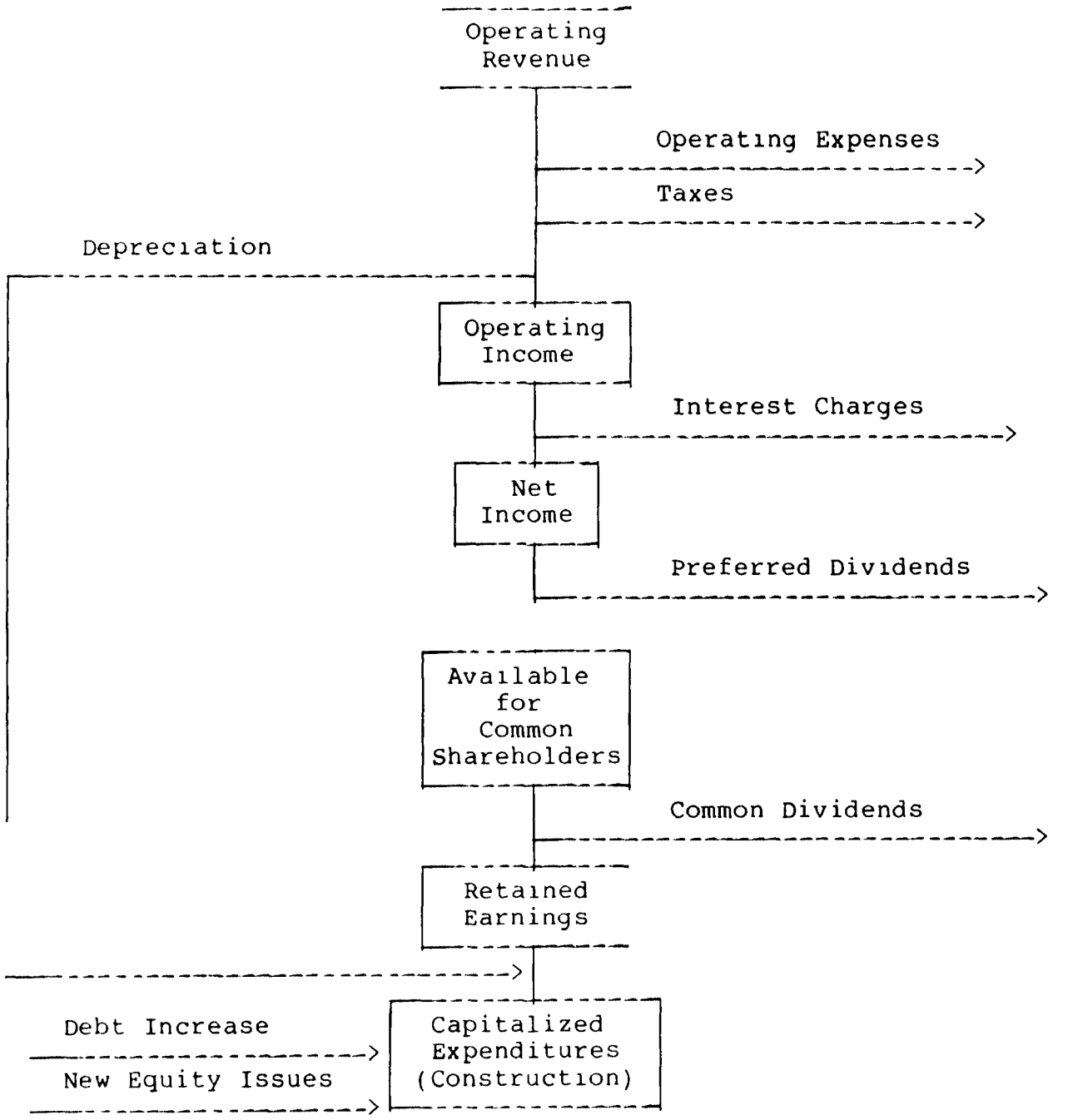
For identifying the factors which influence the financial health of the utility industry, we selected the return on equity, MBR, and bond rating indicators as three most appropriate measures for the analysis. Appendix II discusses other indicators which were considered. In the following section, we review a simple model of a regulated firm. We then present the methodology we use to statistically identify the significant factors that relate to the chosen measures of financial health. The results from a pooled cross section and time series sample are then presented and discussed.

