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The Relationship between the Environmental and Financial Performance of Public Utilities

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Abstract. A growing body of research has centered on the issue of the relationship between financial and environmental performance. The lack of consensus in this literature can be attributed to several factors. The cost of complying with environmental regulation can be significant and detrimental to shareholder wealth maximization. Conversely, a firm that can effectively control pollution might also be able to effectively control other costs of production and hence earn a higher rate of return. We utilize data from the Investor Responsibility Research Center as well as a proprietary database to investigate the relationship between environmental performance and financial performance in electric utilities. Utilities, as producers and distributors of energy, produce substantial amounts of pollution. However, since public utilities are regulated, studying the financial and environmental performance of utilities affords us the opportunity to see what role regulation plays in enhancing or diminishing the relationship between financial and environmental performance. Our results differ from earlier studies in that we find do not find a positive relationship between holding period returns and an industry-adjusted measure of environmental performance nor do we find that regulatory climate appears to explain returns. While there does not appear to be a clearly defined relationship between regulatory climate and a compliance based measure of environmental performance, there is evidence of a negative relationship between financial return and a more pro-active measure of environmental performance. We offer several possible interpretations of these results and extensions for future research.

Key words: environment, performance, public utilities, regulation

JEL classifications: G38, L94, Q30

1. Introduction

Until somewhat recently, the financial markets and the financial economics literature largely ignored environmental performance as a criterion to assess whether a company is a good investment. Typically, the market paid attention only in cases where the financial analysts determined that *poor* environmental management would create liabilities that would adversely affect the firm value. As such, the focus had almost entirely been on the negative side of valuation, on risk and

exposure to environmental liabilities rather than on environmental performance as a *success* factor. The case for looking upon environmental cost drivers as creators of values, as opposed to treating them purely as potential liabilities, had not been effectively communicated to investors. This undoubtedly made it more difficult for investors to identify, and then to evaluate, the financial consequences of environmental activities.

More recently, the relationship between corporate environmental and financial performance has attracted increasing attention in the empirical literature as well as in the business community. The traditional perspective viewed environmental expenditures, whether on waste treatment and removal or pollution prevention strategy, as a drain on firm resources and a commitment of funds to non-productive uses (Palmer et al. 1995). However, a growing movement argues that pollution prevention and the associated re-evaluation of a firm's production processes creates opportunity for the firm to strategically alter production (e.g., to reuse/recycle raw material, substitute less environmentally harmful materials, etc.) and translate innovation into competitive advantage (Porter and van der Linde 1995). It is further argued that firms with better environmental records are more attractive investments due to the lower perceived compliance costs and liabilities (Konar and Cohen 2001).

Thus, the empirical literature has evolved into examining the relationship between environmental and financial performance, hypothesizing that poor (good) environmental performance is associated with decreased (increased) financial performance. Several motivating factors have generated the recent interest in this topic including the growing movement towards corporate "beyond compliance" actions, or the voluntary reduction of emissions beyond legal limits, and the adoption of riskier proactive and preventative environmental policies that seek to alter production techniques and to adopt innovative, clean technologies. This research agenda has also gained exposure due to the increasingly popular socially/environmentally responsible investment approaches and consumer demand for "green products".

Previous research addressing the relationship between financial and environmental performance (e.g., Marlin 1972; Chen and Metcalf 1980; Hart and Ahuja 1996) has not produced a clear answer. The lack of consensus in this literature can be attributed to several factors. First, the cost of complying with environmental regulation can be significant and detrimental to shareholder wealth maximization. However, a firm that can effectively control pollution might also be able to effectively control other costs of production and hence enhance shareholder wealth. Second, successful firms can afford to spend more of its resources on promoting more sustainable uses of resources. Conceivably, a company that achieves a good environmental performance gains an advantage over its competitors. It also possible that for some companies environmental compliance is just an extra cost with no added value.

Most studies examining the relationship between financial and environmental performance look at a wide variety of industrial corporations. This study concentrates on the electric utility industry. We do so for several reasons. One is that public utilities, by their very nature as producers and distributors of energy, produce substantial amounts of pollution. A second reason is that since public utilities are regulated, studying the financial and environmental performance of utilities affords us the opportunity to see what role regulation plays in enhancing or diminishing the relationship between financial and environmental performance. Finally, studying a single industry responds to criticism by Reed (1998) that many studies of the relationship between environmental and financial performance examine a cross section of firms from many different industries thereby ignoring the likelihood that the degree to which a more proactive approach to environmental management will vary from one industry to another.

While the regulation of public utilities has been pervasive in most modern economies, many state governments are in various stages of deregulating the public utilities operating under their jurisdictions. A better understanding of how regulation affects the relationship between financial and environmental performance will lead to a better sense of the enthusiasm with which government officials approach deregulation. Regulation is designed to overcome the deficiencies of market discipline such as the inability to internalize externalities and to take advantage of economies of scale and size inherent in downward sloping cost functions. How varying degrees of regulation affect the elimination of these market deficiencies and a lower cost of producing electricity have impacts for all parties concerned (i.e., consumers, management, investors, community, and the environment).

