RISK-ADJUSTED PERFORMANCE OF THE UTILITIES INDUSTRY IN THE UNITED STATES AND CANADA

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ABSTRACT

RISKE-ADJUSTED PERFORMANCE OF THE UTILITIES INDUSTRY
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This paper examines the risk-adjusted performance of the utilities industry in both the United States and Canada from 1970 to 2001 using five measures of risk-adjusted performance. Risk-adjusted performance is analyzed using the Sharpe ratio, the Jensen Alpha, the M^2, the Fama-French three-factor model, and a conditional CAPM model adjusted on market movements. We analyze the effect of deregulation on the industry and test whether the geographic location or the SIC classification are indicative of superior performance. We also analyze the volatility of the market, subsectors, and firms within the utilities industry to determine the volatility patterns of stock returns in the industry.

The utilities industry in both the US and Canada have outperformed their respective markets on a risk-adjusted basis for the full period. Deregulation had a positive effect on the performance of US utilities, however, deregulation did not affect the performance of Canadian utilities. Geographic location does not provide an indication of superior performance within the US utilities industry, however, according to the SIC classification, gas companies clearly outperform other subsectors in the industry whereas water companies have the lowest performance. In the Canadian market, eastern companies have the highest performance, followed by western companies, then the central companies. According to the SIC classification, the Canadian electricity subsector shows signs of higher performance relative to the gas subsector and the other subsectors of the industry.

Volatility analysis shows no trend in the volatility of the US and Canadian markets. In both countries, subsector volatility is higher than the market volatility, however, firm-level volatility is higher than the market and the subsector volatility. Analysis shows that volatility has increased dramatically since 1998 for both markets.

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EVALUATION OF THE RISK-ADJUSTED PERFORMANCE OF THE UTILITIES INDUSTRY IN THE US AND CANADA

1. INTRODUCTION

Finding reliable and accurate measures to assess and compare the performance of portfolios has been stimulating the finance literature for a long period of time. Before the 1960s, investors evaluated portfolio performance using the rate of return only; risk was not included in the analysis. The development of portfolio theory and the Capital Asset Pricing Model (CAPM) by Sharpe (1964), Lintner (1965), and Black (1972) provided the foundation for risk–adjusted performance analysis. Risk, measured by either the standard deviation or beta, became included in the evaluation process. The seminal works by Sharpe (1966), Treynor (1965) and Jensen (1968) represent significant contributions to the evaluation of portfolio performance. Most studies in the modern literature still utilize their theoretical frameworks as the basis of their analysis. About 30 years after these works, Modigliani and Modigliani (1997) derived a risk-adjusted performance (RAP) measure, M^2, by adjusting the risk of a particular portfolio so that it matches the risk of a market portfolio and then calculating the appropriate return for that portfolio. Since the 1960s, there have been other advances than the M^2 with respect to portfolio return measurement. These additional measures will be presented in the next section.

Models explaining the behavior of stock returns are also used in performance evaluation. The Sharpe-Lintner-Black (SLB) model provided the basis of such analysis. Early studies by Black, Jensen, and Scholes (1972) and Fama and MacBeth (1973) provided support for the SLB model. However, the model came under severe criticism by many authors. Many contradictions, also known as anomalies, to the CAPM have shaken its basic premises and have encouraged theorists to investigate other factors that explain stock behavior. Many researchers tested a conditional CAPM or tried to find other variables than beta that better explain the cross-sectional variation of stock returns. The most important criticism of the CAPM came from Fama and French (1992). They show the inability of the CAPM to explain the cross-sectional variation of expected returns and argue that two factors, size and book-to-market (BE/ME), are capable of explaining the cross-sectional variation of expected returns. The Fama-French three-factor model and other studies using different factors to predict and explain stock returns are frequently used for performance measurement. This is typically done by regressing returns on the factors and taking the intercept as a measure of risk-adjusted performance.

The aim of this thesis is to examine the risk-adjusted performance of the utilities industry in both the United States and Canada from 1970 to 2001 using five measures of risk-adjusted performance. The research has three primary objectives. The first objective is to examine the effect of deregulation on the performance of the industry and its subsectors. The second objective is to determine whether the geographic location of the companies within the industry explains differences in performance. The third objective is to verify whether the SIC classification explains differences in performance. This study uses three traditional measures of risk-adjusted performance, the Sharpe ratio, the Jensen alpha, and M^2 to evaluate the performance of the industry and its various subsectors. Two additional measures of performance are used, the Fama and French (1993) three-factor model and a conditional CAPM model adjusted on market movements. We also analyze the volatility of the market, subsectors, and firms within the utilities industry to determine the volatility pattern of stock returns in the industry.

We find that the US utilities industry has outperformed the market for the full period from 1970 to 2001 and that deregulation has had a positive effect on the performance of the industry. Geographic location does not provide an indication of superior performance. However, the performance of foreign companies was higher (lower) than US companies for the period before (after) deregulation. We also find that gas companies clearly outperform other subsectors in the industry whereas water companies have the lowest performance.

The Canadian utilities industry has also outperformed the market for the full period as well as for the periods before and after deregulation, although deregulation does not seem to have an effect on the performance of the industry. Using geographic classification, we find that eastern companies have the highest performance, followed by western companies, then the central companies. By SIC classification, the electricity subsector shows signs of higher performance, followed by the gas subsector, and finally the other subsectors of the industry.

The remainder of the thesis is organized as follows. Chapter 2 provides a literature review. Chapter 3 surveys the deregulation process of the utilities industry in the US and Canada. Chapter 4 covers the data. Chapter 5 presents the methodology of the study. Chapter 6 presents the empirical findings of the study. Chapter 7 provides the analysis of the trends in the volatilities of returns. Finally, chapter 8 provides a conclusion for the thesis.

2. LITERATURE REVIEW

2.1 Traditional Measures of Performance

Treynor (1965) presented the first formal technique to combine both risk and return in a single performance measure, known as the Treynor Measure. Sharpe (1966) developed the Sharpe ratio and examined the returns of 34 mutual funds in the period 1954-1963. He concluded that the differences in returns were due to the expenses of the mutual funds. He also found that a large proportion of the sample mutual funds failed to outperform the Dow Jones Index. Jensen (1968) developed the Jensen alpha and examined the returns of 115 mutual funds in the period 1945-1964 to estimate how much a manager's forecasting ability contributes to the fund's returns. He concluded that funds were on average not able to predict security prices well enough to outperform a buy-the-market-and-hold policy, and also that there was very little evidence that any individual fund was able to do significantly better than what is expected from mere random chance.

McDonald (1974) used the Sharpe ratio and the Treynor index to analyze 123 mutual funds using monthly excess returns in the period 1960-1969. He found that 67 mutual funds had a higher Treynor value than the stock market average, while only 39 mutual funds showed values for Sharpe's index higher than that for the stock market average. Cumby and Glen (1990) examined 15 US-based internationally diversified funds between 1982 and 1988 using the Jensen measure and the positive period weighting measure proposed by Grinblatt and Titman (1989b). They did not find that any of these funds outperformed an international stock index. Furthermore, they presented some evidence that the sample mutual funds achieved higher returns than a domestic portfolio composed of only US stocks. This excess return was attributed to the benefits of international diversification.

An extensive body of literature exists on the use of risk-adjusted measures to examine the performance of mutual funds. These studies seek to analyze whether managers have superior skills that justify the existence of mutual funds and the costs associated with investing in funds. Treynor-Mazuy (1966) developed a measure to capture market-timing abilities of portfolio managers. Henriksson and Merton (1981) developed parametric and non-parametric tests to detect superior timing abilities and to measure the separate effects of security selection and timing abilities on fund performance. Lobosco (1999) Style/Risk Adjusted Measure, Sharpe (1992) style analysis, Momentum measures by Jagadeesh and Titman (1993), and Grinblatt, Titman, and Wermers (1995) were also developed to examine whether managers of mutual funds had superior skills that justified investments in mutual funds.

In general, the evidence on the ability of investment managers to time the market is mixed. Several studies of mutual fund timing skill (e.g. Treynor and Mazuy (1966), Henriksson (1984), Lehmann and Modest (1987), Grinblatt and Titman (1989a), and Daniel, Grinblatt, Titman, and Wermers (1997)) generally find little evidence of timing skill. On the other hand, Ferson and Schadt (1996) find some evidence of timing skill when macroeconomic conditions are accounted for. Graham and Harvey (1996) detect evidence of timing skill using certain benchmarks, and Wagner, Shellans, and Richard (1992) and Chance and Hemler (1999) find positive timing evidence as well. Lehman and Modest (1987) compared the returns of 130 mutual funds in the period 1968-1982 with a benchmark return based on the arbitrage pricing theory. According to Lehman and

Modest, the return of the mutual funds proved to be very sensitive to the arbitrage pricing theory of portfolio building. Moreover, the researchers noticed significant differences between the performance indexes based on the capital asset pricing model and the arbitrage pricing theory.

2.2 Explaining Stock Returns

Extending on Markowitz (1952, 1959), Sharpe (1964), Lintner (1965) and Black (1972) developed the Capital Asset Pricing Model (CAPM), also known as the SLB. The SLB model shows that the expected return for each portfolio is a function of the risk-free rate of return, the portfolio beta, and the expected market return. Early studies on the CAPM were performed by Fama and MacBeth (1973) and Black, Jensen and Scholes (1972). Both studies tested the unconditional CAPM and found a positive relationship between returns and beta in earlier periods and concluded that betas explain well the cross-sectional variation of returns of US stock portfolios. Other studies introduced a modified version of the CAPM. Merton (1973) presented an intertemporal capital asset pricing model (ICAPM) to capture the multi-period changing aspect of financial market equilibrium and Breeden (1979) introduced a consumption-based model.

Later studies empirically examine the unconditional CAPM and show the model's inability to explain the cross-sectional variation of returns (e.g. Basu (1977, 1983), Banz (1981), Jaffe, Keim and Westerfield (1989), Rosenberg, Reid and Lanstein (1985), Chan, Hamao and Lakonishok (1991), and Lakonishok and Shapiro (1984), and Bhandari (1988)). In response, many researchers test for other variables or propose conditional CAPM models that can better explain the cross-sectional variation of returns. Jagannathan and Wang (1996) test a conditional CAPM that allows betas to vary over time and includes human capital. They find that the conditional CAPM explains well the cross-sectional variation of US stocks. Kryzanowski, Lalancette, and To (1994) test a conditional model and apply non-linear estimation techniques to examine the performance of Canadian funds. Their model explains well the cross-sectional variation in expected returns. Lettau and Ludvigson (2001) examine a consumption-oriented capital asset pricing model (CCAPM) that allows expected returns to vary over time. They use the ratio of aggregate consumption to wealth as a "conditioning variable" to model the evolution of expected returns over time and find that the CCAPM explains the cross-sectional variation in returns.

The most important criticism of the CAPM came from Fama and French (1992). They examined size, leverage, E/P, BE/ME, and beta using monthly returns for the period 1963-1990 in one cross-sectional study and showed that the previously documented positive relation between beta and average return was an artifact of the negative correlation between firm size and beta. They compared the explanatory power of size, leverage, E/P, BE/ME, and beta in cross-sectional regressions. Their results indicate that size and BE/ME are the variables that significantly explain the portfolio returns. The explanatory power of the other variables was found to be very small when these two variables are included in the regressions. Fama and French concluded that the SLB model does not describe the average stock returns for the last 50 years.

The Fama-French findings have been under severe attack since they were published. Several papers argued that the Fama-French results were likely an artifact of data mining and that the relations between returns and size and BE/ME would disappear if another time period or another data source were analyzed (e.g. Black (1993) and

Mackinlay (1995)). Others argued that the explanatory power of BE/ME is due to survivorship bias (e.g. Kothari, Shanken and Sloan, 1995). A third criticism was based on the explanatory power of size and BE/ME (e.g. Brennan, Chordia, and Subrahmanyam, 1998).

In response to these attacks on the Fama-French model, several papers appeared to check the validity of such attacks. A number of studies examined the survivorship bias (e.g. Davis (1994) and Chan, Jegadeesh, and Lakonishok (1995)). Several studies examined data mining (e.g. Barber and Lyon (1997) and Davis, Fama, and French (2000)). Others examined the Fama-French results in different countries (Fama and French (1998) and Capaul, Rowley, and Sharpe (1993)). Results of these studies have provided support for the Fama-French model. Moreover, Elton, Gruber, Agrawal, and Mann (2001) examined the explanatory power of SMB and HML in the bond market and found that that these same risk factors also work in the bond market. Although the debate on the Fama-French three-factor model is still ongoing, the strong confirmation for the model supports its ability to explain stock returns and its suitability for measuring performance.

There are other models explaining stock behavior that are frequently used for performance evaluation. Cahart (1997) creates a 4-factor model to explain stock returns. These are the returns on a market portfolio, a return on small minus big firms, a return on high minus low book-to-market firms, and a return on high minus low momentum stocks. Elton, Gruber, and Blake (1996) propose a 4-index model including the S&P index, a size index, a bond index, and a value/growth index. Grinblatt and Titman (1989a) develop an 8-portfolio benchmark formed on the basis of firm size, dividend yield, and past returns.

Ferson and Schadt (1996) find that previous studies relied upon "unconditional" performance measures that ignored information about the changing nature of the economy and thus portfolio alphas and betas will change dynamically with changing market conditions. They propose a Conditional Performance Evaluation (CPE) measure (conditional Jensen Measure) that employs time-varying economic variables.

2.3 Volatility Trends

With regard to volatility patterns, Campbell et al. (2001) find that the firm-relative to market-volatility in the US has risen over the period from 1962 to 1997. This contradicts the general belief that markets are becoming more volatile and suggests that a larger number of stocks in a portfolio are needed to achieve reasonable diversification. Malkiel and Xu (2001) study the behavior of idiosyncratic volatility for the post war period. They use aggregate idiosyncratic volatility statistics constructed from the Fama and French (1993) three-factor model, and find that the volatility of individual stocks has increased over time. They also argue that the idiosyncratic volatility of individual stocks is associated with the degree to which their shares are owned by financial institutions, and that idiosyncratic volatility is positively related to expected earnings growth. Christie (1982) finds that equity variances have a strong positive association with both financial leverage and interest rates. Duffee (1995) finds that stock returns and changes in volatility are negatively correlated.

3. UTILITIES INDUSTRY

According to the SIC classification, industries in the Utilities subsector provide electric power, natural gas, steam supply, water supply, and sewage removal through a permanent infrastructure of lines, mains, and pipes. Establishments are grouped together based on the utility service provided and the particular system or facilities required to perform the service. The utilities industry classification is divided into five major subgroups: 491x, the Electric Services; 492x, the Gas Production and Distribution; 493x: the Combination Electric and Gas, and other Utility; 494x, the Water Supply; and finally, 495x to 497x, which includes other types of utilities (Sanitary Services, Steam and Air-conditioning Supply, and Irrigation Systems).

According to Richard Bernstein of Merrill Lynch, the S&P Utility Index outperformed the Nasdaq since the Nasdaq's inception in 1971. From Nasdaq's inception, the Nasdaq returned a compound annualized rate of return of 11.2% per year, whereas the S&P Utility Index returned a compound annualized rate of return of 12.0% per year. Moreover, the Utilities outperformed the Nasdaq over the 30-year period while incurring less risk. Figures 1 and 2 from Merrill Lynch Quantitative Strategy show risk/return relationships between Nasdaq and the S&P Utilities using two different definitions of risk. The first chart incorporates the traditional standard deviation of returns as the definition of risk, whereas the second chart uses the percent of the returns that are negative (i.e., how often did one incur a loss over a 12-month time horizon). In both cases, the S&P Utilities' returns are higher and risk is lower.

The largest subgroups within the utilities industry are the electric power and the natural gas industries. For more than 50 years, these two industries have been regulated. However, recent market trends necessitated the deregulation of both industries. The following sections present an overview of the history of deregulation within the two major subgroups within the utilities industry in the US and Canada.

3.1 Utilities in the US

3.1.1 Electric utilities

The foundation of federal regulation of electric utilities in the US is the Public Utilities Holding Company Act of 1935 (PUHCA) and the Federal Power Act (FPA), now the Federal Energy Regulatory Commission (FERC). Prior to PUHCA, electricity holding companies were characterized as having excessive consumer rates, high debt-to-equity ratios, and unreliable service. The PUCHA of 1935 forced the holding companies to break up and gave utilities a government-sanctioned monopoly over a limited territory. In exchange, utilities agreed to provide reliable electric service to all customers at a regulated rate.

This regulatory framework remained virtually unchanged between 1935 and 1978. However, in November 1978, the Congress passed a series of laws, including the Public Utility Regulatory Policies Act (PURPA) for electric power in order to start deregulating the industry. PURPA was followed by other policies, precipitating more vigorous competition and resulting in virtually the complete deregulation of the wholesale electric market. As a result of the Federal and State initiatives, the electric power industry is transitioning from highly regulated, local monopolies which provided their customers with a total package of all electric services. The industry is moving towards competitive companies that provide electricity while utilities continue to provide transmission or distribution services. States are moving away from regulations that set rates for electricity and toward oversight of an increasingly deregulated industry in which prices are determined by competitive markets.

3.1.2 Natural gas utilities

With regard to natural gas, the Natural Gas Act (NGA) of 1938 gave the Federal Power Commission authority to regulate interstate natural gas sales for resale and transportation rates and to issue certificates of public convenience and necessity for new services and pipeline construction. In November 1978, the Congress passed the Natural Gas Policy Act (NGPA) for the natural gas industry. The natural gas industry has been transformed since the enactment of the NGPA; changing from an almost totally regulated industry to one that today largely operates as a free market. In the following years, other policies have been enacted to further deregulate the gas industry. However, it is the Natural Gas Policy Act (NGPA) of 1978 that started the deregulation of this industry. Deregulation has initiated other developments with regard to the natural gas industry. The New York Mercantile Exchange launched the world's first natural gas futures contract in April 1990. Volume and open interest have grown rapidly, establishing the contract as the fastest growing instrument in Exchange history. In October 1992, the Mercantile launched options on natural gas futures, giving market participants additional flexibility in managing their market risk. Thus, from a market of stable but controlled prices and long-term contracts, the natural gas market has emerged as a dynamic, highly competitive business with flexible pricing, an active spot market, and widespread use of short-to-medium-term contracts. This has caused a fundamental change in the way each of the traditional segments of the industry (producers, pipelines, and industrial users) operate.

3.2 Utilities in Canada

3.2.1 Electric utilities

In the traditional market structure of the Canadian electricity industry, generation, transmission and distribution of electricity are owned and managed by vertically integrated monopolies. This form of market structure, which still prevails in much of Canada today, was widely adopted because the electricity supply industry was regarded as a natural monopoly. Electricity in Canada is regulated at the provincial level. Since electricity in most provinces is regulated on a cost-of-service basis, prices reflect the costs of generation, transmission and distribution. These costs vary among provinces.

Restructuring of the electric industry refers to reorganizing electric utilities from vertically integrated monopolies into separate generation, transmission and distribution service companies. This separation, or unbundling is intended to promote competition between generators, and to "open" the transmission and distribution systems, eventually increasing competition in the supply and marketing of electricity. The beginning of the industry restructuring and deregulation in Canada was in March 1985 although Canada has been slow in the deregulation process and the industry is still far from being completely deregulated.

3.2.2 Natural gas utilities

The Canadian gas market has been in the deregulation phase since March 1985. Significant structural changes have occurred in the industry since deregulation of the industry in 1985. These changes include increased competition in the gas business, entry of new shippers on the gas pipelines, and more reliance on market mechanisms to establish gas prices, transportation tolls and tariffs. Deregulation has resulted in greater competition, which has changed the way natural gas is traded in Canada. Natural gas producers used to sell exclusively to the delivery companies, but they now sell to many different kinds of buyers, including industrial customers, independent marketers, local distribution companies, agents, and brokers.

4. DATA

Daily and monthly returns and market capitalizations are gathered from the Centre for Research in Security Prices (CRSP) for the United States and from the Canadian Financial Markets Research Center[1] (CFMRC) for Canada. Monthly data for the US and Canada cover the period from 1970 to 2001. Daily data cover the same period for the US and cover the period from 1975 for Canada. The US Tbill rate is obtained from the Federal Reserve statistics and the Canadian Tbill rate is obtained from the CFMRC. Data for the Fama-French three-factor model are obtained from the Fama-French data library. A value index and a growth index for Canada, which are used to examine a modified version of the Fama-French three-factor model in Canada, are obtained from Datastream.

Companies in the utilities sector in the US in number ranged from 147 companies in 1970 to 183 companies in 2001. The number of firms has varied during this period between 147 and 282 companies because of new entrants, delistings, and mergers and acquisitions. The total number of U.S. companies included in the study is 450. The market capitalization of the US utilities industry ranges from US$47 billion in 1970 to US$446 billion in 2001, with a maximum market capitalization of $591 billion in January

[1] We have searched the whole CFMRC database for utilities companies, i.e. companies whose first two SIC digits is 49.

2001. The number of companies in the utilities industry in Canada ranges from 16 companies in 1970 to 24 companies in 2001. The number of firms has varied during this period between 16 and 33. The total number of Canadian companies included in the study is 75. The market capitalization of the Canadian utilities industry ranges from C$63 million in 1970 to C$900 million in 2001, with a maximum market capitalization of C$1.2 billion in September 2000.