OVERVIEW OF A REGULATED UTILITY

Our model of the regulated firm is summarized in figure 5. The characteristics of the demand facing the firm, combined with the rates allowed by the public utility commission, determine the operating revenue collected by the utility. Operating expenses, primarily fuel costs, are then removed, along with taxes and depreciation, to yield operating income. Subtracting interest charges on outstanding debt yields net income, or accounting profits. Net income minus preferred dividends yields income available for common shareholders. For our purposes, we will define return on equity as income available for common shareholders divided by the book value of common equity. Subtracting common dividends yields retained earnings.

Capitalized expenditures, primarily investment in new construction, is financed by internal and external sources of funds. Internal sources consist of retained earnings and depreciation. External sources of funds consist of increases in debt and new equity issues.

Figure 5



Source: GAO.

METHODOLOGY

Well documented and accepted theories and models on what determines the financial health of the electric utility industry are generally limited. Consequently, we had to develop our own multivariate models. For example, according to Lev,

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> "The trend in modern financial analysis is clearly toward extensive use of multivariate models in the explanation and prediction of business phenomena. Such models usually incorporate accounting as well as nonaccounting data and are constructed by statistical means rather than based on well developed theories. Sometimes a well defined theory can guide the analyst in the specification of variables, mathematical form, and relative weights. Often, however, well-defined theories are nonexistent, and the analyst must experiment with various alternative models and, on statistical grounds, choose the most appropriate one. This can be done, for example, by using least-squares regression technique when appropriate."[1]

Modelling the financial performance of a public utility can be quite complicated. The return on equity, for example, is a "bottom line" figure which is a net result of all the operations of the firm plus accounting conventions regarding depreciation, taxes, and so forth. As mentioned above, operating revenues are determined by a combination of factors including the demand facing the firm, the ratio of peak to off-peak demand, the price and income elasticity of demand, and the overall predictability of demand. The prices charged by the utility are determined by the public utility commission on the basis of the allowed rate of return. Thus, the commission determines the actual rate structure, not just the allowed rate of return.

Factors such as the regional demand characteristics, the allowed and requested rates of return, the revenue requested and allowed, and the regulatory lag, among other things, will determine operating revenues and ultimately return on equity. Similarly, operating expenses, especially fuel costs, but also reserve margin, labor costs, economies or diseconomies of scale, and overall operating efficiency will influence operating income and, eventually, return on equity. Interest charges on outstanding debt are a cost of doing business which can have a profound effect on the bottom line. In an industry as capital-intensive as electric utilities, financing a large proportion of capital expenditures through debt can result in very high interest charges and correspondingly lower rates of return. Similarly, the decision to finance with preferred stock issues will require larger preferred stock dividends and a lower amount available for common stock.

Thus, a long list of factors contribute to the determination of the return on equity. In order to derive a parsimonious statistical model of the return on equity, we analyzed various financial, operational, and regulatory measures of all these factors and included those most appropriate in a multiple regression and eliminated the insignificant variables in a sequential manner.

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[1]Boruch Lev, Financial Statement Analysis A New Approach, 1974, p. 43.

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This backward elimination stepwise regression technique is a standard method of exploratory data analysis. One problem with this technique is that the estimated coefficients and significance tests depend in part on the order in which variables are eliminated. Furthermore, the t-scores and significance tests are not strictly correct since we are using the data to both specify and test the model. The procedure which we follow in all three regression models (return on equity, MBR, and bond rating) is to specify and test the model on 1981 data, the most recent available, and then test the preferred form of the regession on a pooled cross section and time series sample covering the period 1973-81. Since the 1981 data are overwhelmed by the other eight cross sections, we expect this to be a reasonable test of the model specification.

The theory of valuation of a firm's common shares is even less developed than the theory of its financial performance. Equity investors are concerned fundamentally with the future stream of income associated with ownership of a share of the corporation. Just what information investors consider when making these decisions and what relative weights the typical potential common share buyer places on those considerations is difficult to know. The absence of a well-defined theory in this area again forced us to embark on an exploratory data analysis using the 1981 cross section of firms, during which, we analyzed and considered many factors which could contribute to an explanation of the firm's MBR. Again, the results were tested against the pooled time series cross section data.