This paper not only presents evidence on whether public utilities that perform well on environmental criteria also do well financially, but also how this relationship is affected by the overall regulatory climate in which the firm operates. The environmental performance measures are obtained from government records or securities filing disclosures as reported on the Corporate Environmental Profiles Database S&P 500–2000 complied by the Investor Responsibility Research Center (IRRC) Online Analyst service (www.oa.irrc.org). In addition, we examine the relationship between financial performance and more pro-active, as opposed to compliance based, measures of environmental performance from a proprietary database.

Our results differ from earlier studies in that we find a positive relationship between holding period returns and an industry-adjusted measure of environmental performance. We also determine that this relationship holds most strongly for firms facing an average regulatory climate compared to utilities operating in above or below average climates. Although regulatory climate affects the relationship between holding period returns and environmental performance, there does not appear to be a well defined relationship between the measure of regulatory climate and the measure of environmental performance.

When the proactive measures of environmental performance are considered, we find no relationship between these measures and financial performance, but we do find a positive relationship between these measures of environmental performance and regulatory climate. We offer several possible interpretations of these results and extensions for future research.

2. Prior Evidence on the Relationship between Environmental and Financial Performance

Several distinct approaches have been used to explore the link between corporate environmental performance and financial performance. The first studies in this area were primarily confined to an analysis of the performance of socially screened portfolios compared to more diversified stock market indices. The results from these studies are generally mixed (see, e.g., Vance 1975; Cochran and Wood 1984; McGuire et al. 1981; White 1991).

A second group of studies (see, e.g., Spicer 1978; Mahaptra 1984, Erfle and Fratantuono 1992) looked at the pollution control records published by the Council of Economic Priorities (CEP) and their relationship with different measures of financial performance in several resource intensive industries such as petroleum refining, steel, and pulp and paper. Once again, the results have been mixed.

A third stream of the articles, primarily within the accounting literature, has examined the relationship between pollution disclosures and financial performance. In a review of the early literature in this area, Stinson and Schaltegger (1993) point out that those studies showed little or no association between extensiveness of pollution disclosures and economic performance; no association between environmental disclosures and a firm's stock returns; and little association between water-pollution regulations and market returns. Since then, Barth and McNichols (1994) show that the market's valuation of a firm's environmental liabilities exceeds the book value of the liabilities of the reporting firms. Campbell et al. (1998) discover that the number of Superfund sites with which a company is identified negatively affects market value. In addition, they find that Superfund sites are more negatively related to the market values after the Superfund Reauthorization Act. Moreover, Blacconiere and Northcut (1995) find that firms with less disclosure of liabilities had a more negative reaction to announcement of more stringent environmental legislation.

Still another group of scholars have employed the event study methodology to ascertain the effect various exogenous, environmentally related, events on the market value of publicly traded firms. Klassen and McLaughlin (1996) discover that good environmental news such as being nominated for a "clean company" award resulted in positive abnormal returns, while bad news such as a toxic chemical leak caused significantly negative abnormal returns. Karpoff et al. (1999) confirmed this relationship. Hamilton (1995) shows that there were significantly negative abnormal returns for companies with toxic release inventory (TRI) emis-

sions when the TRI was first disclosed in 1989. Konar and Cohen (1997) found that those firms with the largest reaction to the TRI disclosure also had the largest reduction in TRI emissions in the years following the initial TRI release. However, King and Lennox (2002) note that form with more market power may be able to manage the effects of both positive and negative events, thus hampering the interpretation of the reaction to the event. For event studies using TRI data, they suspect that the same-day price movements likely reflect the contemporaneous pollution rankings reported through the right-to-know network.

Our study examining the relationship between the environmental and financial performances of public utilities is part of a fifth strand of the literature. These studies attempt to link financial performance with specific measures of environmental performance over a longer period of time than the typical event studies. Most previous studies of this kind have found a positive relationship between environmental and financial performance. Cormier et al. (1993), find weak support of the existence of a premium (discount) for firms that meet (do not meet) environmental regulations. Cohen et al. (1995) show that a portfolio consisting of environmental leaders as evidenced by nine different measure of performance among firms in the S&P 500 perform at least as well as the S&P Index itself. Konar and Cohen (2001), using similar measures of environmental performance employed here, demonstrate that a below average environmental performance negatively impacts the value of a company's intangible assets. We hope to add to this literature by gaining a better understanding what role regulation plays in the relationship between environmental and financial performance.

3. Regulatory Climate

Utility regulation has been the subject of a wide variety of studies (Phillips 1988). Both the constitutional and public interest views of regulation have been frequent topics in the legal and public policy journals. Economists have studied the effects of managerial decisions on production and operations of utilities. Financial decisions such as capital investments in plant, property and equipment and long-term as well as market reactions to those decisions have been frequent topics in finance journals. Oftentimes, the differential reactions by utility stocks in comparison to other industrials leads to greater understanding of the causal factors explaining financial performance. This possibility provides some of the motivation for our study.