Companies within the utilities industry are divided according to two criteria. Equal-weighted portfolios are formed according to the two divisions using monthly returns. The first categorization is based on the geographic location of the business of the company. For the United States, the market is divided into five subgroups: the northwest, the northeast, the southwest, the southeast, and the foreign companies. Foreign companies refer to companies that are listed on the US exchanges but which have the majority of their business in a country outside of the US. For Canada, companies are divided into three groups according to location: western, central and eastern Canada. The second categorization is according to SIC classification. For the US, companies are divided into five SIC subgroups: 491x, the Electric Services; 492x, the Gas Production and Distribution; 493x, the Combination Electric and Gas, and other Utility; 494x, the Water Supply; and finally, 495x to 497x, which includes other types of utilities (Sanitary Services, Steam and Air-conditioning Supply, and Irrigation Systems). For Canada, companies are divided into three subgroups: 491x, the Electric Services; 492x, the Gas Production and Distribution; and 493x, other utilities.

Panels A and B of Table 1 report the number of companies included in the different portfolios created for the US and Canada, respectively. Table 2 provides a detailed categorization of the SIC codes. For all portfolios, we calculate the five risk-adjusted performance measures for the full period, the period before deregulation and the period after deregulation. The period following deregulation is further divided into five-year subperiods in order to estimate the long-term effects of deregulation.

5. MEASURES OF PORTFOLIO PERFORMANCE

5.1 The Three Traditional Portfolio Performance Measures

5.1.1 Sharpe ratio

The first measure of performance is the Sharpe ratio (Sharpe, 1966), which determines the excess return per unit of total risk. This ratio uses the standard deviation of the portfolio as the measure of risk. The Sharpe Ratio is a useful measure for an investor who holds a portfolio that is not fully diversified so that total risk matters. The equation for the Sharpe ratio is:

$$SR_p = \frac{\bar{R}_p - \bar{R}_f}{\sigma_p} \qquad (1)$$

where:

$\bar{R}_p$ is the mean return on portfolio p over the interval considered;

$\bar{R}_f$ is the mean risk-free rate over the interval considered; and

σ_p is the standard deviation of the return on portfolio p over the interval considered.

The Sharpe ratio can be used to compare the performance of different portfolios. Two portfolios with the same excess return for a period but different levels of risk will have Sharpe ratios that reflect the difference in their levels of risk. The performance of the portfolio with the lower Sharpe ratio is interpreted as exhibiting comparatively more risk for the desired return compared to the other portfolio. If the two portfolios had the same level of risk but different levels of excess return, the portfolio with the higher Sharpe ratio would be preferred because the portfolio achieved a higher average return with the same level of risk as the other portfolio.

Usually, the Sharpe ratio is measured and used without any tests of statistical significance. But one can test whether the difference between two Sharpe ratios is zero. For two portfolios, *p* and *n* (or one portfolio and a benchmark), we can test the following null hypothesis: H_0: S(*p*) - S(*n*) = 0. This hypothesis is rejected when the test statistic *t(pn)* is larger than the critical value *t*(c), which is distributed as N(0,1). In this study, in order to compare the performance of the respective portfolios with each other and with the benchmarks, we use the Jobson & Korkie (1981) *t*-test. This t-statistic tests for the equality of the Sharpe ratios of any two portfolios. The test statistic for two portfolios *p* and *n* can be formulated as:

$$Z_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}} \qquad (2)$$

where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where $\bar{r}_p$ and $\bar{r}_n$ are the mean excess returns of portfolios under investigation, s_p and s_n are the standard deviations of both portfolios, and

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right] \qquad (3)$$

In this equation, T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

Jobson and Korkie (1981) show that the test statistic, t, is approximately normally distributed with a zero mean and a unit standard deviation for large samples. A significant t-statistic would reject the null hypothesis of equal risk-adjusted performance and would suggest that one of the portfolios outperforms the other. Jobson and Korkie note that the statistical power of the test is low, especially for small sample sizes. Thus, observing a statistically significant t score between two portfolios can be seen as strong evidence of a difference in risk-adjusted performance.

5.1.2 Jensen's alpha

The Jensen measure (Jensen, 1968) is the average return on the portfolio over and above that predicted by the CAPM using the portfolio's beta and the average market return. The Jensen measure is given by the estimated intercept or alpha from a regression of the excess returns of a portfolio against the excess returns of the market. The equation used to obtain the Jensen alpha is:

$$\bar{R}_{pt} = \alpha_p + \beta_p \bar{R}_{mt} + \varepsilon_{pt} \qquad (4)$$

where:

α_p is the portfolio's alpha,

$\bar{R}_{pt}$ is the mean excess return on portfolio p over the Treasury bill rate;

$\bar{R}_m$ is the mean excess return on the market over the Treasury bill; and

β_p is the unconditional measure of risk.

Alpha is the difference between the average realized return of a portfolio and the expected return of the passive strategy based on its systematic risk. A superior portfolio would have a significant and positive α_p value. Under the null hypothesis of no-abnormal performance, the alpha coefficient should be equal to zero.

5.1.3 M^2 (risk adjusted performance)

Modigliani and Modigliani (1997) derived a risk-adjusted performance (RAP) measure by adjusting the risk of a particular portfolio so that it matches the risk of a market portfolio and then calculate the appropriate return for that portfolio. Unlike the Sharpe measure or the Jensen measure, the unique feature of RAP is that it measures the performance of a portfolio in basis points and allows investors to compare the RAP of a portfolio directly with the return of a market portfolio. A high (low) RAP indicates that the portfolio has outperformed (underperformed) the market portfolio. However, the M^2 lacks any test of significance.

The M^2 uses the standard deviation as a measure of risk and a risk-adjusted measure of portfolio performance. If a portfolio has a lower (higher) standard deviation than the market, the return of the portfolio is leveraged up (down) until we have a standard deviation for the portfolio that is equal to the standard deviation of the market. The M^2 is then calculated by comparing returns since both the portfolio and the market have the same standard deviation. The equation used for the calculation of M^2 is:

$$M^2 = \bar{R}_p - \bar{R}_m \quad (5)$$

where:

$\bar{R}_p$ is the mean return on the adjusted portfolio p over the interval considered; and

$\bar{R}_m$ is the mean market return over the interval considered.

5.2 Additional Portfolio Performance Measures

5.2.1 The Fama-French three-factor model

We use the Fama-French three-factor model to measure the risk-adjusted performance of the industry. Davis, Fama, and French (2000) show that the three factors (the excess market return, the size factor, and the value-versus-growth factor) have explanatory power for stock returns because they are associated with risk. Moreover, as Davis (2001) argues "regardless of one's belief about what High minus Low and Small minus Big measure, the premiums associated with the factors can be earned by a passive strategy of buying a diversified portfolio of stocks with a desired level of sensitivity to the factors" (p. 20). For each portfolio, we use each portfolio's excess returns to estimate the following regression:

$$R_{pt} = \alpha_p + \beta_p(R_{mt}) + s_p SMB_t + h_p HML_t + \varepsilon_{pt} \qquad (6)$$

Where R_{pt} is the portfolio excess return, R_{mt} is the excess market return (the value-weighted return on all NYSE, AMEX, and NASDAQ stocks from CRSP minus the one-month Treasury bill rate), SMB (Small Minus Big) is the average return on three small portfolios minus the average return on three big portfolios, HML (High Minus Low) is the average return on two value portfolios minus the average return on two growth portfolios, and ε_{pt} is the error term. The intercept α_p is the measure of performance relative to the three factors. β_p, s_p, and h_p indicate sensitivity to the market, size, and value factors, respectively. The R_{mt}, SMB_t, and HML_t are obtained from the Fama-French data library. We also test a modified version of the Fama-French three-factor model. We test the model using the S&P 500 and the CRSP EW indices for the calculation of the excess market return, R_{mt}. Since the CRSP VW portfolio is very similar to the Fama-French R_{mt}, we do not test it. The three-factors are not available for the Canadian market. Thus, we obtain similar data (a value index and a growth index instead of the SMB and HML, respectively) from Datastream and use the TSE 300, the CFMRC EW, and CFMRC VW indices for calculating the excess market return, R_{mt}.

5.2.2 Conditional market model

Our last risk-adjusted performance measure is a conditional market model based on the evolution of the market index. For US utilities, the S&P 500, the CRSP EW, and the CRSP VW indices are used for calculating the excess market return, R_{mt}. For Canadian utilities, the TSE 300, the CFMRC VW, and the CFMRC EW indices are used. Herein, we regress the excess return of each portfolio on the conditioned market return. Up (down) markets are periods in which the benchmark index exceeds (is below) the monthly 3 months Tbill rate. We estimate the following equation:

$$R_{pt} = \alpha_p + (\beta_{1pt} \times \delta \times R_{mt}) + (\beta_{2pt} \times (1-\delta) \times R_{mt}) + \varepsilon_t \quad (7)$$

Where $\delta = 1$ if $(R_{mt}-R_{ft}) > 0$ (i.e. when the market excess returns are positive), and $\delta = 0$ if $(R_{mt}-R_{ft}) < 0$ (i.e. when the market excess returns are negative). The R_{pt} is the portfolio excess return, R_{mt} is the excess market return, and ε_t is the error term. We estimate the above equation using the three benchmarks and estimate α_p as the measure of the risk-adjusted performance.

6. EMPIRICAL RESULTS

6.1 The Performance of US Utilities

6.1.1 Before and after deregulation

Table 3 presents the average monthly excess returns for the 10 portfolios in the US market as well as for the three benchmarks, the S&P 500, the CRSP equally-weighted portfolio, and the CRSP value-weighted portfolio. Column 2 of Table 3 shows that all of the portfolios have an average monthly excess return greater than the S&P 500 and the CRSP value-weighted portfolio over the whole period. One-half or 5 of the 10 portfolios have an average monthly excess return greater than the CRSP equal-weighted portfolio. The same applies for the periods before and after deregulation based on columns 3 and 4. Monthly excess returns are significantly different from zero for the full period (see column 2) and the period after deregulation (see column 4).

If we compare the excess returns of the period before deregulation (see column 3) to the period after deregulation (see column 4), we realize that the monthly average excess returns have increased substantially between the two periods. For the five periods after deregulation, columns 5 to 9 in Table 3 show a general tendency of all portfolios to have high excess returns in the periods following deregulation. Then a decrease is evident for all portfolios for the period beginning with January 1994. The lone exception is the WATER industry in the period from January 1994 to December 1998, which exhibits an average monthly excess return of 2.11%.

The Sharpe ratios are reported in Table 4. All portfolios have a positive Sharpe ratio for the whole period (see column 2) as well as before and after deregulation (see columns 3 and 4). All of the Sharpe ratios have increased substantially post-deregulation, including those for the benchmarks. For the subperiods following deregulation, as reported in columns 5 to 9, we find that the Sharpe ratios are positive except for three cases.

We test the Jobson and Korkie (1981) *t*-test of the significance of Sharpe ratios for each portfolio against the three benchmark portfolios, i.e. the Sharpe ratio of each portfolio is compared to the Sharpe ratio of each of the three benchmarks. Results for the full period from 1970 to 2001 are presented in Table 5A. The *t*-statistics reported in columns 5 to 7 are generally positive which suggests that the different portfolios have outperformed the benchmarks, and with the exception of the WATER portfolio (0.99), this outperformance is significant at the 1% level against the S&P 500. This superior performance is evident but statistically weaker when performance is benchmarked against the CRSP EW and the CRSP VW indices.

Tables 5B and 5C present the *t*-test of significance of the Sharpe ratios for the period before deregulation, from January 1970 to October 1978, and the period after deregulation, from November 1978 to December 2001, respectively. Generally, the portfolios outperform the benchmarks, especially the S&P 500, where all of the results are statistically significant in the period before deregulation and most are positive and statistically significant for the period after deregulation. Tables 5D and 5E show that these results remain positive and statistically significant for the periods from November 1978 to December 1988. However, Tables 5F and 5G show that for the period after 1988, the results are becoming mixed and the general tendency of positive results is declining. This is evident in Table 5G where all of the portfolios, except WATER, have negative significant results at the 1 % level against the S&P 500 and the CRSP VW indices. The WATER portfolio is significantly positive at the 1% level against the three benchmarks during this period.

Table 6A presents the Jensen alpha calculated using the S&P 500 for the different portfolios by period. For the full period from January 1970 to December 2001 presented in column 2 of this table, all of the portfolios have a positive alpha. Six out of ten alphas are statistically significant. Columns 3 and 4 of Table 6A for the periods before and after deregulation exhibit positive alphas. However, there does not seem to be any effect resulting from deregulation. Positive alphas still remain in the two periods after deregulation from November 1978 to December 1988. In the following periods, some alphas become negative. We also estimate the Jensen alpha using the CRSP EW and the CRSP VW indexes. Results reported in Tables 6B and 6C, respectively, provide similar conclusions.

Table 7 presents the risk-adjusted performance, M^2. For the whole period (see column 2), all of the portfolios have positive M^2, suggesting that all of the portfolios within the utilities industry outperformed the S&P 500 after adjusting for the standard deviations of the portfolios. If we compare column 3 (the period before deregulation) to column 4 (the period after deregulation), we realize that M^2 has increased after deregulation for all portfolios. This shows that deregulation has had a positive effect on the performance of all portfolios in the utilities industry. Columns 5 to 9 present the results for different periods following deregulation. As with the previous risk-adjusted indicators, M^2 has been increasing in the periods following deregulation in the period from November 1978 to December 1988. However, after that period, M^2 has been decreasing while remaining positive.

Performance using the Fama-French three-factor model is presented in Table 8A. All portfolios have positive alphas (see column2) for the full period, but only the Gas alpha is statistically significant at the 5% level. For the periods before and after deregulation (see columns 3 and 4), results show the tendency of alphas to increase after deregulation. In the period following deregulation (see column 4), all alphas are positive whereas there are several negative alphas for the period before deregulation (see column 3). The five periods after deregulation presented in columns 5 to 9 show the tendency of alphas to decrease. We also test the modified version of the Fama and French model where we use the excess return on the S&P 500 and the CRSP EW portfolios instead of the market excess return used by Fama-French. Fama-French uses the value-weighted return on all NYSE, AMEX, and NASDAQ stocks from CRSP minus the one-month Treasury bill rate to calculate excess market return. Results presented in Tables 8B and 8C show similar patterns where alphas are positive for the full period (see column 2 of Tables 8B and 8C) and the period after deregulation (see column 4 of Tables 8B and 8C).

Table 9A presents the risk-adjusted performance of the conditional market model using the S&P 500. The full period (see column 2) shows that alphas are positive (5 out of 10 are statistically significant). If we compare the periods before deregulation (see column 3) to the period after deregulation (see column 4), we realize that alphas have increased and the results are generally statistically significant for the periods after deregulation. The same results are found when the two other benchmarks are used to estimate performance. Tables 9B and 9C present the results of the conditional model using the CRSP EW and CRSP VW portfolios, respectively. Results show that all alphas have increased in the period following deregulation (see column 4). Results are statistically significant against the CRSP EW (Table 9B).

The five risk-adjusted performance measures show that the utilities industry in general has outperformed the market indexes for the whole period as well as before and after deregulation. Post-deregulation performance has been higher than the performance before deregulation. However, the risk-adjusted measures of performance have moved towards their previous levels in later periods.

6.1.2 By geographic classification

The US utilities industry is divided into five portfolios according to the main business location of each company within the industry. The industry is divided into the Northwest (NW), Southwest (SW), Southeast (SE), Northeast (NE), and Foreign (FOR) portfolios, where the Foreign portfolio refers to companies whose primary business location is outside the United States.

Panel A of Table 3 shows that the FOR portfolio has the highest performance in terms of excess returns (0.71) for the full period. It is followed by the SE, SW, NE, and finally the NW portfolio (see column 2). If we compare performance before and after deregulation (see columns 3 and 4 of Table 3), we find that the SE portfolio has the greatest increase in excess returns, an increase of 178% (from 0.30 to 0.85). The FOR portfolio has the lowest increase of 38% (from 0.56 to 0.77). This seems to be logical since deregulation should benefit local companies as opposed to foreign companies which operate in other markets. It is also evident that the performance of the FOR portfolio has been decreasing dramatically in the later periods to the point of achieving negative excess returns in the last period from January 1999 to December 2001.

Panel A of Table 4 presents the Sharpe ratios of portfolios formed on the basis of geographic location. The FOR portfolio has the highest average monthly excess return. It is evident that this is also associated with higher levels of risk, given that it has the lowest Sharpe ratio (0.40) for the full period (see column 2). Panel A of Table 5A shows that the FOR portfolio has the highest standard deviation of 6.36. The second highest standard deviation of 4.30 is for the NW portfolio. Column 2 of Table 4 (the Sharpe ratio for the whole period) does not show that any portfolio within the United States has clearly outperformed the other portfolios since we have a Sharpe ratio of about 0.61 for three of the four portfolios.

The Jobson and Korkie *t*-statistics of the portfolios compared to the benchmarks for the full period are presented in Panel A of Table 5A. The *t*-values show that all portfolios have outperformed the S&P 500 at the 1% level. This superior performance is evident but statistically weaker when performance is benchmarked against the other two portfolios. All portfolios have higher performance than the benchmarks for all periods except in the period from 1994 to 1998. Compared to other portfolios, the NE portfolio has the highest *t*-value against the three benchmarks, which suggests its higher performance. It is followed by the SE, SW, NW, and finally the FOR portfolio. A further analysis was performed to compare the Sharpe ratios of each of the two portfolios together for each period and to test the significance of these results.

This analysis is presented in Table 10. The full period results that are presented in Panel A show that the NE portfolio has slightly outperformed the other portfolios.

However, the results are statistically insignificant. Results are statistically insignificant for any 2x2 comparison with the exception of the FOR portfolio which clearly underperforms the other portfolios, as is evident from the last row where the results are negative and statistically significant against three portfolios. The FOR portfolio has a *t*-value of –1.37 against the NW, a value of –2.72 (statistically significant at the 1% level) against SW, a value of -2.80 (statistically significant at the 1% level) against SE, and a value of –2.80 (statistically significant at the 1% level) against NE. For the period before deregulation (see Panel B), we find that the FOR portfolio has outperformed the other portfolios with two *t*-values statistically significant. However, for the period after deregulation (see panel C), the FOR portfolio has clearly underperformed the other portfolios, and this underperformance is significant at the 1% level.

The Jensen alphas using the S&P 500 are presented in Panel A of Table 6A. Results show that for the full period (see column 2), the four US portfolios have positive alphas that are statistically significant at the 1% level. The alpha of the FOR portfolio is also positive but is not statistically significant. The SE portfolio has the highest alpha (0.55), followed by the SW (0.53), the FOR (0.52), the NE (0.44), and finally the NW (0.46). For the pre-deregulation period, the FOR portfolio has the highest alpha (0.79). It has the lowest alpha (0.40) during the post-deregulation period. Using the two other benchmarks (CRSP EW and CRSP VW) to calculate the Jensen alphas (see Tables 6B and 6C), the SE and the SW remain the two portfolios with the largest alphas for the full period, the FOR has the highest alpha in the period before deregulation and the lowest alpha in the period following deregulation.

The M^2 for the different portfolios sorted according to geographic location are presented in Panel A of Table 7. For the full period, the SE, NE, and SW portfolios outperform the NW and the FOR portfolios. The FOR portfolio has the highest M^2 in the period before deregulation (see column 3) and the lowest M^2 in the period after deregulation (see column 4). Results do not show that any portfolio outperforms the others.

Performance using the Fama-French three-factor model is presented in Panel A of Table 8A. All portfolios have positive alphas (see column 2) for the full period, but none of the alphas is statistically significant. The FOR portfolio has the highest alpha (0.18), followed by the SE (0.17), the SW (0.16), the NW (0.11), and finally the NE (0.11). During the period before (after) deregulation, the FOR portfolio has the highest (lowest) alpha. The Fama-French model using the other benchmarks (see Tables 8B and 8C) always ranks the FOR portfolio as the highest for the full period and the period before deregulation and ranks it last for the period after deregulation. Overall, the results using the Fama-French model indicate that no portfolio systematically produces statistically superior performance. However, the results of the three tables show that the FOR portfolio has a higher performance before deregulation and a lower performance for the period after deregulation.

Performance of the conditional model using the S&P 500 is presented in Panel A of Table 9A. All portfolios have positive alphas (see column 2) for the full period (four are statistically significant). For the full period, the FOR portfolio has the highest alpha (0.94), followed by the SW (0.69), the SE (0.55), the NE (0.40), and finally the NW (0.18). For the period following deregulation (see column 4), the FOR still has the highest performance. Using the other benchmarks (see Tables 9B and 9C), the FOR portfolio always ranks the highest, followed by the SW then the SE for the period before deregulation (see column 3).

Portfolio analysis according to geographic location shows that location does not provide a clear indication of superior performance of any portfolio over the others. However, results indicate that the FOR portfolio has the highest performance in the periods before deregulation and the lowest after deregulation.

6.1.3 By SIC classification

The US utilities industry is divided into five portfolios or SIC subgroups according to the SIC classification; namely, 491x, the Electric Services; 492x, the Gas Production and Distribution; 493x: the Combination Electric and Gas, and other Utility; 494x, the Water Supply; and finally, 495x to 497x, which includes other types of utilities (Sanitary Services, Steam and Air-conditioning Supply, and Irrigation Systems). Because of the limited number of stocks in each of the Sanitary Services (495x), the Steam and Air Conditioning Supply (496x) and the Irrigation Systems (497x) subcategories, they are grouped into one portfolio, "OTHER," for the United States.

Panel B of Table 3 shows that the OTHER (1.04) portfolio has the highest performance in terms of excess returns, followed by the GAS (0.80), COMB (0.59), WATER (0.56), and finally the ELEC (0.52) portfolio. If we compare performance in the periods before and after deregulation (see columns 3 and 4 in Table 3, Panel B), the rankings are the same for the two periods. The OTHER portfolio has the highest average monthly excess returns, while the ELEC portfolio has the lowest. In comparison to the benchmarks, all portfolios outperformed the S&P 500 and the CRSP VW index, while only the OTHER and GAS portfolios outperformed the CRSP EW benchmark.