The situation, with respect to prediction of bond ratings, is somewhat better since Standard and Poor (S&P) published the criteria it uses to rate bonds. However, S&P does not publish the relative weights that it uses on the various factors, so we again rely on a multiple regression to identify the weights and their significance.

One possible econometric problem is that, according to S&P, bond raters consider MBR to be a fundamental indicator of credit worthiness. On the other hand, since a firm's bond rating is public information, equity investors may consider the bond rating in determining their demand for a firm's common stock. Thus, a potential simultaneous equation bias exists if ordinary least squares is applied to either the bond rating or market/book equation. Also, a possible simultaneity exists between the return on equity equation. We are inclined to reject the possibility of simultaneity between the bond rating and the return on equity because the interest charges borne by a firm are determined by the amount of debt as well as the average interest rate on that debt. The average interest is a weighted average of all the interest rates on all the bonds issued by the firm, hence of all previous bond ratings, not the current bond rating. Thus, interest charges, and therefore the return on equity is determined in part by lagged bond ratings, which cannot be simultaneously determined with current return on equity and current bond ratings.

The data for this analysis were taken from Utility Compustat II Annual and Quarterly tapes. The firms included in the sample are all Compustat firms in SIC codes 4931 (Electric and Other Service Combined, 57 firms) and 4911 (Electric Service, 103 firms). Some of the firms in the sample of 160 firms are holding companies (e.g., American Electric Power, Middle South Utilities, etc.). S&P rates the bonds of subsidiaries rather than the holding companies. Thus, holding companies do not have bond ratings, and subsidiaries do not have MBR. Since we require a common sample for both regressions, we allocated the parent firm's MBR to each of its subsidiaries and deleted the parent company from the sample.

Several variables were identified as potentially significant, using the 1981 cross section data. These variables are defined below. A list of variables tested is included in table 4. The bond rating (RATING) is defined as S&P's bond rating translated into a range from 10 (B-) to 180 (AAA+). No company had a bond rating lower than B-. MBR is defined as the closing market value of the firm's common stock divided by the firm's book value. Allowance for funds used during construction (AFUDC) is essentially a long-term account receivable that is counted as part of the utility's income. Cash flow equals net income (less AFUDC) plus subsidiary-preferred dividends, minority interest, depreciation, amortization, deferred taxes and credits, and other internal sources. The debt-asset ratio (DA) consists of total debt (long-term debt, long-term debt due within 1 year, and short-term debt) divided by common equity. Times interest earned (TIE) is gross income plus income taxes divided by interest charges. The embedded interest rate (EMBEDI) is computed by dividing interest charges by total debt. Gross plant, which is the undepreciated value of all previous investment, was included as a measure of firm's size and was also identified as a potentially significant variable. However, problems of interpretation arise because firms with recent construction program will have high gross plant because of the rapid inflation of construction costs. A better measure of size is net generating capability measured in millions of kilowatts (megawatts). Thus, we use generating capability instead of gross plant in the return of equity equation reported below in order to have a less ambiguous measure of firm size.

POOLED TIME SERIES AND CROSS SECTION ANALYSIS

The results of the previous analysis could be biased toward significance since the data are being used to both specify and test the model. Pooling the 1981 cross section with eight more cross sections (1973-80) should provide a stringent test of the

model developed in the last section.[2] However, there is another problem with regression analyses done on a single cross section. Certain variables, such as the quality of management and the relationship between the utility and its regulatory commission must be omitted from the regression because they are not observable. However, if these unobservables are correlated with the other independent variables in the regression, such as would occur if good managers succeeded in raising the return on capital and therefore the MBR and bond rating of the firm, then omitting the "management" effect would bias the coefficients on the remaining variables. Thus, overall firm efficiency, arising from good management will bias the coefficients in the cross section regression and perhaps make them appear to be significant when they are not. Any factor, such as management, which is specific to the firm is referred to as a "fixed effect." Also, two variables that have been identified as being theoretically important for equity investors are the covariance between the firm's rate of return and the overall market rate of return (the "beta" coefficient), and the expected rate of return. Applied researchers typically estimate each of these variables using multiyear time series data, with the result that both variables tend to remain constant over time. As such, their influence is incorporated into the firm's fixed effect.[3] The only cure for such unobservable firm effects and the resulting bias is application of the so-called "fixed effects model" on pooled data.[4] We implement the fixed effects model here by utilizing a set of firm and "year" dummy variables to