Regulation complicates the relationship between environmental and financial performance. Public utility commissions (PUCs), charged with regulating utilities in the public interest, might have varying views as to how environmental costs should be shared by consumers and shareholders and varying views as to how diligently PUCs should attempt to monitor those costs. Although the PUCs' job has been to set fair, just and reasonable rates, differential manners in which the PUCs execute their mandate have important impacts on the financial and environ-

mental performances of the utilities. Some PUCs provide managers a great deal of leeway in their decisions, rather than diligently monitoring these decisions to guarantee that both the consumers and the investors are receiving fair treatment. Lax regulators may look the other way when environmental laws are being violated and may not be reluctant to see consequent penalties passed on to consumers.

There are several ways to distinguish between strict and lenient PUCs. One common method is to use the PUC ratings provided by investment research organizations. Duff & Phelps, Goldman Sachs, Salomon Brothers, and Value Line are among the more frequently mentioned of these rating agencies. We use the Value Line rating which ranks companies on a three point regulatory climate scale: above average, average, and below average where an above (below) average regulatory climate is considered to be more (less) favorable to the investors in the public utility. Navarro (1983) looked at the over 20 Wall Street investment and research firms that rank the state PUCs and found eight factors were used to determine regulatory rank:

(1) allowed rate of return on equity;
(2) average regulatory lag;
(3) whether a historical or future test year is used;
(4) whether construction work in progress is allowed in the rate base and whether an allowance for funds used during construction is computed;
(5) whether an automatic adjustment clause is in effect;
(6) whether an original cost or fair value rate base is used;
(7) whether interim rates are put into effect;
(8) whether the tax benefits from accelerated depreciation are normalized to enhance short-term cash flow for the utility or are "flowed through" to the rate payer.

Of these eight, Navarro concluded that factors (1) and (4) had the greatest predictive power in explaining the rankings by the investment and research companies.

In their study on the effect of regulatory climate on the capital structure of electric utilities, Rao and Moyers (1994) tested the effect of alternate measures of regulatory climate by separately using the Value Line measure, factor (4) above, and the market to book ratio, a commonly cited surrogate for regulatory climate (see, e.g., Dubin and Navarro 1982). They found all three measures of regulatory climate similarly related to capital structure.

The intensity of regulation has been shown to be related to several different financial aspects of public utilities. Archer (1981), using a composite measure of regulatory climate, found that a more favorable climate was associated with a lower cost of capital. Measuring regulatory climate with Duff and Phelps data, Gorman and Vora (1993) reported that flotation costs on seasoned issues of common stock were negatively related to regulatory climate, i.e., the less favorable the climate, the higher the underwriting costs. Filbeck et al. (1997) also used Duff and Phelps measures of regulatory climate and discovered it had no effect on the extent of

the negative stock price reaction to the announcement of an intent to issue new common stock. As noted above, Rao and Moyer (1994) employed Value Line measures as well as other surrogates to study the effect of regulatory climate on the capital structure of utilities and determined that utilities operating in less favorable regulatory climates tended to take on additional debt in response to the less favorable climate.

Based on the effect that regulatory climate has had on these financial variables, it seems natural to wonder how regulatory climate might also affect the degree of correlation between financial performance and environmental performance in that both measures of performance are likely to be related to regulatory climate. As Navarro (1983) has noted, an increase an unfavorable regulatory climate increases the cost of capital to a utility which in turn may force the utility to forego capital improvement expenditures. To the extent that this results in a reduced ability to be in compliance with environmental rules and regulations, we might expect to see a negative relationship between regulatory climate and environmental performance.

4. Data and Methodology

4.1. ENVIRONMENTAL PERFORMANCE – IRRC

Our principal source of data used in this study to measure environmental performance is from the Investor Responsibility Research Center (IRRC)'s 2000 Corporate Environmental Profiles Database (CEPD). The Online Analyst database contains information on the environmental record of Standard & Poor's 500 Index companies. The data comes from The Corporate Benchmarking Service, which transforms raw data sets from 20 Federal Agency sources into environmental data in five categories that can be more easily compared and analyzed. CEPD then takes transformed data and prepares indices that are designed to assist in cross-sectional comparisons within an industry as well as trend analysis for individual firms. The five main indices are described in Figure 1.

The indices improve upon the usefulness of the quantitative data by normalizing the data based on company size. CEPD uses revenues as a proxy for company size and calculates an indexed value for each company within an industry across the five databases by dividing environmental performance data items by a multiple of revenues to create a size-neutral index. Not all indices values carry an economic meaning nor are they intended to be compared in normalized form to each other. However, each individual index is designed to allow for relative comparisons of environmental performance of firms within an industry. Index values are calculated for each of the latest three-year periods of available data.