Panel B of Table 4 presents the Sharpe ratio for each portfolio. Even though the OTHER portfolio has the highest average monthly returns, it has the second lowest Sharpe ratio for the full period (see column 2) due to its high level of risk. The GAS portfolio clearly dominates the other portfolios, and the WATER portfolio has the lowest Sharpe ratio. For the full period and the two periods before and after deregulation, the five portfolios have higher Sharpe ratios than the S&P 500. However, the results are mixed when compared against the other two benchmarks.

Panel B of Table 5A reports the *t*-statistics of the Sharpe ratios against the benchmarks for the whole period. Four of the portfolios outperform the S&P 500 (see column 5) at the 1% level of significance. The WATER portfolio has a *t*-value of 0.99 which is statistically insignificant. Results for the two other benchmarks (see columns 6 and 7) show similar results in terms of the rankings of the portfolios even though the results differ and the statistical significance is lower than the case when the S&P 500 is used as the benchmark. Tables 5B to 5H for the different periods exhibit similar results. The one exception is the period from January 1994 to December 1998 (see Table 5G), where the results are negative and statistically significant at the 1% level. This confirms the findings in the previous section for performance by geographic location, which showed a similar negative performance of the industry during this period.

In order to determine whether the differences in the Sharpe ratios are statistically significant, the Sharpe ratios of the five portfolios are compared to each other using the Jobson and Korkie *t*-statistic. Results are presented in Table 11. For the full period results, which are presented in Panel A of Table 11, the outperformance of the GAS portfolio is reflected in the statistically significant positive *t*-values obtained against all of the other portfolios. The WATER portfolio underperforms the other portfolios, as is evident from the statistically significant negative *t*-values. Panels B to H show similar results (i.e., GAS highest and WATER lowest performance), except for the period from 1994 to 1998. During this period (see Panel G), the WATER portfolio has the highest performance.

The Jensen alphas using the S&P 500 as benchmark, which are presented in Panel B of Table 6A, show that all portfolios have a positive alpha for the full period (see column 2). The alphas are statistically significant at the 1% level for the GAS and COMB portfolios, and statistically significant at the 5% level for the ELEC portfolio. Although the WATER portfolio has the lowest alpha over the full period, it has high statistically significant positive results for the 1994-1998 period (see column 8). The periods before and after deregulation are presented in columns 3 and 4. The GAS portfolio generally has the highest (and statistically significant) alphas, and the WATER portfolio has the lowest performance after deregulation. Results presented in Tables 6B and 6C show that similar results are obtained using the CRSP EW and CRSP VW as benchmarks in estimating Jensen alphas. For each period, we test the significance of the differences in alphas using the three benchmarks. Each portfolio is compared to all of the other portfolios with lower alphas. Results are reported in Appendices C to E. The higher alpha for the GAS portfolio is evident, and is statistically significant for the three periods using the three benchmarks.

The M^2 values for the different portfolios sorted according to the SIC classifications are presented in Panel B of Table 7. For the full period (see column 2), the GAS portfolio has the highest M^2 (0.94), followed by the OTHER (0.80), the COMB (0.68), the ELEC (0.60) and finally the WATER portfolio (0.55). These results are consistent with those reported previously, which show that the highest performer is the GAS portfolio and the worst performer is the WATER portfolio in terms of risk-adjusted measures. For the periods before and after deregulation, the GAS portfolio has the highest M^2.

Performance results based on the Fama and French three-factor model are presented in Panel B of Table 8A. All of the portfolios have positive alphas (see column 2) for the full period. The GAS portfolio has the highest performance, which is statistically significant at the 5% level. For the periods before and after deregulation (see columns 3 and 4), the GAS portfolio has the highest ranking. Performance results for the modified Fama-French model using the other benchmarks (S&P 500 and CRSP EW) are presented in Tables 8B and 8C. These results confirm that the GAS portfolio has the highest performance, and only the GAS portfolio generally produces statistically significant superior performance. The WATER portfolio has relatively higher performance during the 1994-1998 period (see column 8).

Panel B of Table 9A presents the risk-adjusted performance measures for the conditional market model using the S&P 500 as the benchmark. The GAS portfolio has the highest positive and significant results at the 1% level for the full period (see column 2). The GAS portfolio has the highest performance for the periods before and after deregulation (see columns 3 and 4, respectively). No other portfolio systematically produces higher or lower performance than the other portfolios. The results for the different periods only support the higher performance of the GAS portfolio. However, we once again find that the WATER portfolio has high performance during the 1994-1998 period.

In general, the analysis based on SIC classification shows that the highest performer was the GAS portfolio, while the lowest performer was the WATER portfolio.

6.1.4 Conclusions for the US market

The US utilities industry has outperformed the market indexes for the full period from 1970 to 2001 based on the risk-adjusted measures of performance. Performance increased dramatically after deregulation, and then began to return to their previous levels thereafter. Geographic location does not provide a clear indication of differential performance among the portfolios of US utilities. Foreign companies listed on US exchanges have outperformed US companies during the period before deregulation. However, during the post-deregulation period, the FOR portfolio has exhibited the lowest performance. The GAS portfolio has clearly outperformed other industry subsectors, and the WATER portfolio has underperformed the other subsectors.

6.2 The Performance of Canadian Utilities

6.2.1 Before and after deregulation

Table 12 presents the average monthly excess returns of the six portfolios in the Canadian market as well as the three benchmarks, the TSE 300, the CFMRC equally-weighted portfolio, and the CFMRC value-weighted portfolio. Column 2 presents the average monthly excess returns for the full period under study, from January 1970 to

December 2001. Column 3 presents the period before deregulation from January 1970 to March 1985, and column 4 presents the period after deregulation from April 1985 to December 2001. The period following deregulation from April 1985 till December 2001 is further divided into three five-year subperiods (see columns 5 to 7) to check the long-term effect of deregulation.

Based on column 2 for the whole period, no portfolio has outperformed the CFMRC EV portfolio and four out of six portfolios have an average monthly excess return greater than the TSE 300 and the CFMRC VW indices. For the period before deregulation (see column 3), all six portfolios have an average monthly excess return greater than the TSE 300 and the CFMRC VW indices. For the period after deregulation (see column 4), five of the six portfolios have an average monthly excess return greater than the TSE 300 and the CFMRC VW indices. The periods after deregulation do not show any discernable pattern in the change of excess returns due to deregulation.

Based on the Sharpe ratio presented in Table 13, all portfolios have positive Sharpe ratios for the whole period (see column 2), as well as before and after deregulation (see columns 3 and 4, respectively). If we compare the period before and after deregulation, we find mixed results for the Sharpe ratios, which suggests that deregulation has not had a material effect on the industry.

Table 14A presents the Jobson and Korkie (1981) *t*-tests of portfolios against the benchmark portfolios for the full period under study. The Table presents the monthly mean excess return for each portfolio, its standard deviation, its Sharpe ratio, and the Jobson and Korkie *t*-statistic. The *t*-statistics in columns 5 and 7 are positive for four portfolios, which suggests that these portfolios outperformed the TSE 300 and the

CFMRC VW indices. The *t*-values for all of the portfolios against the CFMRC EW portfolio are generally negative and statistically significant.

Tables 14B and 14C present *t* statistics for the Sharpe ratios of portfolios against the benchmarks for the periods before and after deregulation. Comparing Table 14B to 14C, we find mixed results for portfolio performance. Only two portfolios (EAST and ELEC) have statistically significant and positive Sharpe ratios for both periods. Based on Tables 14D, 14E and 14F, we find that the results remain mixed for the periods following deregulation. Even though the Sharpe ratios are significantly negative against the CFMRC EW index, all of the portfolios have positive and significant *t*-values against this index for the first period after deregulation (see Table 14D).

Table 15A presents the Jensen alphas for the different portfolios using the TSE 300 as benchmark by period. For the full period from January 1970 to December 2001 (see column 2), all of the portfolios have positive alphas, with the exception of the OTHER portfolio. Based on columns 3 and 4 for the periods before and after deregulation, respectively, all of the alphas are positive. For the other periods shown in columns 5 to 7, the alphas are positive but not one is statistically significant. The alphas for the other two benchmarks (CFMRC EW and CFMRC VW) are presented in Tables 15B and 15C, respectively. They do not exhibit any systematic effect of deregulation on the performance of the industry.

Table 16 presents the risk-adjusted performance measure, M^2. Nearly all of the M^2 values for all of the periods are positive. This suggests that the industry has generally outperformed the TSE 300. Column 2 reports the results for the whole period. All of the portfolios have positive M^2, which suggests that all of the portfolios within the utilities industry outperformed the TSE 300 after adjusting for risk as measured by the standard deviation of the portfolios over the full period. The M^2 for the periods before and after deregulation are mixed (see columns 3 and 4). The M^2 of some of the portfolios increased, while others decreased. The following periods (see columns 5 to 7) do not exhibit any specific trend in performance.

The modified version of the Fama-French three-factor model is estimated using the TSE 300 to obtain $R_{mt,}$ and two indices from Datastream (MSC Canada Value Index and MSC Canada Growth Index) are used instead of the Fama-French SMB and HML factors. Based on the results reported in Table 17A, the alphas are positive and statistically significant for the full period (see column 2). We find that the alphas decreased from the period before deregulation (see column 3) to the period following deregulation (see column 4). Results using the CFMRC EW and the CFMRC VW indexes to obtain R_{mt}, are presented in Tables 17B and 17C, respectively. They exhibit no systematic effect of deregulation on performance.

The alphas for the conditional model using the TSE 300 as benchmark are presented in Table 18A. The alphas are not statistically significant for the full period and for the periods before and after deregulation (see columns 3 and 4). The use of other benchmarks (see Tables 18B and 18C) to test performance as measured by the conditional model provide similar results.

The risk-adjusted performance measures show that the utilities industry in Canada outperformed the market index for the whole period as well as before and after deregulation. However, there seems to be no effect of deregulation on the industry in Canada.

6.2.2 By geographic classification

The Canadian utilities industry is divided into three portfolios according to the main business location of each company within the industry. The industry is divided into the WEST, CENTRAL, and EAST portfolios.

Based on Table 12, the EAST portfolio has the highest performance in terms of average monthly excess returns for the full period. It is followed by the WEST, then by the CENTRAL portfolios. The same is true for the period after deregulation (see column 4). In the period before deregulation, the WEST portfolio is the highest performer (see column 3).

Panels A of Table 13 presents the Sharpe ratios. The EAST portfolio has the greatest Sharpe ratio (0.54) for the whole period, followed by the WEST (0.32) and the CENTRAL (0.17). The same applies to the periods before and after deregulation (see columns 3 and 4); namely, the EAST has the highest Sharpe ratios for the two periods of 0.46 and 0.62, respectively. Similar results occur for the other periods under study with the exception of the WEST portfolio for the period from January 1991 to December 1995, where the WEST portfolio has the highest Sharpe ratio of 0.65.

Panel A of Table 14A presents the *t*-statistics of the portfolios against the TSE 300 for the full period. The EAST portfolio outperforms the TSE 300 and the CFMRC VW benchmarks at the 1% significance level. The WEST portfolio outperforms the same benchmarks but the difference is not statistically significant. The CENTRAL portfolio insignificantly underperforms both benchmarks (the TSE 300 and CFMRC VW). Thus, the EAST has the highest performance, followed by the WEST, then the CENTRAL. The ranking of the portfolios against the benchmarks remains the same for the different periods under study (see Tables 14B and 14C).

The Jobson and Korkie *t*-statistics for a 2x2 comparison of the Sharpe ratios of different portfolios is presented in Table 19. For the full period (see Panel A), the EAST portfolio outperforms the WEST and the CENTRAL portfolios at the 1% significance level. The WEST portfolio outperforms the CENTRAL portfolio for the whole period at the 5% significance level. Portfolio rankings remain nearly the same for the other periods presented in Panels B to E.

The Jensen alpha using the TSE 300 as benchmark is presented in Panel A of Table 15A. For the full period (see column 2), the three portfolios have positive alphas. The EAST portfolio has the highest alpha (0.53) which is statistically significant at the 1% level. The alpha of the WEST portfolio is greater than that of the CENTRAL portfolio. The same rankings of portfolios occur for the periods before and after deregulation (see columns 3 and 4), and for the other two benchmarks (see Tables 15B and 15C). For each period, we test the significance of the differences in alphas using the three benchmarks. Each portfolio is compared to all of the other portfolios with lower alphas. Results are reported in Appendices F to H. The higher alpha for the EAST portfolio is evident and statistically significant for the three periods using the three benchmarks.

The M^2 values for the different portfolios sorted according to geographic location are presented in Table 16. For the full period (see column 2), the three portfolios have positive M^2. The EAST (0.73) ranks the highest, followed by the WEST (0.54) and the CENTRAL (0.33). For the period after deregulation, the same ranking of the portfolios remains (see column 4). In the period before deregulation (see column 3), the WEST portfolio has a slightly higher M^2 than the EAST portfolio.

The modified Fama-French model alphas are presented in Table 17A. For the full period, the WEST portfolio has the highest performance, followed by the EAST, and then the CENTRAL. The alphas are statistically significant for only the WEST and EAST portfolios. For the period before deregulation (see column 3), the WEST has the highest performance, and the EAST has the highest performance for the period after deregulation (see column 4).

The alphas for the conditional market model for each of the three benchmarks are presented in Tables 18A to 18C. The alphas are not significant against the TSE 300 or the CFMRC VW (see Tables 18A and 18C). For the CFMRC EW index (Table 18B), the EAST portfolio significantly (1% level) outperforms the other portfolios with an alpha value of 1.06 (1.34) for the full (after deregulation) period.

Thus, the EAST portfolio has a superior performance over the other two portfolios. It is followed in performance by the WEST portfolio, and then the CENTRAL portfolio.

6.2.3 By SIC classification

The Canadian utilities industry is divided into three portfolios according to the SIC classification as follows: 491x, the Electric Services; 492x, the Gas Production and Distribution; and 493x: the OTHER utilities which includes the Combination Electric and Gas, and other Utility; 494x, the Water Supply; and finally, 495x to 497x, which includes other types of utilities (Sanitary Services, Steam and Air-conditioning Supply, and Irrigation Systems).

Based on Panel B of Table 12, the ELEC (0.59) portfolio has the highest performance in terms of average monthly excess returns. It is followed by the GAS (0.55) and the OTHER (0.19) portfolios. The same ranking holds before deregulation (see column 3). After deregulation (see column 4), the GAS portfolio outperforms the ELEC. The ELEC and GAS portfolios outperform the TSE 300 and the CFMRC VW for the full period and for the periods before and after deregulation.

Table 13 reports the Sharpe ratio of each portfolio. For the full period (see column 2), the ELEC has the highest Sharpe ratio (0.41), followed by the GAS (0.36), and the OTHER (0.09) portfolios. For the periods before and after deregulation (see columns 3 and 4), the ranking of the portfolios are unchanged.

Panel B of Table 14A reports the *t*-statistics for the Sharpe ratios of the portfolios against the benchmarks for the whole period. The ELEC and GAS portfolios outperform the TSE 300 and the CFMRC VW. The ELEC has a *t*-value of 2.63 (2.32) against the TSE 300 (CFMRC VW). These t-values are significant at the 1% level. The GAS portfolio has a *t*-value of 1.98 against the TSE 300 and a *t*-value of 1.67 against the CFMRC VW, which are significant at the 5% and 10% levels, respectively. The OTHER portfolio has *t*-values of –1.82 and –2.12 against the TSE 300 and CFMRC VW, which are significant at the 10% and 5% levels, respectively. This again confirms the findings that the ELEC portfolio has the highest performance, and the OTHER portfolio has the lowest performance. Panel B of Tables 14B though 14E presents the *t*-statistics for the various periods under study. The results are almost the same for all periods.

A 2x2 portfolio analysis is presented in Table 20 to compare the Sharpe ratios of different pairs of portfolios. For the full period, which is presented in Panel A, the ELEC portfolio outperforms the two other portfolios in terms of the Sharpe ratio. The *t*-values are positive against the GAS (0.649) and the OTHER (4.378) portfolios, but are only statistically significant for the latter comparison. The GAS portfolio significantly outperforms the OTHER portfolio (*t*-value of 3.749). The same holds for the periods before and after deregulation (see Panels B and C, respectively), and for other periods (see the other Panels).

The Jensen alphas using the TSE 300 are presented in Panel B of Table 15A. For the full period (see column 2), the ELEC and GAS portfolios have positive alphas whereas the OTHER portfolio has a negative alpha. The alpha of the ELEC portfolio is the highest and is statistically significant at the 10% level. For the periods before and after deregulation (see columns 3 and 4), the OTHER portfolio always has the lowest alpha. The Jensen alphas, which are presented in Tables 15B and 15C for the two other benchmarks, provide identical rankings. For each period, we test the significance of the differences in alphas using the three benchmarks. Each portfolio is compared to all of the other portfolios with lower alphas. Results are reported in Appendices I to K. Results are generally not statistically significant, except for the performance of the ELEC portfolio for the full period with an alpha of 0.38, statistically significant at the 5% level against the GAS portfolio and an alpha of 0.34, statistically significant at the 10% level against the Other portfolio (see Appendix I).

The M^2 for the different portfolios sorted according to the SIC classifications are presented in Table 16. For the full period (see column 2), the ELEC portfolio has the highest M^2 (0.59), followed by the GAS (0.55), and finally the OTHER portfolio (0.32). These rankings extend to the periods before and after deregulation (see columns 3 and 4). These rankings are identical to those presented earlier.

Alphas for the modified Fama-French model using the TSE 300 are presented in Table 17A. The ELEC (OTHER) portfolio has the highest (lowest) alpha for the full period (see column 2) and for the periods before and after deregulation (see columns 3 and 4). The ELEC portfolio has a significant alpha of 0.61 for the full period, a significant alpha of 0.78 for the period before deregulation, and a significant alpha of 0.53 for the post-deregulation period. The GAS portfolio ranks second for the three periods and the three alpha estimates are statistically significant. The use of the two other benchmarks (see Tables 17B and 17C) provide similar results, although statistical significance is weaker.

The alphas for the conditional model using the three benchmarks are presented in Tables 18A, 18B, and 18C. The alphas are generally not statistically significant. However, the ELEC portfolio ranks the highest, followed by the GAS, then the CENTRAL for the full period and the periods before and after deregulation.

6.2.4 Conclusions for the Canadian market

The risk-adjusted performance measures show that the utilities industry in Canada outperformed the market indexes for the whole period as well as before and after deregulation. However, there seems to be no effect of deregulation on the utilities industry. The analysis by geographic location shows that the EAST portfolio has superior performance over the other two regional portfolios. It is followed by the WEST portfolio and then the CENTRAL portfolio. According to the SIC classification, the highest performer was the ELEC portfolio, followed by the GAS, and finally the OTHER portfolio.

7. TRENDS IN THE RETURN VOLATILITIES

7.1 Campbell et al. disaggregated model

We analyze the volatility trends of the utilities industry using the Campbell et al. (2001) disaggregated model. Campbell et al. decompose the return on a typical stock into three components: the market-wide return, an industry specific residual, and a firm-specific residual. They then construct time series of volatility measures for these three components for each firm. There is one difference between our model and the one used by Campbell et al. For the US market, we use the return on the CRSP value-weighted index as the market return whereas Campbell et al. computed a market return by aggregating returns across all firms in the CRSP data set (NYSE, the AMEX, and the Nasdaq). Campbell et al. find that their market index is very similar to the value-weighted index of the CRSP data set, as the correlation between the two indexes is almost perfect at 0.997. For consistency, we use the CFMRC VW index to calculate market returns for the Canadian market.

To obtain the volatility measures, the first step is to decompose returns as follows. Subsectors are denoted by an i and individual firms are denoted by j. The excess return of firm j that belongs to the subsector i in period t is denoted as R_{jit}. The excess return is measured as the excess return over the 3-months Tbill. The excess return of subsector i in period t is given by $R_{it} = \sum_{j \in i} \varpi_{jit} R_{jit}$. For weights in period t, we use the market capitalization of a firm in period $t - 1$ and take the weights as being constant within period t. We use the return on the CRSP value-weighted index (CFMRC) as a proxy for the market return in the US (Canada). R_{mt} is the excess return on the market calculated by subtracting the 3 month Tbill rate from the CRSP (CFMRC) value-weighted index. We use daily subsector (firm) returns to get average monthly returns for each subsector (firm) and calculate the residuals.

To obtain the subsector residual, we use equation (8):

$$R_{it} = R_{mt} + \varepsilon_{it} \tag{8}$$

ε_{it} is the difference between the subsector return R_{it} and the market return R_{mt}.

To obtain the firm-specific residual, we use equation (9):

$$R_{jit} = R_{it} + \eta_{jit} \tag{9}$$

η_{jit} is the difference between the firm-specific return R_{jit} and the subsector return R_{it}.

We then compute the volatility of the three measures (market, subsector and firm). Let s denote the interval at which returns are measured. We use daily intervals in our estimates. Using returns of interval s, we construct volatility estimates at interval t, which refers to months. We then use the time series variation of the individual return components within each period t.

The sample volatility of the market return, MKT, is computed as follows for each month:

$$MKT_t = \hat{\sigma}^2_{mt} = \sum_{s \in t} (R_{ms} - \mu_m)^2 \tag{10}$$

where R_{ms} is the daily market return and μ_m is the monthly mean market return.