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[2]In order to pool, we must constrain the coefficients on the independent variables to be constant across years and firms. This is a somewhat more stringent assumption than that used for a single cross-section regression (which requires only that the coefficients be constant across firms) or a single-time series regression (which requires only that the coefficients be constant across time). However, the advantages of the pooling method are substantial. Only by pooling can we control certain omitted or unobservable influences such as management efficiency or the general economic climate. Other ordinary least-squares methods yield biased estimates in the presence of these omitted effects. Autocorrelation and heteroskedasticity are reduced because of the presence of time and firm dummy variables. Thus, our method is unbiased, consistent, and free of serious autocorrelation and heteroskedasticity.

[3]Also, research has shown that leverage is correlated with beta values. (Lev, 1974, pp. 202-207). To that extent, we have included a proxy for beta. It is interesting to note in this context that, as we shall see below, leverage is not significantly related to MBR when the firm dummy variables are included in the regression, indicating that these variables might be better measures of risk than leverage is.

[4]See Mundlak (1978) for a fuller discussion of the fixed effects model.

capture any omitted firm and year effects.[5] This technique is usually referred to as the Least Square Dummy Variables (LSDV) method and is unbiased and consistent in the presence of fixed effects. A test of the significance of such effects is conducted by means of an F test on the dummy variables. In all three of our regressions, the firm and year dummy variables were highly significant, indicating the presence of such effects.[6] In the analysis presented below, we apply three stage least squares to the fixed effects model estimated on pooled time series and cross section data.

The pooled bond rating regression is presented in table 5 below. Interest coverage, measured by times interest earned (TIE) is positively related to bond rating, as is the proportion of net generation from coal. The debt/asset ratio (DA), a measure of leverage and therefore a measure of risk, is negatively related to bond rating. The embedded interest rate (EMBEDI), the average cost of previous loans, is also negatively related to bond rating. MBR, which was identified as a possibly significant explanatory variable in the preliminary analysis of the 1981 cross section data, is not significant in this pooled regression. This may be a result of the individual firm dummy variables capturing the relevant information carried by the market-to-book ratio. Thus, the larger the debt the firm incurs relative to its asset base and the higher the interest rate it must pay on that debt, the lower the bond rating. On the other hand, bond raters seem to prefer firms which use coal heavily and firms which earn high rates of return--income which can be used to cover interest payments. The year dummy variables show the net effect on bond ratings of influences that affected all utilities that year, excluding the factors in the regression, such as overall macroeconomic conditions, fuel costs, and interest rates. Incorporating the initial year--1973--into the intercept allows us to calculate the effect of each year relative to 1973. A glance at the coefficients shows that bond ratings have suffered relative to other 1973 levels in every year since 1973, even holding the other factors (interest coverage, leverage, etc.) constant. The worse "year effect" occurred in 1976. The years 1977 to 1979 saw improvement, but 1980-81 saw a slight worsening.

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[5]A "year effect" is an influence or set of influences which affect all utilities in a given year. For example, we expect 1974 to have a negative effect on all utilities because of the unanticipated rise in fuel prices. Omission of year effects will bias the coefficients in a time series in the same manner as omitting the firm effects in a cross section.

[6]The results of the F tests on the significance of the firm and year dummy variables for the three equations are as follows: F(RATING)=26.05), F(MBR)=20.25, F(ROE)=5.89. The critical value for all of these tests is 1.32.

Table 5

Pooled Time Series and Cross Section Regression

Variable[a]	Bond rating Coefficient	T-ratio	Label
INTERCEPT	102.66	6.42	
TIE	5.22	2.99	Times interest earned
DA	-42.09	3.20	Debt/asset ratio
SOLIDPCT	0.09	2.13	Solid fuel percentage
EMBEDI	-287.06	4.25	Embedded interest rate
MBR	0.09	0.54	Market-to-book ratio
1974	-0.41	0.07	Year dummy, 1974
1975	-5.97	2.87	" " 1975
1976	-6.83	3.57	" " 1976
1977	-5.42	3.04	" " 1977
1978	-3.79	1.13	" " 1978
1979	-2.94	0.62	" " 1979
1980	-3.65	0.67	" " 1980
1981	-4.69	0.94	" " 1981

RSQ = 0.84, F = 34.07, N = 780, DF = 676.