Of particular interest in this study is the relationship between the IRRC Compliance Index® and shareholder returns over corresponding periods. The IRRC Compliance Index® provides detailed information on the number and dollar amount of penalties assessed to firms during the period 1996–1998 based on viola-

Hazardous waste clean-up responsibilities	**Cleanup Indices** represent 1) the ratio of Superfund NPL sites at which the company or its subsidiaries have been named a PRP in the SETS database to the total of company revenues from 1996 through 1998 (expressed in tens of billions of dollars); and 2) the ratio of ongoing RCRA Corrective Actions at facilities belonging to the company or its subsidiaries to the total of the company's revenues from 1996 through 1998 (expressed in tens of billions of dollars).
Permit restrictions	**Permit Restriction Indices** represent 1) the ratio of RCRA Part B permit denials at company facilities from 1996 through 1998 to the total of the company's domestic revenues during that period (expressed in hundreds of billions of dollars); and 2) the ratio of Minerals Management Service shut-ins from 1996 through 1998 to the total of the company's domestic revenues during that period (expressed in tens of billions of dollars).
Toxic chemicals	**IRRC Emissions Efficiency Index®** is the ratio of reported toxic chemical emissions in pounds to the company's domestic revenues (expressed in thousands of dollars). A high index value may indicate that a company operates in an industry with relatively high pollutant emissions. A high index value in comparison to other firms in the same industry may be an indication that a company has more toxic chemical-intensive operations or has been less efficient than its competitors in reducing the use or emission of certain toxics in its production process. The **Production Waste Generation Index** is calculated in the same manner as the IRRC Emissions Efficiency Index®, and is a useful indicator of the extent to which companies are employing source reduction measures as part of their efforts to reduce emissions of TRI chemicals.
Reported spills	**IRRC Spill Index** is the ratio of the combined number of oil and chemical spills to the company's domestic revenues (expressed in tens of billions of dollars). This index provides a size-neutral measure of a company's success in safely handling and transporting materials.
Compliance data	**IRRC Compliance Index®** normalizes the total cost of the penalties shown for a company under all of the environmental statutes listed above in a single year by dividing this total by the domestic revenues reported by the company in that year (expressed in millions of dollars). This index provides a relative measure of the total amount of resources the company spent on environmental penalties. Consistently above-industry-average scores on this compliance index over time may be an indicator that a company lags behind its industry in attaining environmental compliance and may face increased environmental costs in the future if regulations become stricter.
Source: 2000 Corporate Environmental Profiles Database Online Analyst website (www.oa.irrc.org).	

Figure 1. Corporate Environmental Profiles Database (CEPD) indices of environmental profiles.

tions of the following federal environmental statutes: Resource Conservation and Recovery Act (RCRA), Clean Air Act (CAA), Clean Water Act (CWA), Safe Drinking Water Act (SDWA), Toxic Substances Control Act (TSCA), Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), Mining Safety and Health Act (MSHA), Atomic Energy Act (AEA), and the Endangered Species Act (ESA) and related statutes.

Dividing the sum of a company's penalty assessments by the revenues generated by the company during that same time frame normalizes the Compliance Data Index. The result is a relative measure of the magnitude of compliance problems a company had under a particular statute, expressed in dollars of fines per million dollars of revenue. As a result, this index results in an economically valuable calculation. Because this index contains a relative measure of the total amount of resources the company spent on environmental penalties, it serves to reason that investors of companies with relatively high penalty indices associated with violations of these various environmental statutes would be especially troubled. The IRRC data is available for 1996 through 1998.

4.2. ENVIRONMENTAL AND FINANCIAL PERFORMANCE

We explore the relationship between environmental performance and financial performance in a variety of ways. Our sample consists of 24 firms that make up the IRRC/S&P 500 electric company industry.[1] The IRRC Compliance Index is used as our benchmark for environmental performance. The index reports a company's index value for each year during the period 1996–1998 and an aggregate company index for the entire three-year period.

Our first hypothesis is that a negative relationship exists between the values of the IRRC Compliance Index® and contemporaneous financial performance. This result would be consistent with most of the literature cited above. We believe that the market will view assessed penalties based on violations of environmental statues negatively resulting in a depressed stock price. As suggested by the IRRC, investors may perceive relatively higher penalties as an indication of future costs that may be incurred. Consistently, above-industry-average scores on this compliance index over time may be an indicator that a company lags behind the industry in attaining environmental compliance and may face increased environmental costs in the future if regulations become stricter. Therefore, we hypothesize that firms with higher (lower) 1996–1998 IRRC Compliance Index® values will have lower (higher) holding period returns during the contemporaneous time period.