For the volatility in each subsector i, we sum the squares of the subsector-specific residuals in equation (8) within a period t:

$$\hat{\sigma}^2_{\varepsilon it} = \sum_{s \in t} \varepsilon^2_{is} \tag{11}$$

Then we average over subsectors to obtain the monthly average subsector volatility SUB:

$$SUB_t = \sum_i w_{it} \hat{\sigma}^2_{\varepsilon it} \tag{12}$$

For the firm-specific volatility, we sum the squares of the firm-specific residuals in equation (9) for each firm in the sample. For weights in period t, we use the market capitalization of each firm in period $t - 1$ and take the weights as being constant within period t.

$$\hat{\sigma}^2_{\eta jit} = \sum_{s \in t} \eta^2_{jis} \tag{13}$$

Then we compute the weighted average of the firm-specific volatilities within each subsector:

$$\hat{\sigma}^2_{\eta it} = \sum_{j \in i} w_{jit} \hat{\sigma}^2_{\eta jit} \tag{14}$$

Finally, we average over subsectors to obtain a measure of average firm-level volatility FIRM:

$$FIRM_t = \sum_i \omega_{it} \hat{\sigma}^2_{\eta it} \tag{15}$$

7.2 The Evidence for US Utilities

Figures 3 to 5 plot the three variance components for the US market estimated monthly using daily data over the period from 1970 to 2001; namely: market volatility MKT, subsector volatility SUB, and firm-level volatility FIRM. The top panels show the monthly time series and the bottom panels show a lagged moving average of order 12. Figure 3 shows the market volatility, MKT. Market volatility shows the same patterns that are reported in other studies (Campbell et al. (2001) and Schwert (1989)). The bottom panel shows that the market volatility has a slow-moving component and high frequency noise. Market volatility was high around the 1970s, the mid-1970s, the stock market crash of 1987, and the market boom of 1998 to 2001. The MKT value in October 1987 is about five times as high as the second highest value and is excluded from the graph.

Figure 4 presents the subsector volatility, SUB. The subsector volatility is lower than the market volatility, although it has tended to be very high during the last period, from 1998 to 2001. Deregulation of the industry in 1978 did not have any effect on the volatility of the different subsectors. The effect of the October 1987 crash has been downweighted in this figure.

Figure 5 plots the firm-level volatility, FIRM. The firm-level volatility is higher than MKT and SUB. As per Campbell et al., this implies that the firm-specific volatility is the largest component of total volatility of the average firm. Firm volatility has increased during the early 1970s, early 1980s and from 1990 to 1996. However, there seems to be no specific trend[2] in the volatility of firms as documented by Campbell et al. The graph indicates that the stock market has become more volatile but on a firm level rather than on a market level.

7.3 The Evidence for Canadian Utilities

Figures 6 to 8 plot the three variance components for the Canadian market, which are estimated monthly using daily data over the period from 1975 to 2001. The top panels depict the monthly time series and the bottom panels show a lagged moving average of order 12. Figure 6 shows the market volatility, MKT. The market had very high patterns of volatility in the late 1970s and early 1980s as well as in 1988. The graph also shows high volatility levels in the market boom period of 1998-2000. The bottom panel shows that the market volatility has a slow-moving component.

Figure 7 presents the subsector volatility, SUB. The figure shows that the subsector volatility is much lower than the market volatility, although it has also been very high in 1980 and at the end of the period. Deregulation of the industry in 1985 does not seem to have any effect on the volatility of the different subsectors. Generally volatility of the subsectors shows similar patterns to the volatility of the market although it tends to be lower.

Figure 8 plots the firm-level volatility, FIRM. The firm-level volatility is higher than the market volatility and much higher than the subsectors' volatility. As in the US, this implies that the firm-specific volatility is the largest component of total volatility of

[2] We test for trend in the volatility series using simple linear regression techniques. The slope of this regression is not significantly different from zero.

the average firm. Firm volatility has no specific trend. However, we see periods of very low volatility between 1970 and 1974 and especially between 1988 and 1998.

8. CONCLUSION

This thesis examines the risk-adjusted performance of the utilities industry in both the United States and Canada from 1970 to 2001 using five measures of risk-adjusted performance. We use the Sharpe ratio, the Jensen alpha, the M^2, the Fama and French three-factor model, and a conditional CAPM model adjusted on market movements. We also analyze the volatility of the market, subsectors, and firms within the utilities industry to determine the volatility pattern of stock returns in the industry.

We find that the US utilities industry has outperformed the market on a risk-adjusted basis and that deregulation has had a positive effect on the performance of the industry. Unlike for the SIC classified portfolios, geographic location does not provide an indication of superior performance within the industry. We find that gas companies clearly outperform other subsectors in the industry whereas water companies have the lowest performance. The Canadian utilities industry also outperformed the market for the full period as well as for the periods before and after deregulation. However, deregulation did not affect the industry as much as in the US. We find that eastern companies have the highest performance, followed by western companies, then the companies in central Canada. The Canadian electricity subsector has higher performance relative to the gas subsector and the other subsectors of the industry.

Our results indicate the existence of certain market segments which can provide higher returns while incurring less risk. Results also show that deregulation had a positive effect on the utilities industry in the US in the early years following deregulation but not in Canada. A future area of research is to examine the risk-adjusted performance of other industries and study the effect of deregulation in various deregulated industries. Another interesting topic for future study is an examination of the financial and operating performance of the utilities companies before and after deregulation. Another area for future study is to examine the factors that explain the cross-sectional variation of returns of the utilities industry, and whether the Fama-French three-factors model or a conditional market model may explain the cross-sectional variation of returns in the industry better than the basic CAPM. Malkiel and Xu (2002) demonstrate that the idiosyncratic volatility variable is more powerful than either beta or size measures in explaining the cross section of returns. This may be further investigated. Campbell et al. (2001) find an upward trend in firm-level volatility for the whole market whereas our results do not indicate the existence of any trend for the utilities industry. A future area of research is to examine the existence of any trend in the firm-level volatility of other industries in a Canadian context.

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Table 1: Number of companies per portfolio according to SIC classification and geographic location

This table reports the number of firms included in the study. For the US, there are a total of 450 firms. For Canada, there are a total of 75 firms. Panel A reports the number of firms included in each portfolio for the US market. Firms are grouped into 5 portfolios based on the SIC and 5 portfolios based on the geographic classification. Panel B reports the number of firms included in each portfolio for the Canadian market. Firms are grouped into 3 portfolios based on the SIC and 3 portfolios based on the geographic classification.

Panel A: US Utilities

SIC	No. of companies	Location	No. of companies
491x	97	**Northwest**	21
492x	133	**Southwest**	117
493x	67	**Southeast**	54
494x	30	**Northeast**	227
Other	123	**Foreign**	31
Total	450	**Total**	450

Panel B: Canadian Utilities

SIC	No. of companies	Location	No. of companies
491x	16	**West**	44
492x	37	**Central**	26
Other	22	**East**	5
Total	75	**Total**	75

The list of companies included in the study are presented in Appendixes A and B for the US and Canada, respectively.

Foreign companies portfolio in the United States refers to companies that are listed on the US exchanges but which have the majority of their business in a country outside of the US.

Table 2: SIC classification

This table reports the SIC industry classification used to construct the portfolios. Because of the limited number of stocks in each one of the subcategories, the Steam and Air Conditioning Supply (496x), and the Irrigation Systems (497x), are added to the Sanitary Services (495x) to form one portfolio, "OTHER," for the United States. For Canadian utilities, the Combination Utility Services (493x), the Water Supply (494x), the Sanitary Services (495x), the Steam and Air Conditioning Supply (496x), and the Irrigation Systems (497x) are grouped into one portfolio, "OTHER," for the same reason.

4900 . . . Electric, Gas, And Sanitary Services

Electric Services

4911 Electric services

Gas Production and Distribution

4922 Natural gas transmission
4923 Gas transmission and distribution
4924 Natural gas distribution
4925 Gas production and/or distribution

Combination Utility Services

4931 Electric and other services combined
4932 Gas and other services combined
4939 Combination utilities, (not elsewhere classified)

Water Supply

4941 Water supply

Sanitary Services

4952 Sewerage systems
4953 Refuse systems
4959 Sanitary services, (not elsewhere classified)

Steam and Air Conditioning Supply

4961 Steam and air conditioning supply

Irrigation Systems

4971 Irrigation systems

Table 3: Average monthly excess returns

This table reports the average monthly excess returns of each portfolio according to the geographic and the SIC classifications. The excess return is measured over the monthly 3 months Tbill rate. Column 2 reports the average monthly excess returns for the full period. Column 3 (4) reports the average monthly excess returns for the period before (after) deregulation. Columns 5 to 9 report the average monthly excess returns for each five year interval after deregulation.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic Classification								
NW	0.60	0.41	0.67	0.71	1.09	0.78	0.30	0.37
p-value	*0.006****	*0.327*	*0.007****	*0.160*	*0.092**	*0.040***	*0.523*	*0.668*
SW	0.69	0.49	0.77	1.04	0.68	0.98	0.51	0.52
p-value	*0.001****	*0.226*	*0.001****	*0.065**	*0.247*	*0.025***	*0.281*	*0.405*
SE	0.70	0.30	0.85	1.01	1.20	0.76	0.54	0.63
p-value	*0.001****	*0.461*	*0.000****	*0.021***	*0.015***	*0.119*	*0.312*	*0.384*
NE	0.62	0.32	0.73	0.67	1.06	0.43	0.61	0.98
p-value	*0.001****	*0.435*	*0.000****	*0.135*	*0.038***	*0.181*	*0.107*	*0.079**
FOR	0.71	0.56	0.77	1.60	1.50	0.40	0.07	-0.13
p-value	*0.030***	*0.314*	*0.059***	*0.229*	*0.082**	*0.423*	*0.918*	*0.862*
Panel B: SIC Classification								
ELEC	0.52	0.18	0.64	0.40	1.04	0.75	0.31	0.78
p-value	*0.009****	*0.646*	*0.002****	*0.397*	*0.048***	*0.039***	*0.440*	*0.249*
GAS	0.80	0.61	0.88	1.04	0.75	1.00	0.55	1.15
p-value	*0.000****	*0.121*	*0.000****	*0.082**	*0.112*	*0.012***	*0.186*	*0.052*
COMB	0.59	0.19	0.74	0.57	1.05	0.79	0.81	0.31
p-value	*0.003****	*0.653*	*0.001****	*0.235*	*0.035***	*0.035***	*0.058**	*0.679*
WATER	0.56	0.35	0.64	0.46	0.32	-0.24	2.11	0.46
p-value	*0.128*	*0.530*	*0.154*	*0.528*	*0.717*	*0.868*	*0.006****	*0.635*
OTHER	1.04	0.81	1.11	3.20	1.41	-0.04	0.24	0.34
p-value	*0.022***	*0.466*	*0.020***	*0.022***	*0.231*	*0.951*	*0.753*	*0.738*
Panel C: Benchmarks								
S&P 500	0.24	-0.32	0.46	0.15	0.44	0.49	1.31	-0.46
p-value	*0.293*	*0.489*	*0.086**	*0.792*	*0.516*	*0.311*	*0.014***	*0.581*
CRSP EW	0.67	0.40	0.78	1.41	0.06	0.91	0.61	0.93
p-value	*0.026***	*0.558*	*0.017***	*0.056**	*0.937*	*0.117*	*0.303*	*0.443*
CRSP VW	0.50	0.02	0.69	0.64	0.64	0.75	1.28	-0.25
p-value	*0.032***	*0.962*	*0.011***	*0.265*	*0.339*	*0.115*	*0.017***	*0.782*

The *p-value* measures the null hypothesis that mean excess returns equal zero. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Sharpe Ratios

The Sharpe ratios are presented in this table. The Sharpe ratio is calculated using the following equation: $SR_p = \bar{R}_p - \bar{R}_f / \sigma_p$ where $\bar{R}_p$ is the average return on each portfolio, $\bar{R}_f$ is the average risk-free rate, and σ_p is the standard deviation of the returns of the portfolio.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic Classification								
NW	0.50	0.30	0.59	0.65	0.81	0.90	0.29	0.25
SW	0.60	0.37	0.70	0.88	0.54	1.06	0.50	0.50
SE	0.61	0.21	0.82	1.10	1.20	0.76	0.47	0.53
NE	0.61	0.25	0.81	0.69	1.01	0.58	0.76	1.10
FOR	0.40	0.38	0.41	0.58	0.86	0.37	0.05	-0.10
Panel B: SIC Classification								
ELEC	0.48	0.14	0.66	0.38	0.95	0.98	0.35	0.71
GAS	0.76	0.49	0.88	0.82	0.75	1.22	0.62	1.24
COMB	0.54	0.14	0.75	0.54	1.02	1.01	0.90	0.25
WATER	0.28	0.19	0.31	0.29	0.17	-0.07	1.42	0.28
OTHER	0.45	0.28	0.52	1.24	0.59	-0.03	0.14	0.20
Panel C: Benchmarks								
S&P 500	0.19	-0.23	0.37	0.12	0.30	0.47	1.22	-0.31
CRSP EW	0.41	0.20	0.52	0.93	0.04	0.75	0.48	0.47
CRSP VW	0.39	0.02	0.55	0.51	0.45	0.75	1.18	-0.16

Table 5 A: Sharpe Ratio significance tests for the full period from January 1970 to December 2001

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the full period from January 1970 to December 2001. The Sharpe ratio of each portfolio is compared to the Sharpe ratio of the benchmarks. Column 2 presents the average monthly excess returns of the portfolios. Column 3 reports the average monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie t test of significance against the S&P 500, the CRSP equal-weighted portfolio, and the CRSP value-weighted portfolio, respectively. The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$

where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

Portfolios	Mean	SD	Sharpe	Benchmarks S&P 500	 CRSP EW	 CRSP VW
Panel A: Geographic Classification						
NW	0.60	4.30	0.50	4.09***	1.24	1.52
SW	0.69	4.14	0.60	5.43***	2.61***	2.89***
SE	0.70	4.14	0.61	5.49***	2.68***	2.96***
NE	0.62	3.64	0.61	5.52***	2.70***	2.98***
FOR	0.71	6.36	0.40	2.71***	-0.14	0.13
Panel B: SIC Classification						
ELEC	0.52	3.86	0.48	3.76***	0.91	1.19
GAS	0.80	3.85	0.76	7.43***	4.69***	4.96***
COMB	0.59	3.90	0.54	4.59***	1.76*	2.04**
WATER	0.56	7.13	0.28	0.99	-1.84*	-1.57
OTHER	1.04	8.54	0.45	3.34***	0.50	0.77
Panel C: Benchmarks						
S&P 500	0.24	4.50	0.19			
CRSP EW	0.67	5.88	0.41			
CRSP VW	0.50	4.59	0.39			

A positive t value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5 B: Sharpe Ratio significance tests for the period before deregulation from January 1970 to October 1978

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from January 1970 to October 1978. The Sharpe ratio of each portfolio is compared to the Sharpe ratio of the benchmarks. Column 2 presents the average monthly excess returns of the portfolios. Column 3 reports the average monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie t test of significance against the S&P 500, the CRSP equal-weighted portfolio, and the CRSP value-weighted portfolio, respectively. The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**S&P 500**	**CRSP EW**	**CRSP VW**
Panel A: Geographic Classification						
NW	0.89	4.82	0.30	6.57***	1.43	4.05***
SW	0.96	4.65	0.37	7.50***	2.41***	5.02***
SE	0.78	5.00	0.21	5.36***	0.18	2.81***
NE	0.80	4.54	0.25	5.84***	0.67	3.30***
FOR	1.03	5.23	0.38	7.59***	2.50***	5.11***
Panel B: SIC Classification						
ELEC	0.66	4.71	0.14	4.25***	-0.94	1.68*
GAS	1.08	4.40	0.49	9.02***	4.05***	6.61***
COMB	0.66	4.67	0.14	4.33***	-0.86	1.76*
WATER	0.82	6.35	0.19	5.02***	-0.14	2.47***
OTHER	1.29	10.45	0.28	6.22***	1.09	3.71***
Panel C: Benchmarks						
S&P 500	0.24	4.71	-0.23			
CRSP EW	0.87	7.04	0.20			
CRSP VW	0.50	4.85	0.02			

A positive t value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5 C: Sharpe Ratio significance tests for the period after deregulation from November 1978 to December 2001

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from November 1978 to December 2001. The Sharpe ratio of each portfolio is compared to the Sharpe ratio of the benchmarks. Column 2 presents the average monthly excess returns of the portfolios. Column 3 reports the average monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie *t* test of significance against the S&P 500, the CRSP equal-weighted portfolio, and the CRSP value-weighted portfolio, respectively. The *t* statistic is computed as follows:

$t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**S&P 500**	**CRSP EW**	**CRSP VW**
Panel A: Geographic Classification						
NW	0.67	4.10	0.50	3.11***	0.96	0.54
SW	0.77	3.93	0.60	4.63***	2.51***	2.08
SE	0.85	3.77	0.61	6.05***	3.98***	3.55***
NE	0.73	3.23	0.61	6.03***	3.95***	3.52***
FOR	0.77	6.74	0.40	0.61	-1.54	-1.96
Panel B: SIC Classification						
ELEC	0.64	3.48	0.48	4.08***	1.95	1.53
GAS	0.88	3.62	0.76	6.90***	4.84***	4.42***
COMB	0.74	3.56	0.54	5.19***	3.08***	2.66***
WATER	0.64	7.41	0.28	-0.82	-2.93***	-3.36***
OTHER	1.11	7.91	0.45	2.07**	-0.07	-0.50
Panel C: Benchmarks						
S&P 500	0.46	4.41	0.19			
CRSP EW	0.78	5.38	0.41			
CRSP VW	0.69	4.49	0.39			

A positive *t* value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5 D: Sharpe Ratio significance tests for the first period after deregulation from November 1978 to December 1983

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from November 1978 to December 1983. The Sharpe ratio of each portfolio is compared to the Sharpe ratio of the benchmarks. Column 2 presents the average monthly excess returns of the portfolios. Column 3 reports the average monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie *t* test of significance against the S&P 500, the CRSP equal-weighted portfolio, and the CRSP value-weighted portfolio, respectively. The *t* statistic is computed as follows:

$t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**S&P 500**	**CRSP EW**	**CRSP VW**
Panel A: Geographic Classification						
NW	0.71	3.94	0.65	7.32***	-3.64***	1.90*
SW	1.04	4.33	0.88	10.03***	-0.67	4.86***
SE	1.01	3.36	1.10	12.49***	2.23**	7.63***
NE	0.67	3.48	0.69	7.83***	-3.12***	2.44***
FOR	1.60	10.36	0.58	6.37***	-4.49***	0.97
Panel B: SIC Classification						
ELEC	0.40	3.68	0.38	3.75***	-7.17***	-1.80*
GAS	1.04	4.64	0.82	9.39***	-1.34	4.17***
COMB	0.57	3.77	0.54	5.91***	-5.03***	0.43
WATER	0.46	5.73	0.29	2.38***	-8.35***	-3.13***
OTHER	3.20	10.73	1.24	13.63***	3.85***	9.04***
Panel C: Benchmarks						
S&P 500	0.15	4.31	0.12			
CRSP EW	1.41	5.68	0.93			
CRSP VW	0.64	4.49	0.51			

A positive *t* value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5 E: Sharpe Ratio significance tests for the second period after deregulation from January 1984 to December 1988

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from January 1984 to December 1988. The Sharpe ratio of each portfolio is compared to the Sharpe ratio of the benchmarks. Column 2 presents the average monthly excess returns of the portfolios. Column 3 reports the average monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie t test of significance against the S&P 500, the CRSP equal-weighted portfolio, and the CRSP value-weighted portfolio, respectively. The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$

where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$ where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**S&P 500**	**CRSP EW**	**CRSP VW**
Panel A: Geographic Classification						
NW	1.09	4.93	0.81	6.85***	10.24***	4.89***
SW	0.68	4.50	0.54	3.37***	7.03***	1.33
SE	1.20	3.72	1.20	11.21***	14.25***	9.45***
NE	1.06	3.87	1.01	9.17***	12.40***	7.30***
FOR	1.50	6.55	0.86	7.43***	10.81***	5.49***
Panel B: SIC Classification						
ELEC	1.04	4.00	0.95	8.55***	11.80***	6.66***
GAS	0.75	3.58	0.75	6.14***	9.65***	4.15***
COMB	1.05	3.77	1.02	9.30***	12.47***	7.44***
WATER	0.32	6.88	0.17	-1.87*	1.82*	-3.89***
OTHER	1.41	9.06	0.59	3.93***	7.57***	1.90*
Panel C: Benchmarks						
S&P 500	0.44	5.18	0.30			
CRSP EW	0.06	5.52	0.04			
CRSP VW	0.64	5.13	0.45			

A positive t value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5 F: Sharpe Ratio significance tests for the third period after deregulation from January 1989 to December 1993

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from January 1989 to December 1993. The Sharpe ratio of each portfolio is compared to the Sharpe ratio of the benchmarks. Column 2 presents the average monthly excess returns of the portfolios. Column 3 reports the average monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie *t* test of significance against the S&P 500, the CRSP equal-weighted portfolio, and the CRSP value-weighted portfolio, respectively. The *t* statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$ where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**S&P 500**	**CRSP EW**	**CRSP VW**
Panel A: Geographic Classification						
NW	0.78	3.13	0.90	5.80***	2.00**	2.04**
SW	0.98	3.37	1.06	7.79***	4.11***	4.14***
SE	0.76	3.63	0.76	3.92***	0.09	0.12
NE	0.43	2.62	0.58	1.59	-2.31**	-2.28**
FOR	0.40	3.85	0.37	-1.43	-5.29***	-5.25***
Panel B: SIC Classification						
ELEC	0.75	2.75	0.98	6.84***	3.11***	3.14***
GAS	1.00	3.01	1.22	9.63***	6.08***	6.11***
COMB	0.79	2.85	1.01	7.11***	3.39***	3.44***
WATER	-0.24	11.00	-0.07	-7.40***	-10.73***	-10.74***
OTHER	-0.04	5.31	-0.03	-7.04***	-10.71***	-10.57***
Panel C: Benchmarks						
S&P 500	0.49	3.71	0.47			
CRSP EW	0.91	4.45	0.75			
CRSP VW	0.75	3.65	0.75			