[a]Coefficients on the individual firm dummy variables have been suppressed.

The pooled market-to-book regression is presented in table 6. This regression indicates the significant factors which determine the typical utility's financial health with respect to new equity issues. The firm's MBR is postively related to return on equity and negatively related to new construction expenditures. Three variables which were identified as potentially significant in the preliminary analysis of 1981 data, the debt/equity ratio, cash flow, and the bond rating were not significant in the pooled regression, again perhaps because the individual firm and year dummy variables carry the same or similar information for investors. The estimated year effects again show an interesting pattern, with the largest decline in 1974, but with the largest decline in 1974, but with recovery beginning in 1975 and 1976, after which things again turned sour. Although the situation has never been as bad as it was 1974, 1980 was almost as bad, and 1981 showed only mild improvement. Thus, the shift away from utilities that began in 1977 may still persist.

The results of the pooled return on equity equation are presented in table 7. Operating income has a significantly positive effect on ROE. Embedded interest rate and net generating capability (megawatt) have significantly negative effects. A FUDC is not a significant determinant of return on equity. The year dummy variables show much less movement (and significance) than in the other regressions.

Table 6

Pooled Time Series and Cross Section Regression

Variable[a]	Market-to-book ratio Coefficient	T-ratio	Label
INTERCEPT	66.22	3.99	
ROE	2.00	6.41	Return on equity
DE	-0.74	0.22	Debt/equity ratio
CASHFLOW	0.0012	0.08	Cashflow
CONSTR	-0.012	1.65	Construction expenditures
RATING	0.20	1.38	Bond rating
1974	-31.95	14.91	Year dummy, 1974
1975	-6.51	2.66	" " 1975
1976	7.16	2.88	" " 1976
1977	-0.04	0.02	" " 1977
1978	-14.97	5.70	" " 1978
1979	-25.10	8.99	" " 1979
1980	-29.96	9.49	" " 1980
1981	-26.97	7.39	" " 1981

RSQ = 0.77, F = 22.09, N = 780, DF = 676.

[a]Coefficients on the individual firm dummy variables have been suppressed.

Table 7

Pooled Time Series and Cross Section Regression

Return on Equity

Variable[a]	Coefficient	T-ratio	Label
INTERCEPT	13.66	10.02	
OPINC	0.03	8.31	Operating income
EMBEDI	-27.76	2.35	Embedded interest rate
AFUDC	-0.001	0.32	AFUDC
MEGAWATT	-0.001	5.45	Net generating capability
1974	-0.81	2.84	Year dummy, 1974
1975	-0.06	0.20	" " 1975
1976	0.04	0.13	" " 1976
1977	0.002	0.01	" " 1977
1978	-0.17	0.51	" " 1978
1979	-0.14	0.38	" " 1979
1980	0.41	1.03	" " 1980
1981	0.27	0.60	" " 1981

RSQ = 0.46, F = 5.60, N = 746, DF = 645.

[a]Coefficients on the individual firm dummy variables have been suppressed.

Table 8

List of Variables Used[a] in the Analysis

1. Bond rating
2. Rate of return on common equity
3. Market-to-book value
4. AFUDC
5. Average revenue
6. Assets
7. Cash flow
8. Construction expenditures
9. CWIP
10. Debt
11. Net plant
12. Debt/asset ratio
13. Deferred taxes
14. Dividends
15. Net generation
16. Price of stock
17. Equity
18. Gross plant
19. Interest paid
20. Load factor
21. Megawatts of capacity
22. Dividend payout
23. Price/earnings ratio
24. Reserve margin
25. Rate of return on assets
26. Sales
27. Revenue requested
28. Revenue allowed
29. Rate of return requested
30. Rate of return allowed
31. Interest coverage
32. Embedded interest rate
33. Number of customers
34. Population density
35. Operating income
36. Percent of natural gas used in generation
37. Percent of coal used in generation
38. Percent of nuclear used in generation
39. Percent of oil used in generation
40. Commission rating
41. Seven U.S. regions
42. Net income
43. Tax treatment
44. Days since last rate decision
45. Average cost per British thermal units
46. kWh growth

[a]These are basic variables, various permutations and transformations considered in the analysis.