Our second hypothesis that is firms with higher (lower) IRRC Compliance Index® values in an individual year will experience lower (higher) returns in the following year. On an ex-ante basis, investors could utilize the information gained on a firm's pollution record to select investment alternatives within the industry for the upcoming year. Using this logic, investors would rebalance their portfolios each year, choosing to hold those firms with relatively better compliance records

(as summarized in the Index®) for the following year. Alternatively, investors may feel that having already paid the compliance penalties, the company may be more diligent in controlling unlawful emissions and so may expect to perform at least as well as other firms in the industry.

4.3. REGULATORY CLIMATE AND ENVIRONMENTAL PERFORMANCE

We also collect the information on *regulatory climate* data for each utility for 1996–1999. The Value Line Investment Survey publishes these ratings annually for private circulation to its clients. Each firm's regulatory climate is rated as above average, average, or below average, thereby describing increasing stringency of regulation. We test whether firms with an above average regulatory climate are less likely to encounter higher regulatory costs (at least in the short run) and thus earn higher holding period returns. The IRRC states that "consistently above-industry-average scores on the Compliance Index over time may be an indicator that a company lags behind its industry in attaining environmental compliance and may face increased environmental costs in the future if regulations become more strict" (www.irrc.org). We believe that this would be a more serious concern for those firms in states that have relatively strict regulatory environments. Thus, our third hypothesis is that the three-year holding period of firms in the electric utility industry will be negatively related to the Compliance Index and positively related to the regulatory climate of the state in which the public utility is registered.

Our last area of inquiry is to establish whether whether environmental performance is directly related to regulatory climate. Our fourth hypothesis is that the regulatory climate in which an electric utility operates influences its level of compliance with federal regulations. In particular we expect that utilities operating in a more stringent (below average) regulatory climate will have a better record of compliance than those operating in states with a more lax (above average) climate. Alternatively, it may be the case that firms in less stringent regulatory climates, where the climate rating is based more on the investor perspective, may try to keep penalties low so as to not attract the attention of environmentalists who may otherwise lead a campaign for more stringent regulatory scrutiny in that state (see, e.g., Maxwell et al. 2000).

4.4. METHODOLOGY

Using methodology similar to Cohen et al. (1995), we divide our electric company industry (as defined by the IRRC) into two portions – a "less compliant" portfolio and a "more compliant" portfolio in order to test our first hypothesis. The two portfolios are listed in Table I. The respective portfolios are constructed by using the median value of the three year IRRC Compliance Index® as the point of separation between the two portfolios.

Table I. Sample characteristics based on three-year classification scheme

More compliant group (annual classifications)[a]	Ticker	Market value (millions)	Less compliant group	Ticker	Market value (millions)
Ameren Corp. (L, L, L)	AEE	4,965	American Electric Power (H, L, H)	AEP	10,557
Cinergy Corp. (L, L, L)	CIN	4,132	Consolidated Edison Inc. (L, H, H)	ED	6,425
CMS Energy Corp. (L, L, L)	CMS	2,805	Constellation Energy Corp. (H, H, H)	CEG	4,984
DTE Energy Co. (L, L, L)	DTE	4,476	Dominion Resources (L, H, H)	D	10,804
Duke Energy Corp. (L, H, H)	DUK	22,668	Firstenergy Corp. (H, H, L)	FE	5,878
Edison International (L, L, L)	EIX	6,836	Niagara Mohawk Holdings Inc. (H, H, H)	NMK	2,295
Entergy Corp. (H, H, L)	ETR	6,238	PG&E Corp. (L, L, H)	PCG	9,970
FPL Group Inc. (H, H, L)	FPL	8,597	Pinnacle West Capital (H, L, H)	PNW	3,352
GPU Inc. (L, H, H)	GPU	3,215	PPL Corp. (H, H, H)	PPL	3,895
Reliant Energy Inc. (H, L, L)	REI	9,520	Public Service Entrp (H, L, L)	PEG	7,275
Southern Co. (L, L, L)	SO	15,851	Exelon Corp. (H, H, H)	EXC	20,679
TXU Corp. (L, L, L)	TXU	8,241	Progress Energy (H, H, H)	PGN	8,862
Average market value		8,129			7,914
Three-year holding period (1996–1998)		14.53%			16.50%
t-test difference in means		–1.92*			

[a]Letters in parenthesis represent the classification of firms on individual basis for 1996, 1997, and 1998 respectively where L = low pollution portfolio; H = high pollution portfolio.
*Statistically different at the 10% level.

Next, we determine whether investors benefited from holding common stock in firms contemporaneously with lower penalties from pollution relative to other firms in the industry. Since the portfolios were constructed by matching firms within industry groups, we are able to control directly for industry specific risk and return variation. Equally weighted monthly total returns (both dividends and capital gains) are calculated for both the "less compliant" and "more compliant" portfolios. We calculate a multi-year (1996–1998) return for each portfolio using

the geometric mean of the equally weighted monthly returns of each portfolio. We utilize a paired difference test to calculate a Student's t-test statistic to compare raw returns between the "less compliant" and "more compliant" portfolios:

$$t = \bar{d}/s_d * \sqrt{n}$$

where:

$\bar{d}$ = the mean difference between the less and more compliant portfolio return each month.
s_d = the standard deviation of the difference between the returns each month.
n = the number of months (36).