A positive *t* value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5 G: Sharpe Ratio significance tests for the fourth period after deregulation from January 1994 to December 1998

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from January 1994 to December 1998. The Sharpe ratio of each portfolio is compared to the Sharpe ratio of the benchmarks. Column 2 presents the average monthly excess returns of the portfolios. Column 3 reports the average monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie t test of significance against the S&P 500, the CRSP equal-weighted portfolio, and the CRSP value-weighted portfolio, respectively. The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$

where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$ where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**S&P 500**	**CRSP EW**	**CRSP VW**
Panel A: Geographic Classification						
NW	0.30	3.55	0.29	-11.61***	-2.65***	-11.22***
SW	0.51	3.61	0.50	-9.10***	0.29	-8.70***
SE	0.54	4.09	0.47	-9.42***	-0.14	-9.01***
NE	0.61	2.87	0.76	-5.83***	3.83***	-5.39***
FOR	0.07	5.56	0.05	-14.32***	-6.10***	-13.98***
Panel B: SIC Classification						
ELEC	0.31	3.05	0.35	-10.86***	-1.78*	-10.47***
GAS	0.55	3.21	0.62	-7.65***	1.91**	-7.22***
COMB	0.81	3.23	0.90	-3.93***	5.64***	-3.47***
WATER	2.11	5.77	1.42	2.40***	11.24***	2.86***
OTHER	0.24	5.96	0.14	-13.36***	-4.86***	-13.03***
Panel C: Benchmarks						
S&P 500	1.31	4.00	1.22			
CRSP EW	0.61	4.54	0.48			
CRSP VW	1.28	4.04	1.18			

A positive t value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5 H: Sharpe Ratio significance tests for the fifth period after deregulation from January 1999 to December 2001

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from January 1999 to December 2001. The Sharpe ratio of each portfolio is compared to the Sharpe ratio of the benchmarks. Column 2 presents the average monthly excess returns of the portfolios. Column 3 reports the average monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie t test of significance against the S&P 500, the CRSP equal-weighted portfolio, and the CRSP value-weighted portfolio, respectively. The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$

where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$ where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**S&P 500**	**CRSP EW**	**CRSP VW**
Panel A: Geographic Classification						
NW	0.37	5.12	0.25	8.66***	-3.40***	6.44***
SW	0.52	3.72	0.50	12.07***	0.35	10.02***
SE	0.63	4.32	0.53	12.31***	0.77	10.30***
NE	0.98	3.25	1.10	18.23***	8.79***	16.70***
FOR	-0.13	4.39	-0.10	3.37***	-8.82***	0.97
Panel B: SIC Classification						
ELEC	0.78	4.01	0.71	14.43***	3.50***	12.58***
GAS	1.15	3.43	1.24	19.31***	10.43***	17.89***
COMB	0.31	4.49	0.25	8.50***	-3.54***	6.28***
WATER	0.46	5.71	0.28	8.99***	-2.99***	6.79***
OTHER	0.34	6.09	0.20	7.79***	-4.52***	5.52***
Panel C: Benchmarks						
S&P 500	-0.46	4.90	-0.31			
CRSP EW	0.93	7.20	0.47			
CRSP VW	-0.25	5.32	-0.16			

A positive t value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6 A: Jensen Alphas using the S&P 500

The α_p of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_p + \beta_p R_{mt} + \varepsilon_{pt}$ where α_p is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the S&P 500 over the Treasury bill rate, and β_p is the unconditional measure of risk. Column 2 presents the full period. Column 3 (4) presents the period before (after) deregulation. The period following deregulation from November 1978 to December 2001 has been divided into five different periods. These are presented in columns 5 to 9.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	0.46	0.66	0.43	0.59	0.71	0.47	-0.22	0.62
p-value	*0.008****	*0.029***	*0.038***	*0.092**	*0.096**	*0.133*	*0.622*	*0.483*
SW	0.53	0.73	0.47	0.89	0.32	0.70	-0.37	0.74
p-value	*0.000****	*0.013***	*0.005****	*0.005****	*0.258*	*0.070**	*0.283*	*0.226*
SE	0.55	0.56	0.62	0.91	0.94	0.46	-0.17	0.67
p-value	*0.001****	*0.077**	*0.001****	*0.003****	*0.001****	*0.221*	*0.720*	*0.367*
NE	0.49	0.54	0.51	0.59	0.78	0.15	0.03	1.03
p-value	*0.001****	*0.085**	*0.001****	*0.081**	*0.005****	*0.460*	*0.911*	*0.067**
FOR	0.52	0.79	0.40	1.43	1.16	0.08	-1.24	0.05
p-value	*0.056*	*0.037***	*0.248*	*0.225*	*0.094**	*0.839*	*0.021***	*0.937*
Panel B: SIC classification								
ELEC	0.40	0.41	0.46	0.34	0.82	0.51	-0.35	0.82
p-value	*0.014***	*0.207*	*0.011***	*0.419*	*0.044***	*0.064*	*0.270*	*0.235*
GAS	0.66	0.84	0.63	0.91	0.48	0.80	-0.17	1.22
p-value	*0.000****	*0.001****	*0.000****	*0.008****	*0.040***	*0.021***	*0.584*	*0.039***
COMB	0.47	0.41	0.57	0.51	0.84	0.55	0.40	0.34
p-value	*0.005****	*0.205*	*0.003****	*0.231*	*0.028***	*0.058**	*0.327*	*0.660*
WATER	0.42	0.57	0.41	0.37	0.04	-0.33	1.36	0.54
p-value	*0.219*	*0.289*	*0.343*	*0.567*	*0.964*	*0.820*	*0.066***	*0.579*
OTHER	0.73	0.89	0.61	2.98	0.79	-0.45	-0.89	0.58
p-value	*0.040*	*0.271*	*0.109*	*0.007****	*0.256*	*0.427*	*0.188*	*0.539*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6 B: Jensen Alphas using CRSP EW

The α_p of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_p + \beta_p R_{mt} + \varepsilon_{pt}$ where α_p is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the CRSP EW over the Treasury bill rate, and β_p is the unconditional measure of risk. Column 2 presents the full period. Column 3 (4) presents the period before (after) deregulation. The period following deregulation from November 1978 to December 2001 has been divided into five different periods. These are presented in columns 5 to 9.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	0.33	0.21	0.41	0.09	1.05	0.40	0.15	0.41
p-value	*0.074**	*0.511*	*0.067**	*0.816*	*0.019***	*0.239*	*0.744*	*0.640*
SW	0.35	0.29	0.36	0.18	0.64	0.47	0.13	0.35
p-value	*0.019***	*0.346*	*0.031***	*0.610*	*0.032***	*0.128*	*0.668*	*0.560*
SE	0.40	0.08	0.56	0.38	1.17	0.29	0.23	0.67
p-value	*0.017***	*0.785*	*0.004****	*0.194*	*0.000****	*0.444*	*0.604*	*0.367*
NE	0.34	0.12	0.46	0.13	1.03	0.05	0.37	0.94
p-value	*0.016***	*0.667*	*0.004****	*0.719*	*0.001****	*0.828*	*0.218*	*0.098**
FOR	0.29	0.32	0.27	0.23	1.45	0.07	-0.43	-0.33
p-value	*0.282*	*0.302*	*0.449*	*0.840*	*0.024***	*0.875*	*0.427*	*0.641*
Panel B: SIC classification								
ELEC	0.29	0.00	0.46	0.07	1.02	0.41	0.10	0.82
p-value	*0.087**	*0.990*	*0.021***	*0.885*	*0.022***	*0.165*	*0.770*	*0.238*
GAS	0.50	0.40	0.56	0.11	0.71	0.76	0.26	1.13
p-value	*0.001****	*0.103*	*0.001****	*0.766*	*0.004****	*0.043***	*0.403*	*0.061**
COMB	0.39	0.00	0.60	0.21	1.03	0.57	0.71	0.41
p-value	*0.031***	*0.998*	*0.004****	*0.646*	*0.014*	*0.109*	*0.092**	*0.586*
WATER	0.35	0.18	0.45	-0.17	0.30	-0.33	1.85	0.58
p-value	*0.326*	*0.744*	*0.312*	*0.802*	*0.725*	*0.822*	*0.012***	*0.551*
OTHER	0.32	0.30	0.26	1.35	1.33	-0.91	-0.39	-0.24
p-value	*0.301*	*0.672*	*0.416*	*0.188*	*0.024*	*0.038***	*0.416*	*0.733*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6 C: Jensen Alphas using CRSP VW

The α_p of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_p + \beta_p R_{mt} + \varepsilon_{pt}$ where α_p is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the CRSP VW over the Treasury bill rate, and β_p is the unconditional measure of risk. Column 2 presents the full period. Column 3 (4) presents the period before (after) deregulation. The period following deregulation from November 1978 to December 2001 has been divided into five different periods. These are presented in columns 5 to 9.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	0.30	0.40	0.33	0.30	0.61	0.33	-0.20	0.38
p-value	*0.078**	*0.171*	*0.118*	*0.392*	*0.139*	*0.278*	*0.657*	*0.667*
SW	0.35	0.47	0.32	0.51	0.18	0.59	-0.37	0.60
p-value	*0.014***	*0.087**	*0.047***	*0.087**	*0.503*	*0.118*	*0.251*	*0.304*
SE	0.40	0.29	0.51	0.64	0.80	0.26	-0.17	0.64
p-value	*0.014***	*0.329*	*0.007****	*0.024***	*0.002****	*0.473*	*0.712*	*0.391*
NE	0.34	0.31	0.40	0.33	0.65	-0.03	0.02	1.00
p-value	*0.012***	*0.299*	*0.007****	*0.321*	*0.015***	*0.876*	*0.947*	*0.074**
FOR	0.31	0.54	0.21	0.90	0.98	-0.10	-1.23	-0.04
p-value	*0.250*	*0.136*	*0.537*	*0.450*	*0.146*	*0.808*	*0.019***	*0.956*
Panel B: SIC classification								
ELEC	0.27	0.17	0.38	0.16	0.72	0.36	-0.32	0.79
p-value	*0.096**	*0.590*	*0.040***	*0.702*	*0.078**	*0.182*	*0.311*	*0.250*
GAS	0.49	0.59	0.50	0.48	0.35	0.67	-0.20	1.18
p-value	*0.000****	*0.016***	*0.002****	*0.138*	*0.113*	*0.051**	*0.504*	*0.044*
COMB	0.35	0.17	0.50	0.31	0.74	0.41	0.43	0.31
p-value	*0.036***	*0.575*	*0.011*	*0.465*	*0.053**	*0.160*	*0.302*	*0.687*
WATER	0.29	0.33	0.32	0.06	-0.08	-0.39	1.36	0.47
p-value	*0.403*	*0.536*	*0.465*	*0.924*	*0.922*	*0.791*	*0.064**	*0.628*
OTHER	0.43	0.60	0.32	2.20	0.47	-0.74	-0.97	0.48
p-value	*0.206*	*0.444*	*0.385*	*0.040***	*0.472*	*0.179*	*0.128*	*0.595*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 7: M SQRD

The M^2 is calculated by comparing the returns of an adjusted portfolio to the market returns. The adjusted portfolio is formed to have the same standard deviation as the market. The S&P 500 is used as the benchmark in this analysis. The equation used for the calculation of M^2 is: $M^2 = R_p - R_m$ where R_p is the excess return on the adjusted portfolio and R_m is the excess market return.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic Classification								
NW	0.63	0.41	0.72	0.78	1.14	0.92	0.33	0.37
SW	0.75	0.49	0.86	1.03	0.78	1.08	0.56	0.69
SE	0.76	0.31	0.99	1.30	1.67	0.78	0.54	0.72
NE	0.76	0.33	0.99	0.83	1.42	0.61	0.85	1.48
FOR	0.66	0.55	0.69	1.17	1.30	0.40	0.17	-0.14
Panel B: SIC Classification								
ELEC	0.60	0.18	0.82	0.47	1.35	1.01	0.40	0.96
GAS	0.94	0.65	1.07	1.03	1.08	1.24	0.69	1.64
COMB	0.68	0.19	0.92	0.66	1.44	1.03	1.00	0.34
WATER	0.55	0.38	0.60	0.56	0.38	0.22	1.58	0.45
OTHER	0.80	0.62	0.86	1.81	1.05	0.10	0.30	0.35

Table 8 A: Fama and French Three-factor Model

This table presents the alphas obtained for the Fama and French (1993) three-factor model. Alphas are obtained for the following regression:

$$R_{pt} = \alpha_p + \beta_p (R_{mt}) + s_p SMB_t + h_p HML_t + \varepsilon_{pt}$$

where R_{pt} is the portfolio excess return, R_{mt} is the excess market return (the value-weighted return on all NYSE, AMEX, and NASDAQ stocks from CRSP minus the one-month Treasury bill rate), SMB (Small Minus Big) is the average return on three small portfolios minus the average return on three big portfolios, HML (High Minus Low) is the average return on two value portfolios minus the average return on two growth portfolios, and ε_{pt} is the error term. The intercept α_p is the measure of portfolio performance relative to the three-factors. β_p, s_p, and h_p indicate sensitivity to the market, size, and value factors, respectively.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	0.11	0.13	0.15	0.08	0.30	0.37	-0.33	0.53
p-value	*0.514*	*0.642*	*0.445*	*0.811*	*0.483*	*0.216*	*0.462*	*0.531*
SW	0.16	0.19	0.13	0.32	-0.21	0.54	-0.30	0.39
p-value	*0.221*	*0.468*	*0.383*	*0.310*	*0.368*	*0.125*	*0.302*	*0.484*
SE	0.17	-0.07	0.31	0.27	0.58	0.27	-0.20	0.47
p-value	*0.263*	*0.769*	*0.081**	*0.341*	*0.027***	*0.453*	*0.672*	*0.470*
NE	0.11	-0.17	0.22	-0.04	0.31	-0.06	0.00	0.87
p-value	*0.352*	*0.487*	*0.103*	*0.894*	*0.200*	*0.763*	*0.998*	*0.097**
FOR	0.18	0.29	0.11	0.77	1.47	-0.15	-1.23	-0.22
p-value	*0.509*	*0.377*	*0.75*	*0.547*	*0.028***	*0.708*	*0.024***	*0.738*
Panel B: SIC classification								
ELEC	0.03	-0.24	0.18	-0.21	0.22	0.27	-0.51	0.75
p-value	*0.846*	*0.413*	*0.282*	*0.604*	*0.569*	*0.292*	*0.104*	*0.252*
GAS	0.31	0.25	0.34	0.23	0.04	0.59	-0.17	1.20
p-value	*0.015***	*0.227*	*0.028***	*0.496*	*0.832*	*0.084**	*0.507*	*0.044***
COMB	0.09	-0.26	0.29	-0.02	0.16	0.35	0.20	0.37
p-value	*0.554*	*0.351*	*0.092**	*0.962*	*0.627*	*0.224*	*0.625*	*0.577*
WATER	0.16	0.07	0.24	-0.08	-0.43	-0.45	1.29	0.77
p-value	*0.635*	*0.903*	*0.577*	*0.912*	*0.610*	*0.765*	*0.094**	*0.430*
OTHER	0.29	0.05	0.21	2.36	1.14	-0.61	-0.58	-0.36
p-value	*0.376*	*0.947*	*0.555*	*0.025***	*0.073**	*0.183*	*0.329*	*0.592*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 8 B: Fama and French Three-factor Model using the S&P 500

This table presents the alphas obtained for the Fama and French (1993) three-factor model. Alphas are obtained for the following regression:

$$R_{pt} = \alpha_p + \beta_p(R_{mt}) + s_p SMB_t + h_p HML_t + \varepsilon_{pt}$$

where R_{pt} is the portfolio excess return, R_{mt} is the excess market return (the S&P 500 minus the one-month Treasury bill rate), SMB (Small Minus Big) is the average return on three small portfolios minus the average return on three big portfolios, HML (High Minus Low) is the average return on two value portfolios minus the average return on two growth portfolios, and ε_{pt} is the error term. The intercept α_p is the measure of portfolio performance relative to the three-factors. β_p, s_p, and h_p indicate sensitivity to the market, size, and value factors, respectively.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	0.30	0.37	0.33	0.41	0.58	0.53	-0.23	0.53
p-value	*0.067**	*0.204*	*0.097**	*0.237*	*0.179*	*0.079**	*0.618*	*0.531*
SW	0.37	0.43	0.33	0.66	0.09	0.69	-0.17	0.39
p-value	*0.006****	*0.125*	*0.031***	*0.043***	*0.697*	*0.048***	*0.544*	*0.495*
SE	0.36	0.17	0.47	0.51	0.82	0.45	-0.09	0.47
p-value	*0.018***	*0.544*	*0.007****	*0.083**	*0.003****	*0.211*	*0.846*	*0.467*
NE	0.29	0.04	0.38	0.23	0.57	0.12	0.11	0.88
p-value	*0.018***	*0.866*	*0.006****	*0.476*	*0.030***	*0.513*	*0.721*	*0.102*
FOR	0.39	0.47	0.31	1.18	1.66	0.05	-1.08	-0.20
p-value	*0.143*	*0.138*	*0.368*	*0.355*	*0.012***	*0.907*	*0.039***	*0.763*
Panel B: SIC classification								
ELEC	0.21	0.00	0.33	0.04	0.45	0.44	-0.40	0.75
p-value	*0.171*	*0.990*	*0.051**	*0.929*	*0.248*	*0.088**	*0.210*	*0.258*
GAS	0.50	0.48	0.52	0.59	0.27	0.74	-0.05	1.20
p-value	*0.000****	*0.029***	*0.001****	*0.097**	*0.116*	*0.030***	*0.858*	*0.048***
COMB	0.27	-0.03	0.45	0.24	0.40	0.52	0.30	0.37
p-value	*0.080**	*0.911*	*0.012***	*0.551*	*0.244*	*0.074**	*0.457*	*0.588*
WATER	0.34	0.29	0.38	0.21	-0.23	-0.36	1.40	0.79
p-value	*0.329*	*0.598*	*0.377*	*0.762*	*0.781*	*0.805*	*0.067***	*0.422*
OTHER	0.55	0.26	0.47	2.75	1.53	-0.42	-0.43	-0.33
p-value	*0.087**	*0.725*	*0.170*	*0.009****	*0.016***	*0.341*	*0.453*	*0.625*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 8 C: Fama and French Three-factor Model using CRSP EW

This table presents the alphas obtained for the Fama and French (1993) three-factor model. Alphas are obtained for the following regression:

$$R_{pt} = \alpha_p + \beta_p(R_{mt}) + s_p SMB_t + h_p HML_t + \varepsilon_{pt}$$

where R_{pt} is the portfolio excess return, R_{mt} is the excess market return (the CRSP EW portfolio minus the one-month Treasury bill rate), SMB (Small Minus Big) is the average return on three small portfolios minus the average return on three big portfolios, HML (High Minus Low) is the average return on two value portfolios minus the average return on two growth portfolios, and ε_{pt} is the error term. The intercept α_p is the measure of portfolio performance relative to the three-factors. β_p, s_p, and h_p indicate sensitivity to the market, size, and value factors, respectively.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	0.20	0.11	0.28	0.20	0.70	0.31	-0.15	0.47
p-value	*0.245*	*0.699*	*0.167*	*0.584*	*0.098**	*0.328*	*0.747*	*0.579*
SW	0.24	0.17	0.25	0.42	0.23	0.33	-0.06	0.28
p-value	*0.069**	*0.526*	*0.097**	*0.189*	*0.322*	*0.282*	*0.830*	*0.638*
SE	0.25	-0.10	0.43	0.35	0.92	0.15	-0.07	0.41
p-value	*0.100*	*0.732*	*0.018***	*0.237*	*0.001****	*0.686*	*0.870*	*0.539*
NE	0.20	-0.20	0.35	0.05	0.67	-0.13	0.18	0.82
p-value	*0.124*	*0.420*	*0.019***	*0.872*	*0.007****	*0.523*	*0.552*	*0.135*
FOR	0.25	0.26	0.22	0.80	1.79	-0.26	-0.90	-0.35
p-value	*0.339*	*0.407*	*0.521*	*0.512*	*0.008****	*0.524*	*0.099**	*0.628*
Panel B: SIC classification								
ELEC	0.12	-0.26	0.31	-0.11	0.54	0.17	-0.31	0.70
p-value	*0.454*	*0.366*	*0.086**	*0.789*	*0.157*	*0.516*	*0.335*	*0.299*
GAS	0.40	0.23	0.48	0.34	0.40	0.52	0.12	1.14
p-value	*0.003****	*0.274*	*0.004****	*0.324*	*0.053***	*0.139*	*0.698*	*0.065**
COMB	0.18	-0.28	0.42	0.08	0.47	0.30	0.38	0.32
p-value	*0.252*	*0.316*	*0.022***	*0.843*	*0.138*	*0.327*	*0.349*	*0.647*
WATER	0.26	0.04	0.38	0.02	0.04	-0.54	1.51	0.72
p-value	*0.461*	*0.935*	*0.391*	*0.973*	*0.965*	*0.723*	*0.049***	*0.468*
OTHER	0.34	0.02	0.29	2.41	1.66	-0.87	-0.46	-0.53
p-value	*1.091*	*0.983*	*0.369*	*0.017***	*0.005****	*0.032***	*0.371*	*0.427*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 9 A: Conditional Model using S&P 500