To summarize, we have estimated a block recursive system of equations on pooled cross section and time series data incorporating fixed effects via individual firm and year dummy variables. Most of our preliminary results based on exploratory data analysis of the 1981 cross section have been verified. However, one finding is that the MBR is not a significant determinant in the bond rating equation after individual firm effects have been taken into account. Similarly, bond rating is not significant in the market-to-book equation. Thus we suspect that, at least for the fixed effects model, a systems estimation technique such as two- or three-stage least squares may not be necessary.[7]

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[7]We did reestimate the equations using ordinary least squares and Zellner Efficient Least Squares after dropping MBR from the bond rating equation and bond rating from the MBR equation. The results were virtually identical. However, since a theoretical simultaneous equation bias exists, we report the three stage least square results.

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FINANCIAL STATISTICS: ELECTRIC UTILITY INDUSTRY'S FINANCIAL INDICATORS

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Rate of return on common equity												
Minimum	5.60	4.72	5.80	-1.82	3.24	4.14	2.10	-6.08	2.14	-0.55	-5.74	-4.72
Maximum	18.93	18.75	17.26	17.46	18.13	17.57	19.67	21.73	17.37	26.28	18.79	19.39
Mean	12.27	11.89	12.36	11.66	10.66	11.54	11.75	11.48	11.59	11.25	11.17	12.35
Standard deviation	2.61	2.54	2.39	2.81	2.75	2.35	2.33	2.87	2.68	2.97	3.51	3.42
No. of companies	147	147	147	147	159	159	159	160	160	160	160	160
Market-to-book value ratio												
Minimum	0.82	0.84	0.90	0.64	0.29	0.47	0.56	0.67	0.53	0.38	0.22	0.30
Maximum	5.46	4.95	4.75	6.69	4.93	5.44	5.64	5.19	4.77	3.91	3.31	2.91
Mean	1.75	1.62	1.51	1.10	0.76	1.01	1.15	1.07	0.92	0.82	0.76	0.79
Standard deviation	0.81	0.70	0.61	0.61	0.47	0.50	0.52	0.44	0.39	0.32	0.27	0.24
No. of companies	115	115	115	117	117	116	116	115	114	114	113	113
Corporate bond ratings[a]												
Minimum	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Maximum	11.00	11.00	11.00	11.00	14.00	14.00	14.00	13.00	12.00	15.00	15.00	18.00
Mean	6.04	6.34	6.55	6.66	7.36	7.63	7.59	7.55	7.61	7.78	8.11	8.29
Standard deviation	2.09	2.27	2.27	2.20	2.33	2.33	2.39	2.31	2.31	2.41	2.60	2.85
No. of companies	118	119	120	128	130	130	131	131	132	133	133	135

[a]Rating codes for S&P corporate bond:

1 = AAA+	10 = BBB+	19 = CCC
2 = AAA	11 = BBB	20 = CC
3 = AAA-	12 = BBB-	21 = C
4 = AA+	13 = BB+	22 = D
5 = AA	14 = BB	
6 = AA-	15 = BB-	
7 = A+	16 = B+	
8 = A	17 = B	
9 = A-	18 = B-	

APPENDIX IV

FINANCIAL STATISTICS: ELECTRIC UTILITY INDUSTRY'S
FREQUENCY DISTRIBUTION MARKET-TO-BOOK VALUE RATIO 1970 - 1981

Range for market-to-book value ratios	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
0.00 - 0.49	-	-	-	-	17	1	-	-	-	1	2	3
0.50 - 0.74	-	-	-	7	59	13	4	3	10	40	58	42
0.75 - 0.99	2	5	6	56	26	67	40	50	85	65	45	61
1.00 - 1.24	21	27	43	31	5	19	51	50	14	5	7	4
1.25 - 1.49	34	36	27	10	7	6	9	6	3	1	-	2
1.50 - 1.74	21	18	15	6	2	5	4	4	1	1	-	-
1.75 - 1.99	14	10	6	3	-	3	4	1	-	-	-	-
2.00 - 2.24	3	4	6	3	-	1	1	-	-	-	-	-
2.25 - 2.49	6	6	5	-	-	-	1	-	-	-	-	-
2.50 - 2.74	4	1	1	-	-	-	1	-	-	-	-	-
2.75 - 2.99	2	3	3	-	-	-	-	-	-	-	-	1
3.00 - 3.24	3	-	-	-	-	-	-	-	-	-	-	-
3.25 - 3.49	-	-	-	-	-	-	-	-	-	-	1	-
3.50 or greater	5	5	3	1	1	1	1	1	1	1	-	-
Companies returning NA[a]	45	45	45	43	43	44	44	45	46	46	47	47

[a]Data not available.