As can be seen from Table I, the less compliant portfolio outperformed the compliant portfolio over the three-year holding period and the difference in returns is significant at the ten percent level. This result is contrary to our first hypothesis and to the extant literature. One possible explanation is that investors pursued less compliant stocks with the assumption that these stocks represented a value opportunity due to previous market overreaction to environmental concerns for these companies.

Next, we test our second hypothesis related to ex-ante selection of portfolios each year based on relative annual pollution outflows, as measured by annual IRRC Compliance Index values for each year between 1996 and 1998. Using similar methodology above, we construct annual "less" and "more" compliant portfolios for subsequent year investment. Portfolios of less and more compliance are then rebalanced at the end of each year based on whether individual public utility companies are above or below the mean for relative expenditures for the year.[2] In Table II, we examine compare the holding period returns for the two portfolios on an annual basis as well as on a three year basis assuming that the portfolio is rebalanced at the end of each year as companies move from one portfolio to the other based on new annual rankings. There are no significant differences between the less and more compliant portfolios for comparisons based on annual returns or for the three year rebalanced portfolio. We find no statistical differences between the returns to the less and more compliant portfolios. When compared to the market index, all eight measures of utility returns are lower than the corresponding market index, and in two cases (less compliant v. market 1999 and more compliant v. market 1997–1999) the results are statistically different at the ten percent level. These results are not too surprising in that utility stocks have historically earned lower returns compared to the overall market due to the utilities' relatively lower systematic risk.

We also calculate two different measures of risk-adjusted performance. The Sharpe Index (Sharpe 1966, 1994) measures return per unit of total risk. It is the appropriate risk-adjusted return measure when the portfolio being analyzed is the

Table II. Ex-ante holding period returns from investing in more *versus* less compliant portfolios

Year	More compliant group	Less compliant group	*t*-test comparison of means (more *versus* less)	Market index	*t*-test comparison of means (more *versus* market)	*t*-test comparison of means (less *versus* market)
1997	28.49	24.71	0.55	31.01	–0.16	–0.30
1998	12.86	23.47	–1.62	26.67	–0.49	–0.14
1999	–19.51	–20.16	0.21	19.53	–1.67	–1.88*
1997–1999	5.29	7.12	–0.69	25.64	–1.85*	1.65

*Statistically differing results at the 10% level.
**Statistically differing results at the 5% level.
***Statistically differing results at the 1% level.

only one held by an investor. It is also known as the reward-to-variability ratio and is calculated:

$$\text{Sharpe Index} = \frac{d_i}{s_{d1}} * \sqrt{12}$$

where:

d_1 = mean monthly difference between the less or more compliant portfolio return and the T-bill return, calculated over 12 or 36 months.
s_{d1} = the sample standard deviation of the monthly return differences.

In addition, the Treynor Index (Treynor 1965) measures return per unit of systematic risk. It is an appropriate measure of risk-adjusted return if the investor is well diversified and is not exposed to company-specific risk. It is calculated:

$$\text{Treynor Index} = \frac{d_1}{\beta}$$

where:

d_1 = the mean monthly difference between the less or more compliant portfolio return and the T-bill return, calculated over 12 or 36 months.
β = the respective measure of beta.

Betas are obtained from the Value Line Investment Survey for each utility and for each year in question.

The results from these tests are reported in Tables III and IV. The most interesting outcome from these tests is that the less compliant portfolio generally outperformed the more compliant low portfolio for the three year holding period

Table III. More *versus* less compliant portfolios Sharpe Index measures

Year	More compliant portfolio	Less compliant portfolio	Market index
1997	1.59	1.17	1.47
1998	0.55	1.12	0.99
1999	–1.26	–1.55	1.08
1997–1999	0.10	0.20	1.17

Table IV. More *versus* less compliant portfolios Treynor Index measures

Year	More compliant portfolio	Less compliant portfolio	Market index	Beta value (more compliant portfolio)	Beta value (less compliant portfolio)
1997	28.04	23.79	23.39	0.75	0.77
1998	11.31	23.57	21.17	0.73	0.74
1999	–41.28	–25.96	14.21	0.59	0.59
1997–1999	2.38	4.84	19.59	0.69	0.70

and two out of the three single year holding periods when adjusted for both systematic risk (Treynor Index) and for total risk (Sharpe Index). It is also interesting to note that in Table IV, the levels of beta are virtually the same for the less and more compliant portfolios. One may infer from this that extent of compliance does not appear to affect the level of systematic risk although it does seem to influence return.