This table presents the α_p, which is the measure of the risk-adjusted performance using the conditional model $R_{pt} = \alpha_p + (\beta_{1pt} \times \delta \times R_{mt}) + (\beta_{2pt} \times (1-\delta) \times R_{mt}) + \varepsilon_t$, where δ = 1 if $(R_{mt}-R_{ft})$ > 0 (i.e. when the market excess returns are positive), and δ = 0 if $(R_{mt}-R_{ft}) < 0$ (i.e. when the market excess returns are negative). The R_{pt} is the portfolio excess return, R_{mt} is the excess return on the S&P 500, and ε_t is the error term.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	0.18	0.14	0.29	1.42	0.48	0.97	-1.75	-0.37
p-value	*0.509*	*0.768*	*0.366*	*0.009****	*0.438*	*0.039***	*0.013***	*0.818*
SW	0.69	0.16	0.96	1.44	0.90	0.89	0.03	1.43
p-value	*0.002****	*0.723*	*0.000****	*0.004****	*0.024***	*0.129*	*0.953*	*0.199*
SE	0.49	0.15	0.74	1.43	1.00	0.86	-0.35	0.38
p-value	*0.053**	*0.760*	*0.012***	*0.003****	*0.012***	*0.127*	*0.654*	*0.783*
NE	0.40	-0.01	0.64	0.83	0.93	0.64	-0.08	0.94
p-value	*0.066**	*0.983*	*0.006****	*0.124*	*0.021***	*0.029***	*0.883*	*0.365*
FOR	0.94	1.09	0.88	2.38	1.12	0.56	-0.26	1.05
p-value	*0.027***	*0.068**	*0.105*	*0.209*	*0.272*	*0.343*	*0.766*	*0.401*
Panel B: SIC classification								
ELEC	0.04	-0.16	0.23	0.06	0.49	1.13	-0.96	-0.06
p-value	*0.872*	*0.750*	*0.425*	*0.927*	*0.407*	*0.006****	*0.065**	*0.964*
GAS	0.92	0.47	1.18	2.24	0.97	1.25	0.14	1.38
p-value	*0.000****	*0.246*	*0.000****	*0.000****	*0.004****	*0.016***	*0.786*	*0.204*
COMB	0.21	-0.04	0.42	0.36	0.83	1.13	-0.06	-1.20
p-value	*0.410*	*0.940*	*0.157*	*0.603*	*0.134*	*0.009****	*0.930*	*0.395*
WATER	0.55	-1.23	1.35	1.39	0.92	1.95	1.97	-0.68
p-value	*0.300*	*0.126*	*0.043***	*0.174*	*0.425*	*0.368*	*0.107*	*0.705*
OTHER	0.51	-0.83	0.97	2.89	0.54	-0.53	0.00	3.96
p-value	*0.359*	*0.506*	*0.101*	*0.098**	*0.598*	*0.541*	*0.996*	*0.019***

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 9 B: Conditional Model using CRSP EW

This table presents the α_p, which is the measure of the risk-adjusted performance using the conditional model $R_{pt} = \alpha_p + (\beta_{1pt} \times \delta \times R_{mt}) + (\beta_{2pt} \times (1-\delta) \times R_{mt}) + \varepsilon_t$, where δ = 1 if $(R_{mt}-R_{ft})$ > 0 (i.e. when the market excess returns are positive), and δ = 0 if $(R_{mt}-R_{ft}) < 0$ (i.e. when the market excess returns are negative). The R_{pt} is the portfolio excess return, R_{mt} is the excess return on the CRSP EW portfolio, and ε_t is the error term.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	0.59	0.11	0.95	0.93	0.49	0.98	-1.12	2.94
p-value	*0.033***	*0.816*	*0.005****	*0.180*	*0.415*	*0.055**	*0.124*	*0.042***
SW	0.85	0.53	1.01	0.48	1.20	0.15	0.18	2.04
p-value	*0.000****	*0.253*	*0.000****	*0.424*	*0.004****	*0.753*	*0.709*	*0.039***
SE	0.67	0.18	1.01	0.89	1.23	0.94	-0.78	1.52
p-value	*0.007****	*0.702*	*0.001****	*0.075**	*0.004****	*0.094**	*0.289*	*0.230*
NE	0.57	-0.16	1.03	0.52	1.15	0.69	0.00	2.38
p-value	*0.007****	*0.703*	*0.000****	*0.404*	*0.006****	*0.059**	*1.000*	*0.012***
FOR	0.91	0.64	1.07	-0.73	1.62	1.02	1.01	0.85
p-value	*0.021***	*0.159*	*0.045***	*0.717*	*0.071**	*0.142*	*0.251*	*0.473*
Panel B: SIC classification								
ELEC	0.48	-0.07	0.88	0.25	0.90	0.78	-0.33	2.46
p-value	*0.061**	*0.892*	*0.003****	*0.751*	*0.144*	*0.081**	*0.570*	*0.035***
GAS	1.06	0.42	1.51	0.96	1.25	1.43	0.67	2.89
p-value	*0.000****	*0.245*	*0.000****	*0.116*	*0.000****	*0.010***	*0.195*	*0.004****
COMB	0.65	-0.04	1.17	0.49	1.05	1.35	0.17	1.91
p-value	*0.015***	*0.939*	*0.000****	*0.538*	*0.069**	*0.010***	*0.803*	*0.137*
WATER	0.96	-0.84	2.05	1.71	2.64	-0.02	2.31	2.19
p-value	*0.067**	*0.302*	*0.002****	*0.138*	*0.021***	*0.992*	*0.059**	*0.184*
OTHER	-0.15	-1.04	0.04	0.03	0.27	-1.04	-1.15	0.53
p-value	*0.742*	*0.318*	*0.936*	*0.986*	*0.731*	*0.114*	*0.151*	*0.658*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 9 C: Conditional Model using CRSP VW

This table presents the α_p, which is the measure of the risk-adjusted performance using the conditional model $R_{pt} = \alpha_p + (\beta_{1pt} \times \delta \times R_{mt}) + (\beta_{2pt} \times (1-\delta) \times R_{mt}) + \varepsilon_t$, where δ = 1 if $(R_{mt}\text{-}R_{ft})$ > 0 (i.e. when the market excess returns are positive), and δ = 0 if $(R_{mt}\text{-}R_{ft})$ < 0 (i.e. when the market excess returns are negative). The R_{pt} is the portfolio excess return, R_{mt} is the excess return on the CRSP VW portfolio, and ε_t is the error term.

Portfolio	Jan-70 Dec-01	Jan-70 Oct-78	Nov-78 Dec-01	Nov-78 Dec-83	Jan-84 Dec-88	Jan-89 Dec-93	Jan-94 Dec-98	Jan-99 Dec-01
Panel A: Geographic classification								
NW	-0.10	-0.13	0.05	0.64	0.20	0.70	-1.81	0.95
p-value	*0.698*	*0.769*	*0.868*	*0.276*	*0.730*	*0.126*	*0.010***	*0.611*
SW	0.40	-0.01	0.68	0.79	0.75	0.78	-0.01	0.89
p-value	*0.067**	*0.972*	*0.008****	*0.113*	*0.049*	*0.177*	*0.983*	*0.466*
SE	0.21	-0.13	0.51	1.10	0.84	0.74	-0.60	0.23
p-value	*0.416*	*0.77*	*0.087*	*0.020*	*0.025***	*0.181*	*0.442*	*0.883*
NE	0.11	-0.31	0.40	0.28	0.77	0.42	-0.17	1.09
p-value	*0.618*	*0.480*	*0.093**	*0.612*	*0.045***	*0.129*	*0.741*	*0.352*
FOR	0.66	0.392	0.75	1.90	1.07	0.49	-0.16	1.07
p-value	*0.120*	*0.480*	*0.176*	*0.344*	*0.273*	*0.419*	*0.844*	*0.450*
Panel B: SIC classification								
ELEC	-0.18	-0.40	0.07	-0.48	0.41	1.08	-0.96	-0.01
p-value	*0.469*	*0.384*	*0.821*	*0.505*	*0.480*	*0.007****	*0.069**	*0.993*
GAS	0.63	0.16	0.96	1.68	0.85	1.08	0.07	1.35
p-value	*0.003****	*0.671*	*0.000****	*0.001*	*0.007****	*0.039***	*0.882*	*0.269*
COMB	-0.35	-0.29	0.23	-0.24	0.69	0.96	-0.09	-1.40
p-value	*0.893*	*0.535*	*0.469*	*0.737*	*0.210*	*0.028***	*0.899*	*0.381*
WATER	0.25	-1.64	1.19	1.27	0.85	1.62	1.69	-0.83
p-value	*0.646*	*0.037***	*0.084**	*0.244*	*0.459*	*0.467*	*0.164*	*0.687*
OTHER	-0.09	-1.37	0.41	1.93	0.03	-0.83	-0.29	4.35
p-value	*0.861*	*0.246*	*0.487*	*0.282*	*0.976*	*0.328*	*0.781*	*0.018***

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 10: Sharpe ratio significance tests by geographic classification

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for various pairings of portfolios. The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

Panel A: full period

	NW	SW	SE	NE	FOR
NW	0.00	-1.36	-1.45	-1.47	1.37
SW	1.36	0.00	-0.09	-0.10	2.72***
SE	1.45	0.09	0.00	-0.02	2.80***
NE	1.47	0.10	0.02	0.00	2.82***
FOR	-1.37	-2.72***	-2.80***	-2.82***	0.00

Panel B: Jan 1970 to Oct 1978 (before deregulation)

	NW	SW	SE	NE	FOR
NW	0.00	-0.97	1.26	0.76	-1.05
SW	0.97	0.00	2.23**	1.74	-0.09
SE	-1.26	-2.23*	0.00	-0.49	-2.30**
NE	-0.76	-1.74	0.49	0.00	-1.81*
FOR	1.05	0.09	2.30**	1.81*	0.00

Panel C: Nov 1978 to Dec 2001 (after deregulation)

	NW	SW	SE	NE	FOR
NW	0.00	-1.55	-3.03***	-3.01***	2.47***
SW	1.55	0.00	-1.50	-1.47	3.99***
SE	3.03***	1.50	0.00	0.04	5.41***
NE	3.01***	1.47	-0.04	0.00	5.38***
FOR	-2.47***	-3.99***	-5.41***	-5.38***	0.00

Panel D: Nov 1978 to Dec 1983 (first period after deregulation)

	NW	SW	SE	NE	Foreign
NW	0.00	-3.00***	-5.87***	-0.54	0.90
SW	3.00***	0.00	-2.91***	2.47***	3.84***
SE	5.87***	2.91***	0.00	5.37***	6.59***
NE	0.54	-2.47***	-5.37***	0.00	1.44
FOR	-0.90	-3.84***	-6.59***	-1.44	0.00

Panel E: Jan 1984 to Dec 1988 (second period after deregulation)					
	NW	**SW**	**SE**	**NE**	**FOR**
NW	0.00	3.62***	-4.83***	-2.52***	-0.61
SW	-3.62***	0.00	-8.31***	-6.08***	-4.20***
SE	4.83***	8.31***	0.00	2.37***	4.20***
NE	2.52***	6.08***	-2.37***	0.00	1.88*
FOR	0.61	4.20***	-4.20***	-1.88*	0.00

Panel F: Jan 1989 to Dec 1993 (third period after deregulation)					
	NW	**SW**	**SE**	**NE**	**FOR**
NW	0.00	-2.12**	1.92*	4.36***	7.11***
SW	2.12**	0.00	4.01***	6.40***	9.07***
SE	-1.92*	-4.01***	0.00	2.42***	5.29***
NE	-4.36***	-6.40***	-2.42***	0.00	3.00***
FOR	-7.11***	-9.07***	-5.29***	-3.00***	0.00

Panel G: Jan 1994 to Dec 1998 (fourth period after deregulation)					
	NW	**SW**	**SE**	**NE**	**FOR**
NW	0.00	-2.96***	-2.52***	-6.46***	3.47***
SW	2.96***	0.00	0.43	-3.57***	6.32***
SE	2.52***	-0.43	0.00	-3.97***	5.88***
NE	6.46***	3.57***	3.97***	0.00	9.54***
FOR	-3.47***	-6.32***	-5.88***	-9.54***	0.00

Panel H: Jan 1999 to Dec 2001 (firth period after deregulation)					
	NW	**SW**	**SE**	**NE**	**FOR**
NW	0.00	-3.80***	-4.19***	-11.84***	5.53***
SW	3.80***	0.00	-0.42	-8.64***	9.20***
SE	4.19***	0.42	0.00	-8.21***	9.48***
NE	11.84***	8.64***	8.21***	0.00	16.09***
FOR	-5.53***	-9.20***	-9.48***	-16.09***	0.00

A positive *t* value indicates that the portfolio outperformed the comparison portfolio, a negative value indicates that the portfolio underperformed the comparison portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 11: Sharpe ratio significance tests by SIC classification

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for various pairings of portfolios for the different periods. The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$

where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

Panel A: full period

	ELEC	GAS	COMB	WATER	OTHER
ELEC	0.00	-3.79***	-0.87	2.74***	0.42
GAS	3.79***	0.00	2.94***	6.43***	4.18***
COMB	0.87	-2.94***	0.00	3.58***	1.27
WATER	-2.74***	-6.43***	-3.58***	0.00	-2.32***
OTHER	-0.42	-4.18***	-1.27	2.32***	0.00

Panel B: Jan 1970 to Oct 1978 (before deregulation)

	ELEC	GAS	COMB	WATER	OTHER
ELEC	0.00	-4.97***	-0.08	-0.80	-2.02**
GAS	4.97***	0.00	4.89***	4.18***	2.96***
COMB	0.08	-4.89***	0.00	-0.72	-1.94*
WATER	0.80	-4.18***	0.72	0.00	-1.22
OTHER	2.02**	-2.96***	1.94*	1.22	0.00

Panel C: Nov 1978 to Dec 2001 (after deregulation)

	ELEC	GAS	COMB	WATER	OTHER
ELEC	0.00	-2.91***	-1.17	4.84***	2.01**
GAS	2.91***	0.00	1.77*	7.59***	4.88***
COMB	1.17	-1.77*	0.00	5.92***	3.14***
WATER	-4.84***	-7.59***	-5.92***	0.00	-2.85***
OTHER	-2.01**	-4.88***	-3.14***	2.85***	0.00

Panel D: Nov 1978 to Dec 1983 (first period after deregulation)

	ELEC	GAS	COMB	WATER	OTHER
ELEC	0.00	-5.91	-2.27**	1.36	-10.54***
GAS	5.91***	0.00	3.75***	7.17***	-5.12***
COMB	2.27**	-3.75***	0.00	3.56***	-8.59***
WATER	-1.36	-7.17***	-3.56***	0.00	-11.64***
OTHER	10.54***	5.12***	8.59***	11.64***	0.00

Panel E: Jan 1984 to Dec 1988 (second period after deregulation)

	ELEC	GAS	COMB	WATER	OTHER
ELEC	0.00	2.66***	-0.85	10.18***	4.81***
GAS	-2.66***	0.00	-3.50***	7.88***	2.25**
COMB	0.85	3.50***	0.00	10.89***	5.62***
WATER	-10.18***	-7.88***	-10.89***	0.00	-5.70***
OTHER	-4.81***	-2.25**	-5.62***	5.70***	0.00

Panel F: Jan 1989 to Dec 1993 (third period after deregulation)

	ELEC	GAS	COMB	WATER	OTHER
ELEC	0.00	-3.04***	-0.32	13.25***	13.01***
GAS	3.04***	0.00	2.73***	15.46***	15.36***
COMB	0.32	-2.73***	0.00	13.48***	13.20***
WATER	-13.25***	-15.46***	-13.48***	0.00	-0.64
OTHER	-13.01***	-15.36***	-13.20***	0.64	0.00

Panel G: Jan 1994 to Dec 1998 (fourth period after deregulation)

	ELEC	GAS	COMB	WATER	OTHER
ELEC	0.00	-3.69***	-7.53***	-12.72***	2.99***
GAS	3.69***	0.00	-3.86***	-9.74***	6.60***
COMB	7.53***	3.86***	0.00	-6.21***	9.99***
WATER	12.72***	9.74***	6.21***	0.00	14.90***
OTHER	-2.99***	-6.60***	-9.99***	-14.90***	0.00

Panel H: Jan 1999 to Dec 2001 (fifth period after deregulation)

	ELEC	GAS	COMB	WATER	OTHER
ELEC	0.00	-7.28***	7.08***	6.43***	7.82***
GAS	7.28***	0.00	13.40***	12.94***	14.17***
COMB	-7.08***	-13.40***	0.00	-0.55	0.89
WATER	-6.43***	-12.94***	0.55	0.00	1.44
OTHER	-7.82***	-14.17***	-0.89	-1.44	0.00

A positive *t* value indicates that the portfolio outperformed the comparison portfolio, a negative value indicates that the portfolio underperformed the comparison portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 12: Average monthly excess returns

This table reports the excess returns (average monthly returns minus the monthly returns of the 3 month Tbill) of each portfolio according to the SIC and geographic classifications. Column 2 reports the average monthly excess returns for the full period. Column 3 (4) reports the average monthly excess returns for the period before (after) deregulation. Columns 5 to 9 report the average monthly excess returns for each five year interval after deregulation.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	0.52	0.73	0.33	-0.21	0.72	0.52
p-value	*0.083**	*0.160*	*0.312*	*0.760*	*0.171*	*0.280*
CENTRAL	0.27	0.34	0.22	0.43	0.49	-0.21
p-value	*0.349*	*0.323*	*0.640*	*0.469*	*0.473*	*0.836*
EAST	0.72	0.68	0.76	0.42	0.63	1.18
p-value	*0.004****	*0.082**	*0.016***	*0.326*	*0.185*	*0.077*
Panel B: SIC classification						
ELEC	0.59	0.68	0.50	0.39	0.36	0.73
p-value	*0.026***	*0.143*	*0.070**	*0.489*	*0.266*	*0.138*
GAS	0.55	0.54	0.56	0.08	0.61	0.97
p-value	*0.048***	*0.230*	*0.101*	*0.896*	*0.233*	*0.107*
OTHER	0.19	0.39	0.00	-0.44	0.91	-0.33
p-value	*0.603*	*0.450*	*0.997*	*0.606*	*0.308*	*0.699*
Panel C: Benchmarks						
TSE 300	0.31	0.32	0.30	-0.10	0.38	0.62
p-value	*0.219*	*0.415*	*0.354*	*0.865*	*0.336*	*0.350*
CFMRC EW	0.96	0.89	1.01	-0.24	1.87	1.51
p-value	*0.004****	*0.065**	*0.025***	*0.712*	*0.004****	*0.114*
CFMRC VW	0.35	0.36	0.33	-0.13	0.40	0.70
p-value	*0.178*	*0.365*	*0.316*	*0.820*	*0.298*	*0.292*

The *p-value* measures the null hypothesis that mean excess returns equal zero. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 13: Sharpe ratio

The Sharpe ratios are presented in this table. The Sharpe ratio is calculated using the following equation: $SR_p = \bar{R}_p - \bar{R}_f / \sigma_p$, where $\bar{R}_p$ is the mean return on each portfolio, $\bar{R}_f$ is the average risk free rate; and σ_p is the standard deviation of the returns on the portfolio.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	0.32	0.38	0.25	-0.13	0.65	0.46
CENTRAL	0.17	0.26	0.12	0.31	0.33	-0.08
EAST	0.54	0.46	0.62	0.42	0.62	0.78
Panel B: SIC classification						
ELEC	0.41	0.39	0.46	0.30	0.51	0.64
GAS	0.36	0.32	0.42	0.05	0.56	0.70
OTHER	0.09	0.20	0.00	-0.21	0.48	-0.16
Panel C: Benchmarks						
TSE 300	0.22	0.21	0.23	-0.07	0.44	0.40
CFMRC EW	0.54	0.50	0.58	-0.15	1.48	0.71
CFMRC VW	0.24	0.24	0.25	-0.09	0.48	0.45

Table 14 A: Sharpe ratio significance tests for full period from January 1970 to December 2001

This table presents the Jobson and Korkie (1981) significance test of the Sharpe ratios for the full period from January 1970 to December 2001 for all portfolios against the benchmarks. Column 2 presents the average monthly returns of the portfolios. Column 3 reports the monthly standard deviations. Column 4 reports the Sharpe ratios. Columns 5, 6, and 7 report the Jobson and Korkie *t* tests of significance against the TSE 300 500, the CFMRC equal-weighted portfolio, and the CFMRC value-weighted portfolio, respectively. The *t* statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows: $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, and s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**TSE 300**	**CFMRC EW**	**CFMRC VW**
Panel A: Geographic classification						
WEST	0.52	5.85	0.32	1.35	-3.16***	1.04
CENTRAL	0.27	5.73	0.17	-0.75	-5.19***	-1.05
EAST	0.72	4.82	0.54	4.41***	-0.06	4.10***
Panel B: SIC classification						
ELEC	0.59	5.17	0.41	2.63***	-1.884*	2.32**
GAS	0.55	5.40	0.36	1.98**	-2.52***	1.67*
OTHER	0.19	7.01	0.09	-1.82*	-6.21***	-2.12**

A positive value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 14 B: Sharpe ratio significance tests for the period before deregulation from January 1970 to March 1985

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from January 1970 to March 1985 for all portfolios against the benchmarks. Column 2 presents the average monthly returns of the portfolios. Column 3 reports the monthly standard deviation. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie t tests of significance against the TSE 300, the CFMRC equal-weighted portfolio, and the CFMRC value-weighted portfolio, respectively.