APPENDIX V

FINANCIAL STATISTICS: ELECTRIC UTILITY INDUSTRY'S
FREQUENCY DISTRIBUTION RETURN ON COMMON EQUITY 1970 - 1981

Range for rates of return	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Less than 0.00	-	-	-	1	-	-	-	1	-	1	3	2
0.00 - 1.99	-	-	-	1	-	-	-	-	-	1	1	1
2.00 - 3.99	-	-	-	-	2	-	2	-	2	1	3	1
4.00 - 5.99	2	1	2	3	7	3	-	4	4	4	3	2
6.00 - 7.99	6	10	3	4	12	10	7	9	8	11	10	7
8.00 - 9.99	22	26	18	21	38	27	16	25	26	23	17	15
10.00 - 11.99	38	38	45	53	60	46	67	54	47	53	52	36
12.00 - 13.99	37	39	39	35	22	52	47	42	42	47	46	49
14.00 - 15.99	30	26	31	25	12	18	16	21	25	15	18	31
16.00 - 17.99	11	6	9	4	5	3	4	3	6	3	4	13
18.00 - 19.99	1	1	-	-	1	-	1	-	-	-	3	3
20.00 - 21.99	-	-	-	-	-	-	-	1	-	-	-	-
22.00 - 23.99	-	-	-	-	-	-	-	-	-	-	-	-
24.00 - 25.99	-	-	-	-	-	-	-	-	-	-	-	-
26.00 - 27.99	-	-	-	-	-	-	-	-	-	1	-	-
28.00 or greater	-	-	-	-	-	-	-	-	-	-	-	-
Companies returning NA[a]	13	13	13	13	1	1	-	-	-	-	-	-

[a]Data not available.

APPENDIX VI

RATE OF RETURN ON COMMON EQUITY,

1982 INTERINDUSTRY COMPARISON

(12 months ending Sept. 30, 1982)

	Industry	Percent
1.	Beverages	21.2
2.	Oil service and supply	20.7
3.	Tobacco	20.6
4.	Drugs	19.1
5.	Publishing and broadcasting	17.5
6.	Cosmetics	17.2
7.	Food and lodging	16.7
8.	Leisure time industries	15.4
9.	Electrical, electronics	15.3
10.	Office equipment, computers	15.1
11.	Service industries	14.5
12.	Natural resources	14.4
13.	Food processing	14.3
14.	Electric utilities	13.8
15.	Retailing (food)	13.7
16.	Banks and bank holding companies	13.3
17.	Nonbank Financial	13.0
18.	Conglomerates	12.8
19.	Aerospace	12.6
20.	Instruments	12.4
21.	Trucking	11.7
22.	Miscellaneous manufacturing	11.3
23.	Retailing (nonfood)	11.0
24.	Textiles	10.4
25.	Chemicals	9.8
26.	Railroads	9.6
27.	General machinery	8.4
28.	Appliances	7.4
29.	Paper and forest products	7.0
30.	Tire and rubber	6.2
31.	Containers	5.1
32.	Real estate and housing	4.2
33.	Special machinery	3.8
34.	Building materials	3.4
35.	Metals and mining	- 1.0
36.	Automotive	- 2.8
37.	Steel	- 6.8
38.	Airlines	- 9.6
39.	Savings and loans	-19.0

Source: Michael Foley, "Electric Utility Financing--Let's Ease Off The Panic Button," Public Utilities Fortnightly, Jan. 6, 1983, p. 23.