To test the third hypothesis that the three-year holding period of firms in the electric utility industry will be negatively related to the relative pollution-related expenditures and positively related to the regulatory climate of the state in which the public utility is registered, we regress the returns against the compliance index levels of our sample of 24 electric utilities and the regulatory climate measure. The regression equation takes the following form:

$$R_{i,t} = B_0 + B_1 CI_{i,t} + B_2 D1_{i,t} + B_3 D2_{i,t} + B_4 MVE_{i,t} + e_{i,t}$$

where:

$R_{i,t}$ is the three year holding period return for company i for 1997–1999;
$CI_{i,t}$ is the level of the average compliance index for company i during 1996–1998;

Table V. OLS regressions of the log of annual holding period returns on company compliance index and regulatory climate variable 1997–1999

Coefficient	Parameter estimate (t-statistic)
Intercept	–0.0024 (–0.1553)
COMPANY COST INDEX	8.41624E-05 (0.8186)
INDICATOR VARIABLE 1	0.00471 (0.3501)
INDICATOR VARIABLE 2	0.0037848 (0.3602)
MVE	6.71039E-10 (0.5865)
F-statistic	0.19929
Adjusted R^2	0.04241
Number of observations	22

*Statistically significant at the 10% level.
**Statistically significant at the 5% level.

$D1_{i,t}$ is an indicator variable = 1 if the firm is ranked with an above average regulatory climate for at least two of the three years within the 97–99 time period, and 0 otherwise;

$D2_{i,t}$ is an indicator variable = 1 if the firm ranked with an average regulatory climate for at least two of the three years within the 1997–1999 time period, and 0 otherwise;

$MVE_{i,t}$ is the market value of equity for company i during for 1999 where the market value of equity is calculated as the stock price at mid-year times the number of shares outstanding. Market value of equity is chosen to account for size as noted by Fama and French (1992).[3]

The results, as reported in Table V, indicate that the negative relationship between compliance and holding period returns no longer holds when regulatory climate and company size are included in the regression.

Our fourth hypothesis is that the regulatory climate in which an electric utility operates influences its level of compliance with federal regulations. To test this hypothesis, we calculate the average level of the compliance index for each year from 1996 through 1998 and for each of the three levels of regulatory climate we conduct pairwise equality of means tests for each average compliance level for each year (see Hays and Winkler 1975). The results are reported in Table VI. Although there appears to be a negative relationship between regulatory climate and the level of the Compliance Index (as the climate become more favorable, the environmental

Table VI. Average compliance index levels and regulatory climate (number of firms)

Year	Below average	Average	Above average	Overall average for the year
1996	25.64 (5)	36.98 (14)	56.15 (5)	38.61
1997	70.86 (5)	26.07 (15)	14.63 (4)	33.49
1998	25.33 (8)	26.60 (10)	23.73 (6)	25.46
1996–1998	38.06 (18)	28.00 (39)	32.11 (15)	32.52

performance improves), the relationship holds only in two of the three years and the results are not statistically significant. Thus, although regulatory climate has an effect on the relationship between environmental and financial performance, it does not appear to directly affect the environmental performance of electric utilities.

5. Extensions for Future Research: Preliminary Results[4]

The compliance data from IRRC are largely measures of whether companies adhere to environmental rules and regulations. While they certainly represent valid measures of environmental performance, they may fail to capture whether a utility has taken pro-active measures to be beyond compliance. To determine whether a more aggressive environmental policy is related to regulatory climate or affects financial performance, we obtained data from the Summit Investment Partners a financial management firm that uses ratings developed by The Total Social Impact Foundation to manage their socially responsible mutual fund. The Total Social Impact Foundation, Inc., an independent, non-profit organization, developed a system of "Total Social Impact Ratings" (TSI) based on the Caux Round Table's Principles for Business.[5]

These principles identify eight major corporate stakeholders: customers, employees, owners/investors, suppliers, competitors, communities, the environment, and trust and transparency. The Foundation scores corporate activity based on ten benchmarks in each of the eight stakeholder categories. Each company is rated on a ten point scale for the first seven factors while the trust and transparency receives triple weighting. This results in each company receiving a total social impact rating scores based on 100 points.

In this study we use the Summit environmental rating to conduct a preliminary look at the relationship between it and the financial performance of the

utilities. The environmental rating includes measures such as whether a company has adopted/implemented at least one of the recognized environmental monitoring programs (e.g., ISO 14000), if a company publicly discloses through an annual environmental report data on each of its operations, and whether a company has established an environmental office/structure reporting to the Board.