The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows: $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, and s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**TSE 300**	**CFMRC EW**	**CFMRC VW**
Panel A: Geographic classification						
WEST	0.73	6.96	0.38	2.30**	-1.72*	1.95*
CENTRAL	0.34	4.58	0.26	0.65	-3.38***	0.30
EAST	0.68	5.27	0.46	3.52***	-0.48	3.18***
Panel B: SIC classification						
ELEC	0.68	6.28	0.39	2.50***	-1.510	2.16**
GAS	0.54	6.03	0.32	1.48	-2.53***	1.14
OTHER	0.39	6.95	0.20	-0.21	-4.20***	-0.55

A positive value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 14 C: Sharpe Ratio significance test: after deregulation From April 1985 to December 2001

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from April 1985 to December 2001 for all portfolios against the benchmarks. Column 2 presents the average monthly returns of the portfolios. Column 3 shows the monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie *t* tests of significance against the TSE 300, the CFMRC equal-weighted portfolio, and the CFMRC value-weighted portfolio, respectively.

The *t* statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows: $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, and s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**TSE 300**	**CFMRC EW**	**CFMRC VW**
Panel A: Geographic classification						
WEST	0.33	4.62	0.89	-0.19	-4.89***	-0.55
CENTRAL	0.22	6.62	0.78	-3.21***	-7.68***	-3.56***
EAST	0.76	4.39	1.32	4.25***	-0.42	3.90***
Panel B: SIC classification						
ELEC	0.50	3.91	1.06	2.78***	-1.96**	2.42***
GAS	0.56	4.78	1.12	1.44	-3.26***	1.09
OTHER	0.00	7.08	0.56	-3.93***	-8.37***	-4.28***

A positive value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 14 D: Sharpe ratio significance tests for the first period after deregulation from April 1985 to December 1990

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from April 1985 to December 1990 for all portfolios against the benchmarks. Column 2 presents the average monthly returns of the portfolios. Column 3 reports the monthly standard deviations. Column 4 reports the Sharpe ratios. Columns 5, 6, and 7 report the Jobson and Korkie t tests of significance against the TSE 300, the CFMRC equal-weighted portfolio, and the CFMRC value-weighted portfolio, respectively. The t statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows: $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**TSE 300**	**CFMRC EW**	**CFMRC VW**
Panel A: Geographic classification						
WEST	-0.21	5.58	-0.13	-0.80	0.37	-0.45
CENTRAL	0.43	4.96	0.31	5.39***	6.54***	5.72***
EAST	0.42	3.54	0.42	6.95***	8.01***	7.27***
Panel B: SIC classification						
ELEC	0.39	4.66	0.30	5.22***	6.36***	5.55***
GAS	0.08	5.21	0.05	1.81*	2.98***	2.15**
OTHER	-0.44	7.04	-0.21	-1.99**	-0.83	-1.65

A positive value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 14 E: Sharpe ratio significance tests for the second period after deregulation from January 1991 to December 1995

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from January 1991 to December 1995 for all portfolios against the benchmarks. Column 2 presents the average monthly returns of the portfolios. Column 3 reports the monthly standard deviations. Column 4 reports the Sharpe ratio. Columns 5, 6, and 7 report the Jobson and Korkie *t* tests of significance against the TSE 300, the CFMRC equal-weighted portfolio, and the CFMRC value-weighted portfolio, respectively.

The *t* statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows: $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, and s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**TSE 300**	**CFMRC EW**	**CFMRC VW**
Panel A: Geographic classification						
WEST	0.72	4.00	0.65	2.93***	-10.26***	2.40
CENTRAL	0.49	5.25	0.33	-1.58	-13.63***	-2.10**
EAST	0.63	3.64	0.62	2.54***	-10.35***	2.01**
Panel B: SIC classification						
ELEC	0.36	2.49	0.51	1.05	-12.01***	0.49
GAS	0.61	3.89	0.56	1.65*	-11.22 ***	1.12
OTHER	0.91	6.88	0.48	0.57	-11.91***	0.05

A positive value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 14 F: Sharpe ratio significance tests for the third period after deregulation from January 1996 to December 2001

This table presents the Jobson and Korkie (1981) significance tests of the Sharpe ratios for the period from January 1996 to December 2001 for all portfolios against the benchmarks. Column 2 presents the average monthly return of the portfolios. Column 3 reports the monthly standard deviations. Column 4 reports the Sharpe ratios. Columns 5, 6, and 7 report the Jobson and Korkie *t* tests of significance against the TSE 300, the CFMRC equal-weighted portfolio, and the CFMRC value-weighted portfolio, respectively. The *t* statistic is computed as follows: $t_{Spn} = \frac{\hat{S}_{pn}}{\sqrt{\theta}}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows: $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, and s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

				Benchmarks		
Portfolios	**Mean**	**SD**	**Sharpe**	**TSE 300**	**CFMRC EW**	**CFMRC VW**
Panel A: Geographic classification						
WEST	0.52	4.08	0.46	0.85	-3.46***	0.10
CENTRAL	-0.21	8.75	-0.08	-6.63***	-10.46***	-7.31***
EAST	1.18	5.57	0.78	5.18***	0.96	4.46***
Panel B: SIC classification						
ELEC	0.73	4.12	0.64	3.31***	-0.98	2.58***
GAS	0.97	5.04	0.70	4.16***	-0.10	3.44***
OTHER	-0.33	7.31	-0.16	-7.61***	-11.37***	-8.28***

A positive value indicates that the portfolio outperformed the benchmark portfolio, a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 15 A: Jensen Alpha
Using the TSE 300

The α_p of the different portfolios for the different periods are presented in this table. The equation for the OLS regression used to obtain the alpha is $R_{pt} = \alpha_p + \beta_p R_{mt} + \varepsilon_{pt}$. The TSE 300 is used as the benchmark. Column 2 presents the full period. Column 3 (4) presents the period before (after) deregulation. The period following deregulation from April 1978 to December 2001 has been divided into three different periods. The alphas for these three periods are presented in columns 5 to 7.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	0.25	0.37	0.15	-0.13	0.36	0.32
p-value	*0.221*	*0.176*	*0.5651*	*0.796*	*0.333*	*0.465*
CENTRAL	0.07	0.11	0.03	0.47	0.24	-0.58
p-value	*0.772*	*0.576*	*0.9313*	*0.348*	*0.712*	*0.553*
EAST	0.53	0.45	0.61	0.47	0.36	0.93
p-value	*0.006****	*0.095**	*0.0242***	*0.155*	*0.353*	*0.131*
Panel B: SIC classification						
ELEC	0.36	0.39	0.35	0.46	0.15	0.53
p-value	*0.058**	*0.188*	*0.1186*	*0.269*	*0.538*	*0.237*
GAS	0.32	0.23	0.41	0.15	0.30	0.83
p-value	*0.120*	*0.332*	*0.172*	*0.755*	*0.451*	*0.159*
OTHER	-0.04	0.16	-0.23	-0.36	0.44	-0.70
p-value	*0.892*	*0.711*	*0.6030*	*0.617*	*0.564*	*0.370*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 15 B: Jensen Alpha using the CFMRC EW

The α_p of the different portfolios for the different periods are presented in this table. The equation for the OLS regression used to obtain the alpha is $R_{pt} = \alpha_p + \beta_p R_{mt} + \varepsilon_{pt}$. The CFMRC EW is used as the benchmark. Column 2 presents the full period. Column 3 (4) presents the period before (after) deregulation. The period following deregulation from April 1978 to December 2001 has been divided into three different periods. The alphas for these three periods are presented in columns 5 to 7.

Portfolio	**Jan-70 Dec-01**	**Jan-70 Mar-85**	**Apr-85 Dec-01**	**Apr-85 Dec-90**	**Jan-91 Dec-95**	**Jan-96 Dec-01**
Panel A: Geographic classification						
WEST	-0.13	-0.11	-0.11	-0.02	-0.46	0.16
p-value	*0.507*	*0.654*	*0.663*	*0.963*	*0.206*	*0.711*
CENTRAL	-0.23	-0.17	-0.29	0.57	-0.33	-1.01
p-value	*0.323*	*0.409*	*0.484*	*0.241*	*0.627*	*0.281*
EAST	0.36	0.23	0.49	0.50	0.22	0.80
p-value	*0.098**	*0.462*	*0.093**	*0.193*	*0.648*	*0.207*
Panel B: SIC classification						
ELEC	0.06	-0.01	0.16	0.54	-0.26	0.40
p-value	*0.746*	*0.966*	*0.485*	*0.167*	*0.339*	*0.378*
GAS	0.02	-0.17	0.22	0.24	-0.33	0.76
p-value	*0.925*	*0.488*	*0.469*	*0.618*	*0.439*	*0.205*
OTHER	-0.40	-0.14	-0.64	-0.25	-0.66	-1.11
p-value	*0.187*	*0.750*	*0.129*	*0.715*	*0.396*	*0.134*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 15 C: Jensen Alpha using the CFMRC VW

The α_p of the different portfolios for the different periods are presented in this table. The equation for the OLS regression used to obtain the alpha is $R_{pt} = \alpha_p + \beta_p R_{mt} + \varepsilon_{pt}$. The CFMRC VW is used as the benchmark. Column 2 presents the full period. Column 3 (4) presents the period before (after) deregulation. The period following deregulation from April 1978 to December 2001 has been divided into three different periods. The alphas for these three periods are presented in columns 5 to 7.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	0.21	0.32	0.14	-0.10	0.32	0.31
p-value	*0.274*	*0.207*	*0.599*	*0.839*	*0.375*	*0.484*
CENTRAL	0.05	0.09	0.01	0.51	0.15	-0.64
p-value	*0.847*	*0.665*	*0.976*	*0.300*	*0.810*	*0.512*
EAST	0.51	0.43	0.60	0.49	0.32	0.89
p-value	*0.008****	*0.118*	*0.027***	*0.142*	*0.390*	*0.146*
Panel B: SIC classification						
ELEC	0.34	0.36	0.35	0.48	0.13	0.51
p-value	*0.074*	*0.230*	*0.132*	*0.237*	*0.590*	*0.257*
GAS	0.29	0.18	0.41	0.18	0.26	0.85
p-value	*0.148*	*0.394*	*0.183*	*0.710*	*0.503*	*0.155*
OTHER	-0.06	0.14	-0.25	-0.33	0.35	-0.76
p-value	*0.834*	*0.748*	*0.556*	*0.642*	*0.627*	*0.326*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 16: M SQRD

The M^2 is calculated by comparing returns of an adjusted portfolio to those of the market. The adjusted portfolio is formed to have the same standard deviation as the market. The TSE 300 is used as the benchmark in this analysis. The equation used for the calculation of M^2 is: $M^2 = R_p - R_m$, where R_p is the mean return on the adjusted portfolio, and R_m is the mean market return.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	0.54	0.72	0.33	-0.04	0.67	0.71
CENTRAL	0.33	0.39	0.22	0.46	0.51	-0.01
EAST	0.73	0.68	0.79	0.56	0.61	1.18
Panel B: SIC classification						
ELEC	0.59	0.69	0.59	0.39	0.44	0.98
GAS	0.55	0.56	0.54	0.16	0.59	1.07
OTHER	0.32	0.47	0.08	-0.02	0.70	-0.17

Table 17 A: Modified Fama and French three-factor model using the TSE 300

This table presents the alphas obtained using the Fama and French (1993) three-factor model. Alphas are obtained from the following regression: $R_{pt} = \alpha_p + \beta_p(R_{mt}) + s_p G_t + h_p V_t + \varepsilon_{pt}$, where R_{pt} is the portfolio excess return, R_{mt} is the excess market return (the TSE 300 minus the three-month Treasury bill rate), V (Datastream Value index), G (Datastream Growth index), and ε_{pt} is the error term. The intercept α_p is the measure of portfolio performance relative to the three-factors. β_p, s_p, and h_p indicate sensitivity to the market, size, and value factors, respectively.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	0.60	1.12	0.32	-0.37	0.75	0.23
p-value	*0.006****	*0.000****	*0.210*	*0.573*	*0.033***	*0.489*
CENTRAL	0.12	0.23	0.03	0.65	0.12	-0.61
p-value	*0.673*	*0.309*	*0.947*	*0.350*	*0.852*	*0.551*
EAST	0.42	0.39	0.36	0.28	0.02	0.65
p-value	*0.054***	*0.261*	*0.202*	*0.536*	*0.951*	*0.289*
Panel B: SIC classification						
ELEC	0.61	0.78	0.53	1.01	0.31	0.48
p-value	*0.002****	*0.031***	*0.016***	*0.075**	*0.191*	*0.189*
GAS	0.50	0.75	0.38	-0.53	0.69	0.46
p-value	*0.024***	*0.005****	*0.182*	*0.413*	*0.077**	*0.296*
OTHER	0.02	0.23	-0.10	-0.12	0.41	-0.59
p-value	*0.949*	*0.709*	*0.832*	*0.902*	*0.611*	*0.464*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 17 B: Modified Fama and French three-factor model using the CFMRC EW

This table presents the alphas obtained using the Fama and French (1993) three-factor model. Alphas are obtained from the following regression: $R_{pt} = \alpha_p + \beta_p(R_{mt}) + s_p G_t + h_p V_t + \varepsilon_{pt}$, where R_{pt} is the portfolio excess return, R_{mt} is the excess market return (the CFMRC EW minus the three-month Treasury bill rate), V (Datastream Value index), G (Datastream Growth index), and ε_{pt} is the error term. The intercept α_p is the measure of portfolio performance relative to the three-factors. β_p, s_p, and h_p indicate sensitivity to the market, size, and value factors, respectively.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	-0.11	0.16	-0.25	-0.22	-0.45	-0.08
p-value	*0.579*	*0.579*	*0.289*	*0.641*	*0.195*	*0.822*
CENTRAL	-0.31	-0.26	-0.33	0.47	-0.27	-1.05
p-value	*0.256*	*0.259*	*0.423*	*0.350*	*0.681*	*0.270*
EAST	0.27	0.12	0.36	0.08	0.33	0.60
p-value	*0.201*	*0.727*	*0.171*	*0.824*	*0.395*	*0.316*
Panel B: SIC classification						
ELEC	0.02	-0.01	0.04	0.43	-0.23	0.18
p-value	*0.918*	*0.975*	*0.842*	*0.288*	*0.372*	*0.639*
GAS	0.01	0.03	0.05	-0.01	-0.31	0.41
p-value	*0.944*	*0.919*	*0.851*	*0.991*	*0.461*	*0.345*
OTHER	-0.56	-0.36	-0.70	-0.38	-0.62	-1.14
p-value	*0.100*	*0.540*	*0.096**	*0.604*	*0.413*	*0.128*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 17 C: Modified Fama and French three-factor model using the CFMRC VW

This table presents the alphas obtained using the Fama and French (1993) three-factor model. Alphas are obtained from the following regression: $R_{pt} = \alpha_p + \beta_p(R_{mt}) + s_p G_t + h_p V_t + \varepsilon_{pt}$, where R_{pt} is the portfolio excess return, R_{mt} is the excess market return (the CFMRC VW minus the three-month Treasury bill rate), V (Datastream Value index), G (Datastream Growth index), and ε_{pt} is the error term. The intercept α_p is the measure of portfolio performance relative to the three-factors. β_p, s_p, and h_p indicate sensitivity to the market, size, and value factors, respectively.

Portfolio	**Jan-70 Dec-01**	**Jan-70 Mar-85**	**Apr-85 Dec-01**	**Apr-85 Dec-90**	**Jan-91 Dec-95**	**Jan-96 Dec-01**
Panel A: Geographic classification						
WEST	0.44	0.86	0.11	0.03	0.67	0.04
p-value	*0.029***	*0.003****	*0.649*	*0.966*	*0.031***	*0.906*
CENTRAL	0.06	0.08	0.05	1.08	0.32	-0.71
p-value	*0.821*	*0.720*	*0.904*	*0.103*	*0.609*	*0.477*
EAST	0.39	0.26	0.44	0.32	0.13	0.67
p-value	*0.067**	*0.447*	*0.106*	*0.468*	*0.728*	*0.260*
Panel B: SIC classification						
ELEC	0.44	0.52	0.35	1.26	0.24	0.29
p-value	*0.023***	*0.151*	*0.101*	*0.018***	*0.308*	*0.424*
GAS	0.41	0.55	0.24	-0.03	0.65	0.39
p-value	*0.049***	*0.020***	*0.374*	*0.968*	*0.053**	*0.367*
OTHER	-0.11	0.04	-0.17	0.11	0.60	-0.78
p-value	*0.761*	*0.948*	*0.696*	*0.910*	*0.421*	*0.322*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 18 A: Conditional model using the TSE 300

This table presents the α_p which is the measure of the risk-adjusted performance using the conditional model $R_{pt} = \alpha_p + (\beta_{1pt} \times \delta \times R_{mt}) + (\beta_{2pt} \times (1-\delta) \times R_{mt}) + \varepsilon_t$, where δ = 1 if $(R_{mt}-R_{ft})$ > 0 (i.e. when the market excess returns are positive), and δ = 0 if $(R_{mt}-R_{ft}) < 0$ (i.e. when the market excess returns are negative). R_{pt} is the portfolio excess return, R_{mt} is the excess return on the TSE 300, and ε_t is the error term.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	-0.07	0.14	0.09	-0.44	0.19	0.41
p-value	*0.813*	*0.741*	*0.825*	*0.528*	*0.785*	*0.570*
CENTRAL	0.71	0.75	0.78	0.69	-0.77	1.36
p-value	*0.055*	*0.015*	*0.228*	*0.333*	*0.501*	*0.388*
EAST	0.34	0.34	0.46	0.76	-0.77	0.84
p-value	*0.255*	*0.424*	*0.256*	*0.105*	*0.263*	*0.405*
Panel B: SIC classification						
ELEC	0.34	0.63	0.36	0.31	-0.61	0.85
p-value	*0.247*	*0.177*	*0.296*	*0.599*	*0.154*	*0.248*
GAS	0.13	0.12	0.43	-0.08	0.22	1.21
p-value	*0.675*	*0.737*	*0.344*	*0.904*	*0.770*	*0.211*
OTHER	0.60	0.95	0.33	0.26	-0.46	0.23
p-value	*0.202*	*0.165*	*0.618*	*0.798*	*0.741*	*0.857*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 18 B: Conditional model using the CFMRC EW

This table presents the α_p which is the measure of the risk-adjusted performance using the conditional model $R_{pt} = \alpha_p + (\beta_{1pt} \times \delta \times R_{mt}) + (\beta_{2pt} \times (1-\delta) \times R_{mt}) + \varepsilon_t$, where δ = 1 if $(R_{mt}\text{-}R_{ft})$ > 0 (i.e. when the market excess returns are positive), and δ = 0 if $(R_{mt}\text{-}R_{ft})$ < 0 (i.e. when the market excess returns are negative). R_{pt} is the portfolio excess return, R_{mt} is the excess return on the CFMRC EW portfolio, and ε_t is the error term.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	0.31	-0.13	0.54	-0.85	-0.13	1.37
p-value	*0.280*	*0.722*	*0.127*	*0.185*	*0.811*	*0.021***
CENTRAL	0.59	0.67	0.52	0.28	-0.13	0.88
p-value	*0.075**	*0.025***	*0.355*	*0.681*	*0.891*	*0.485*
EAST	1.06	0.62	1.34	0.95	0.37	2.46
p-value	*0.001****	*0.180*	*0.001****	*0.079**	*0.605*	*0.004****
Panel B: SIC classification						
ELEC	0.84	0.60	0.95	-0.04	-0.17	1.77
p-value	*0.002****	*0.152*	*0.002****	*0.945*	*0.657*	*0.003****
GAS	0.53	0.01	0.84	-0.36	0.23	1.80
p-value	*0.078**	*0.988*	*0.043***	*0.590*	*0.706*	*0.031***
OTHER	0.31	0.40	0.22	-0.42	-0.72	0.85
p-value	*0.464*	*0.544*	*0.691*	*0.674*	*0.522*	*0.385*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 18 C: Conditional model using the CFMRC VW

This table presents the α_p which is the measure of the risk-adjusted performance using the conditional model $R_{pt} = \alpha_p + (\beta_{1pt} \times \delta \times R_{mt}) + (\beta_{2pt} \times (1-\delta) \times R_{mt}) + \varepsilon_t$, where δ = 1 if $(R_{mt}\text{-}R_{ft})$ > 0 (i.e. when the market excess returns are positive), and δ = 0 if $(R_{mt}\text{-}R_{ft}) < 0$ (i.e. when the market excess returns are negative). R_{pt} is the portfolio excess return, R_{mt} is the excess return on the CFMRC VW portfolio, and ε_t is the error term.