INDUSTRIES EXAMINED FOR INTERINDUSTRY ANALYSIS

Aircraft
Air transportation
Aluminum
Apparel
Automobile
Banks national
Banks state
Chemical
Cigarettes
Coal mining
Construction machinery
Cosmetics
Department stores
Drugs
Electric and gas
Electric machinery and equipment
Farm machinery
Financial services
Food
Home builders
Household appliances
Industrial machinery
Lumber
Malt beverages
Metals and mining
Metalworking machinery
Motion pictures
Natural gas distribution
Natural gas transmission
Natural gas transmission and distribution
Newspaper
Oil and gas
Oil and gas drilling
Oil machinery
Oil refinery
Operative builders
Paper
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Railroads
Restaurants
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Ship building
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PHONE ( ) 2[illegible]6 2474

December 2, 1982

The Honorable Charles A. Bowsher
Controller General
U.S. General Accounting Office
441 G Street, N.W.
Washington, D.C. 20541

Dear Mr. Bowsher:

This is to request the assistance of the GAO in the development of materials to help the Subcommittee in responding to possible legislative proposals by the U.S. Department of Energy and others to alter the manner in which electric utilities are regulated.

At the direction of the Cabinet Council, DOE has been conducting a study of the electric utility industry over the last several months. Apparently on the basis of this study, DOE staff has concluded that (1) poor financial health in the electric utility industry often is linked to a company's capacity expansion schedule, that is, utilities with existing capacity expansion plans tend to be those that are in bad financial condition while those that have abandoned new construction or have no plans to construct have relatively better financial profiles; (2) rate of return regulation is a principal cause of this situation; and (3) the effect of this situation has been, is, and will continue to be to create disincentives for companies to build new plants, plants that would actually lower costs of service or which will be necessary to meet load growth sooner than most think.

DOE staff has proposed a series of draft legislative and administrative remedies for Cabinet Council consideration. The objectives of these proposals is apparently to ease what DOE calls the "price control" aspect of electric utilities regulation so that more capital will be attracted to the industry.

In addition, a parallel effort to scrutinize electric utility regulation and ways in which it might be improved has been undertaken by the National Governor's Association in conjunction with the National Association of Regulatory Utility Commissioners. It is possible that NGA/NARUC will propose legislation to establish a stronger regional presence in electric utility regulation.

It is for the purpose of placing the Subcommittee in a position to respond to these efforts and any legislative proposals emanating from them that I request GAO's assistance. Specifically, and first, the DOE study will produce over twenty separate analytical pieces in support of Staff conclusions and legislative proposals. I request that GAO staff be in a position to consult with Subcommittee staff, on an informal basis, with respect to the technical accuracy and assumptions underlying these studies. Second, I request that the GAO undertake to prepare three reports designed to elucidate information relevant to Subcommittee deliberation on matters raised by the DOE and NGA/NARUC studies and possible legislative proposals:

(1) A report on the financial health of the electric utility industry:

(a) What are the key indices on which a judgment regarding the financial health of the industry should be based?

(b) What is the present financial condition of the electric utility industry?

(c) What is the outlook for electric utility financial health?

(d) What are the key variables that will affect electric utility financial health in the future?

(2) A report on electric utility load forecasting:

(a) On what bases do electric utilities forecast loads?

(b) Is there a "state of the art" in load forecasting and, if so, how widespread is the use of this or these techniques?

(c) What are the key variables that are, or should be, accounted for in load forecasting?

(d) How are customer-side-of-the-meter efficiency improvements and dispersed electric generation factored into load forecasting?

(e) What are the weaknesses of existing utility load forecasting procedures?

APPENDIX IX

(3) A report on the status of electric energy-related efficiency improvement programs in the United States:

(a) What is the status of implementation of federal conservation programs (RCS, CACS, Appliance Efficiency Standards, Building Energy Performance standards, low income weatherization and others) by the federal government, the states and regulated and nonregulated electric utilities?

(b) How widespread are other state and utility programs designed, at least in part, to encourage improvement in the efficiency of consumption of electricity?

(c) How widespread is the implementation of retail electric rate structures that communicate incremental costs to the maximum extent practicable where cost-effective?

(d) What is the status of the development of the energy services industry and related industries to meet demand for customer efficiency improving measures?

(e) What is the status and trend of powerplant productivity in the United States in terms of capacity factors and other relevant measures of the efficiency of electricity production from existing facilities?

The GAO already has reported to the Subcommittee on the status of the implementation of many of the federal conservation programs. Thus, that portion of the third report relating to these programs may be able to consist of a written update of such earlier reports rather than an undertaking to provide new reports. I would hope that all reports requested could be completed by April 30, 1983.

If you or your staff have any questions relating to this request, you may contact Bruce Driver of the Subcommittee staff.

Sincerely,

Richard L. Ottinger
Chairman

RLO:mb

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