The Summit Investment Partners data is limited to 1999 and we first test the relationship between and the environmental performance variable (ENV) for 1999 in a simple linear regression first with the 1997–1999 holding period returns using company size and regulatory climate as additional control variables. Next we regress ENV against holding period returns for 2000–2002. Once again our presumption is that there should be a positive relationship between both measures of performance, i.e., the more environmentally proactive firms should also be those with the superior financial performance. As shown in Tables VII and VIII, we find no evidence that this is the case. In fact when using 1997–1999 holding period returns, we find that the under performing firms during 1997–1999 are associated with a superior environmental performance. When 2000–2002 holding period returns are considered, there appears to be no relationship between environmental performance and the firms subsequent financial performance. Nether firm size nor regulatory climate was significant in either regression. As more data that measures environmental performance in a more proactive manner become available, a clearer picture of the nature of the relationship between environmental and financial performance may emerge. The present results seem inconsistent with the notion that a proactive environmental stance creates a "win–win" outcome for firms and the environment (e.g., Blum et al. 1996).

It should also be remembered that the utilities studied are those that are included in the S&P 500. As such, we have focused on the largest utilities that may have attributes different from the average sized utility not included in the S&P 500. The very fact that the stock is included in the S&P 500 implies that the stock is widely held, often by investors choosing a well-diversified portfolio with a long-term time horizon. Some of the trading in the security may reflect purchases or sales of the S&P Index rather than the individual utilities. Re-examining the relationship with other measures of performance and regulatory climate and a larger sample of public utilities may prove to be a fruitful area of future research.

6. Implications of the Study

The results of this study are unexpected and somewhat provocative. Generally, we did not find a positive relationship between environmental and financial performance that other studies have shown. In fact, most of our results point to an opposite relationship. There could be several reasons for this. One is that we focused on the electric utility industry, which is different from most other industries because of its regulation. Secondly, we examined the relationship during a more recent time period. It is conceivable the positive relationship between financial and

Table VII. OLS regressions of three year annual holding period returns (1997–1999) on environmental variable from Summit Investment Partners

Coefficient	Parameter estimate (t-statistic)
Intercept	0.04942** (2.2151)
Environment	–0.0041** (–2.0053)
MVE	1.8608E-10 (0.1921)
INDICATOR VARIABLE 1	–0.0023 (–0.2781)
INDICATOR VARIABLE 2	0.0073 (0.9179)
F-statistic	1.3928
Adjusted R^2	0.2364
Number of observations	23

*Statistically significant at the 10% level.
**Statistically significant at the 5% level.
***Statistically significant at the 1% level.

environmental performance that prevailed during the late 1980s and early 1990s has been fully incorporated into prices today so that there is no benefit to new investors attempting to exploit this opportunity.

Another possible explanation has to do with our primary measure of environmental performance, viz., the IRRC Compliance Index. A compliance index is by its very name a measure of how well a company is complying with existing statutes and regulations. However, a compliance index does not measure how proactively a company is attempting to move *beyond compliance*. Much of the anecdotal evidence describing the link between financial and environmental performance cites companies that are "best in class" with respect to environmental performance (see, e.g., McInerney and White 1997; Smart 1992). However, when we look at the relationship between financial performance and a more pro-active measure of environmental performance, we still fail to find the positive relationship between the two that others have.

Our investigation of the relationship between the stringency of regulation, as measured by the Value Line regulatory climate rating, and the holding period returns of firms in the electric company industry found that while regulatory climate may influence the relationship between environmental and financial performance, there is not a direct relationship between regulatory climate and environmental performance. Several factors may account for this result. At a very

Table VIII. OLS regressions of three year annual holding period returns (2000–2002) on environmental variable from Summit Investment Partners

Coefficient	Parameter estimate (t-statistic)
Intercept	–0.0104 (–0.4029)
Environment	0.0011 (0.5176)
MVE	–8.8439E-10 (–0.8161)
INDICATOR VARIABLE 1	0.0075 (0.8126)
INDICATOR VARIABLE 2	0.0127 (1.3942)
F-statistic	0.669854518
Adjusted R^2	0.170887597
Number of observations	18

*Statistically significant at the 10% level.
**Statistically significant at the 5% level.
***Statistically significant at the 1% level.

fundamental level, the array of monitoring activities represented by the regulatory climate variable may not be necessarily linked to the relationship between environmental and financial performance. Further, our inability to demonstrate a relationship between regulatory climate and environmental performance could be a function of our measures of each, viz., Value Line Investment Survey and the IRRC Compliance Index, respectively. Once again, additional work in resolving this issue appears necessary.

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Notes

1. Data availability problems eliminated the inclusion of one firm, Xcel Energy, from our sample.
2. This strategy results in an approximate 30 percent turnover rate each year.
3. We omitted two other commonly cited variables, beta and the market to boon ratio because the betas of utilities tend to have very little variability over time and within the industry and Rao and Moyer (1994) use market to book as a surrogate for regulatory climate.

4. In many of the studies linking environmental and financial performance, e.g., Konar and Cohen (1997), data from the Toxic Release Inventory is used as the primary measure of environmental performance. We chose not to utilize this data primarily because it is a measure of total release but it does not measure whether the release is within the amounts allowed be environmental regulatory authorities. We regressed the TRI index from IRRC against holding period returns from 1996–1998 and found no relationship between them.
5. Details of the TSI ratings are available from the authors upon request.

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