Portfolio	Jan-70 Dec-01	Jan-70 Mar-85	Apr-85 Dec-01	Apr-85 Dec-90	Jan-91 Dec-95	Jan-96 Dec-01
Panel A: Geographic classification						
WEST	-0.17	0.00	-0.01	-0.68	0.50	0.21
p-value	*0.563*	*0.991*	*0.975*	*0.314*	*0.435*	*0.779*
CENTRAL	0.62	0.68	0.64	0.55	-0.92	1.33
p-value	*0.085*	*0.024*	*0.315*	*0.435*	*0.386*	*0.405*
EAST	0.44	0.36	0.62	0.78	-0.46	1.23
p-value	*0.130*	*0.388*	*0.130*	*0.098*	*0.480*	*0.229*
Panel B: SIC classification						
ELEC	0.32	0.63	0.25	0.11	-0.51	0.67
p-value	*0.272*	*0.170*	*0.466*	*0.844*	*0.214*	*0.372*
GAS	0.02	-0.02	0.33	-0.25	0.64	0.91
p-value	*0.940*	*0.951*	*0.478*	*0.707*	*0.348*	*0.360*
OTHER	0.53	0.87	0.22	0.08	-0.63	0.31
p-value	*0.257*	*0.196*	*0.739*	*0.939*	*0.621*	*0.812*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 19: Sharpe ratio significance test by Geographic classification

This table presents the Jobson and Korkie (1981) significance test of the Sharpe ratios for each pairing of portfolios. The t statistic is computed as follows: $t_{Spn} = \hat{S}_{pn}/\sqrt{\theta}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows: $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, and s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

Panel A: full period			
	WEST	**CENTRAL**	**EAST**
WEST	0.000	2.085**	-3.072***
CENTRAL	-2.085**	0.000	-5.092***
EAST	3.072***	5.092***	0.000
Panel B: Jan 1970 to March 1985 (before deregulation)			
	WEST	**CENTRAL**	**EAST**
WEST	0.000	1.650*	-1.230
CENTRAL	-1.650*	0.000	-2.871***
EAST	1.230	2.871***	0.000
Panel C: April 1985 to Dec 1990 (after deregulation)			
	WEST	**CENTRAL**	**EAST**
WEST	0.000	-6.131***	-7.646***
CENTRAL	6.131***	0.000	-1.567
EAST	7.646***	1.567	0.000
Panel D: Jan 1991 to Dec 1995 (after deregulation)			
	WEST	**CENTRAL**	**EAST**
WEST	0.000	4.349***	0.331
CENTRAL	-4.349***	0.000	-3.993***
EAST	-0.331	3.993***	0.000
Panel E: Jan 1996 to Dec 2001 (after deregulation)			
	WEST	**CENTRAL**	**EAST**
WEST	0.000	7.452***	-4.395***
CENTRAL	-7.452***	0.000	-11.246***
EAST	4.395***	11.246***	0.000

A positive value indicates that the portfolio outperformed the benchmark portfolio, and a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 20: Sharpe Ratio significance test
By SIC classification

This table presents the Jobson and Korkie (1981) significance test of the Sharpe ratios for each pairing of the portfolios. The *t* statistic is computed as follows: $t_{Spn} = \hat{S}_{pn}/\sqrt{\theta}$ where $\hat{S}_{pn}$ is a transformed Sharpe ratio calculated as follows: $\hat{S}_{pn} = s_n \bar{r}_p - s_p \bar{r}_n$, where r_p and r_n are the mean excess returns of the portfolios under investigation, and s_p and s_n are the standard deviations of both portfolios (or portfolio and benchmark).

$$\theta = \frac{1}{T}\left[2\sigma_p^2\sigma_n^2 - 2\sigma_p\sigma_n\sigma_{pn} + \frac{1}{2}\mu_p^2\sigma_n^2 + \frac{1}{2}\mu_n^2\sigma_p^2 - \frac{\mu_p\mu_n}{2\sigma_p\sigma_n}(\sigma_{pn}^2 + \sigma_p^2\sigma_n^2)\right]$$

where T is the number of observations, and σ_p, σ_n and σ_{pn} are estimates of the standard deviations and covariances of the excess returns of the two portfolios over the evaluation period.

Panel A: full period			
	ELEC	**GAS**	**OTHER**
ELEC	0.000	0.649	4.378***
GAS	-0.649	0.000	3.749***
OTHER	-4.378***	-3.749***	0.000
Panel B: Jan 1970 to March 1985 (before deregulation)			
	ELEC	**GAS**	**OTHER**
ELEC	0.000	1.027	2.691***
GAS	-1.027	0.000	1.678*
OTHER	-2.691***	-1.678*	0.000
Panel C: April 1985 to Dec 1990 (after deregulation)			
	ELEC	**GAS**	**OTHER**
ELEC	0.000	3.438***	7.024***
GAS	-3.438***	0.000	3.739***
OTHER	-7.024***	-3.739***	0.000
Panel D: Jan 1991 to Dec 1995 (after deregulation)			
	ELEC	**GAS**	**OTHER**
ELEC	0.000	-0.651	0.408
GAS	0.651	0.000	1.018
OTHER	-0.408	-1.018	0.000
Panel E: Jan 1996 to Dec 2001 (after deregulation)			
	ELEC	**GAS**	**OTHER**
ELEC	0.000	-0.890	10.561***
GAS	0.890	0.000	11.274***
OTHER	-10.561***	-11.274***	0.000

A positive value indicates that the portfolio outperformed the benchmark portfolio, and a negative value indicates that the portfolio underperformed the benchmark portfolio. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Figure 1: NASDAQ Composite vs. S&P Utilities
1 year risk return relationship 1971-2001

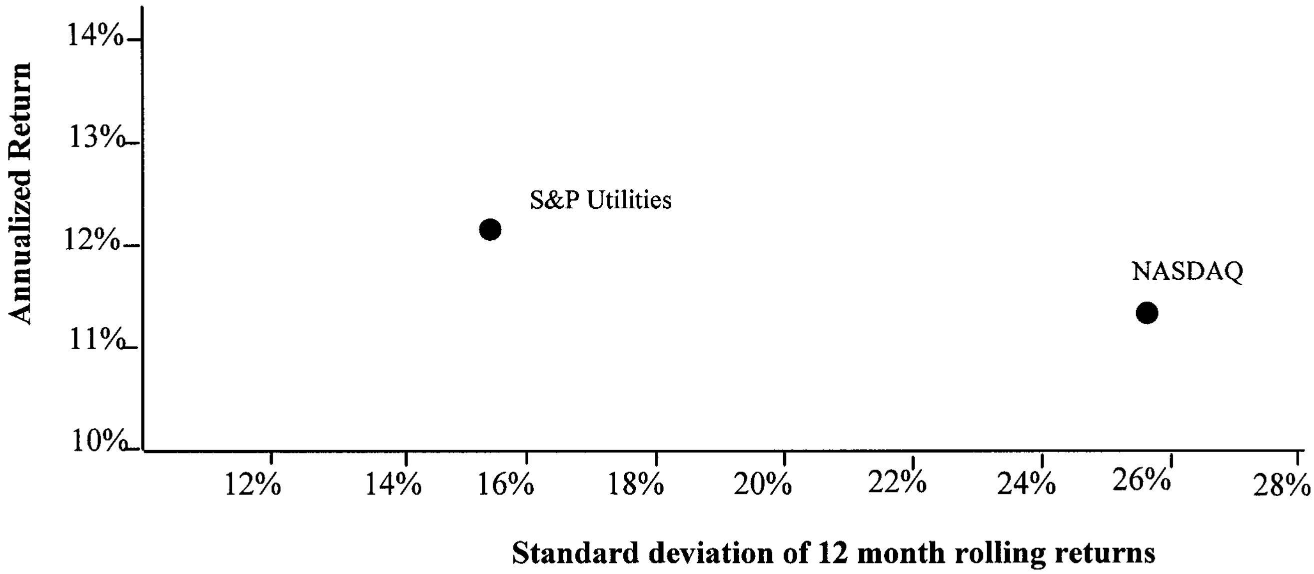
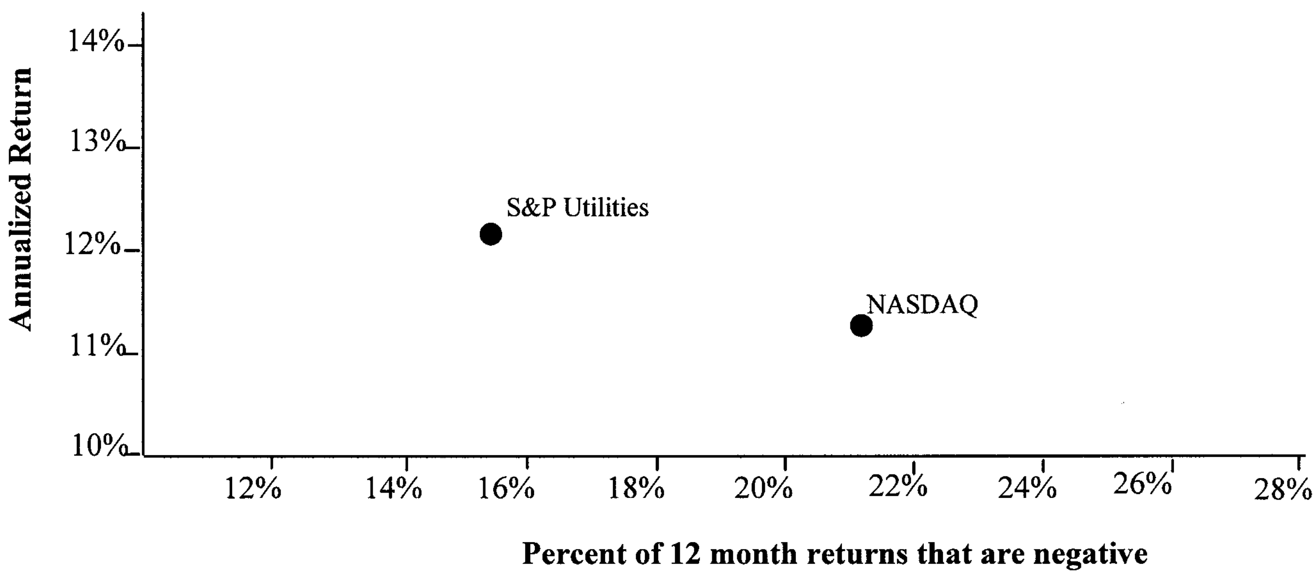


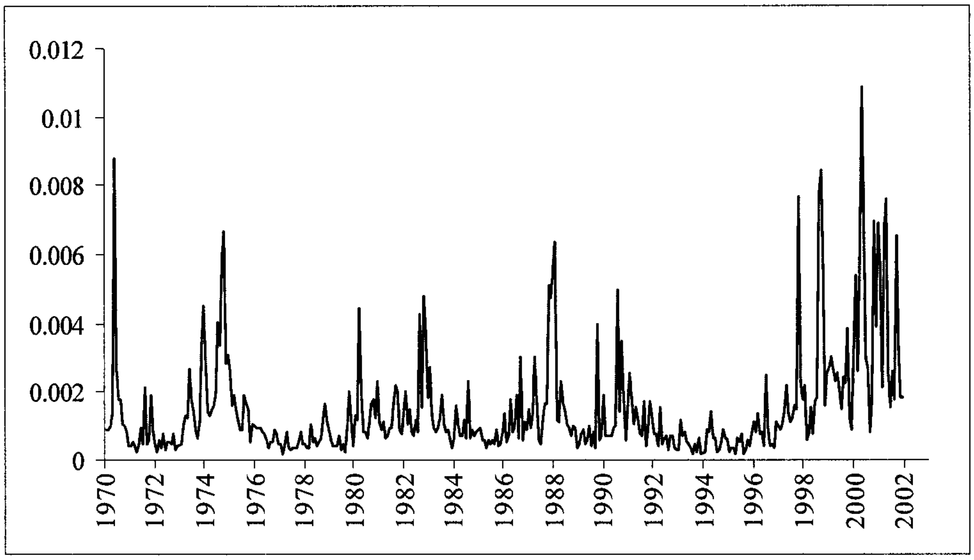
Figure 2: NASDAQ Composite vs. S&P Utilities
1 year risk return relationship 1971-2001



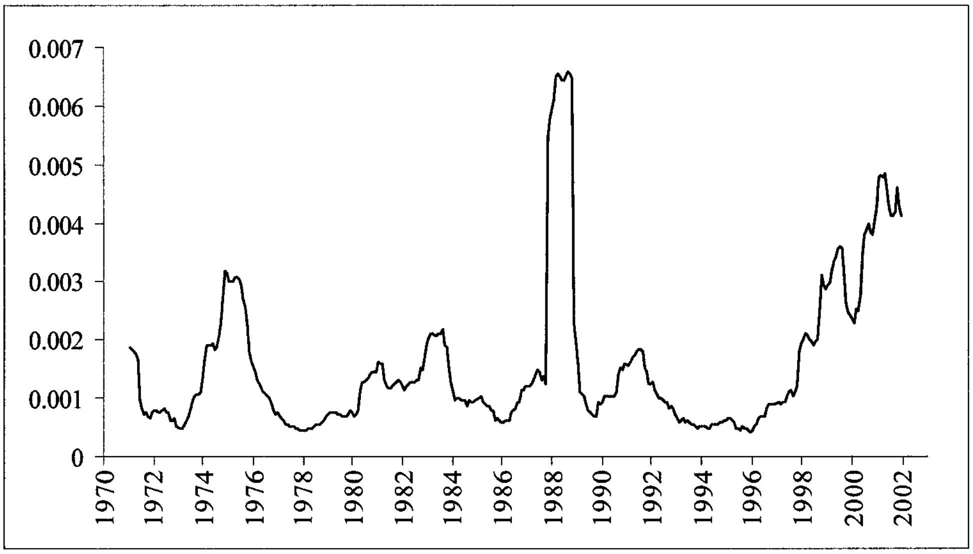
Source: Merrill Lynch Quantitative Strategy, 2001

Figure 3: US Market volatility MKT

Panel A: Market volatility



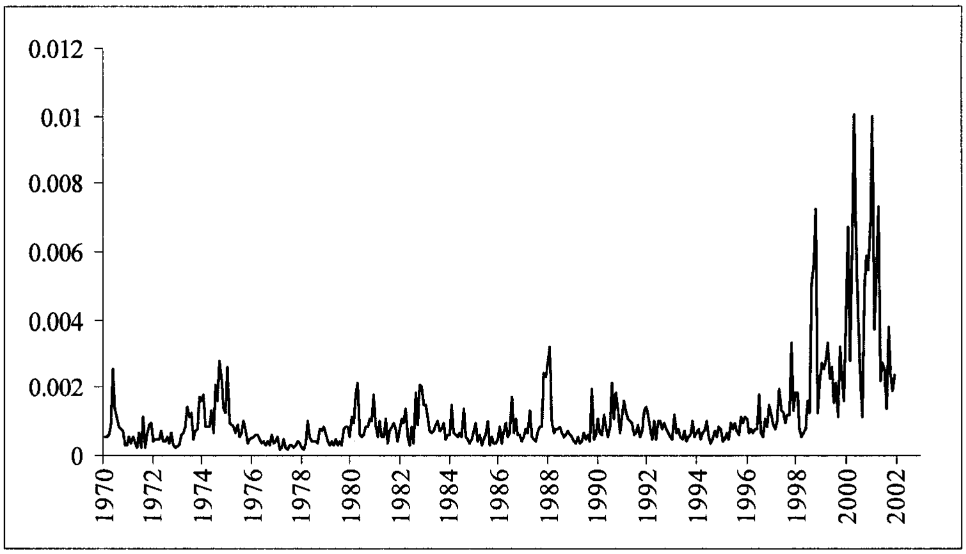
Panel B: Market volatility, MA(12)



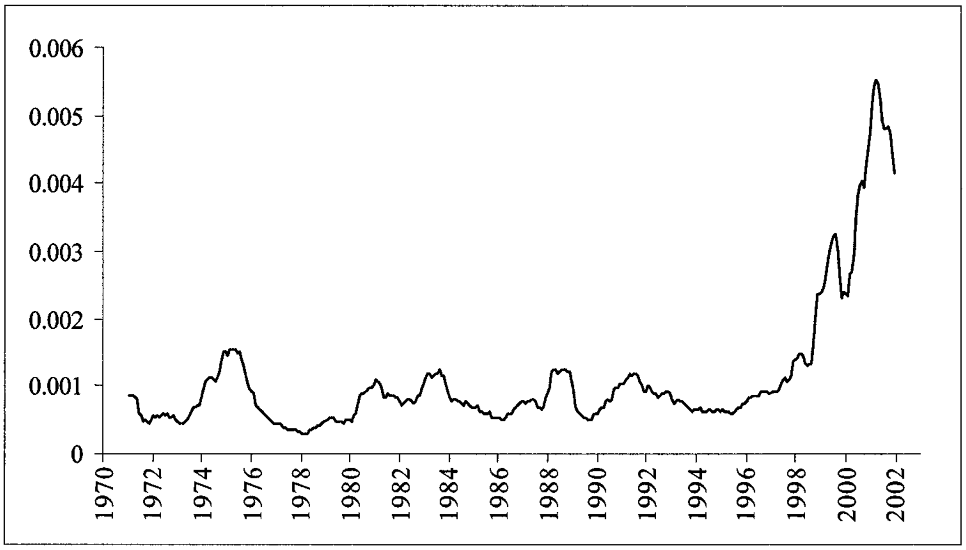
The top panel shows the annualized variance within each month of daily market returns, calculated using equation (10) for the period January 1970 to December 2001. The bottom panel shows a backwards 12-month moving average of MKT.

Figure 4: US Subsector volatility SUB

Panel A: Subsector volatility



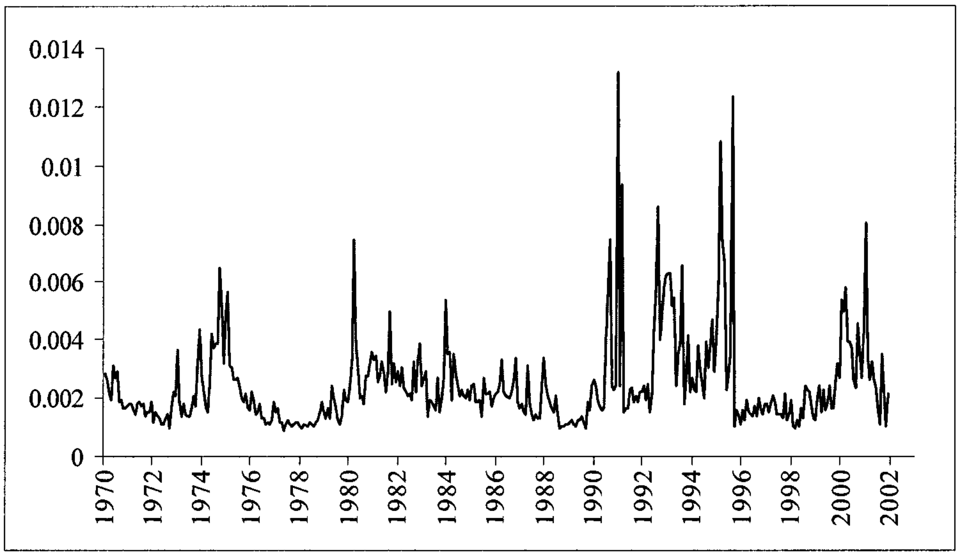
Panel B: Subsector volatility, MA(12)



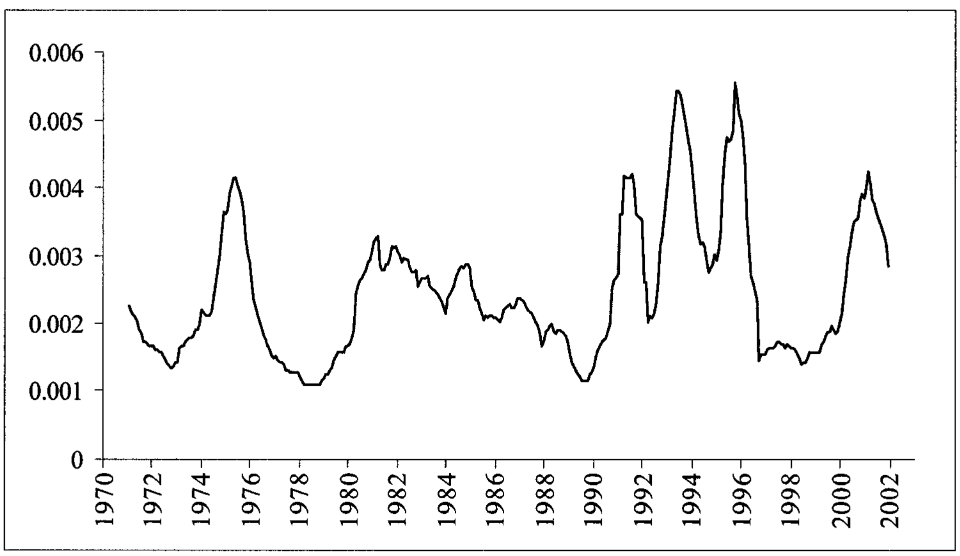
The top panel shows the annualized variance within each month of daily subsector returns relative to the market, calculated using equations (11) and (12) for the period January 1970 to December 2001. The bottom panel shows a backwards 12-month moving average of SUB.

Figure 5: US Firm volatility FIRM

Panel A: Firm volatility



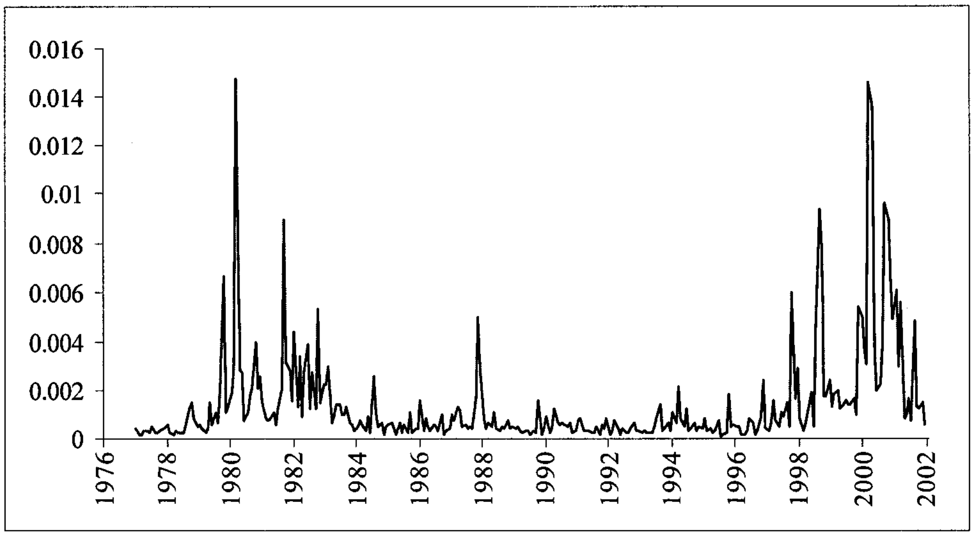
Panel B: Firm volatility, MA(12)



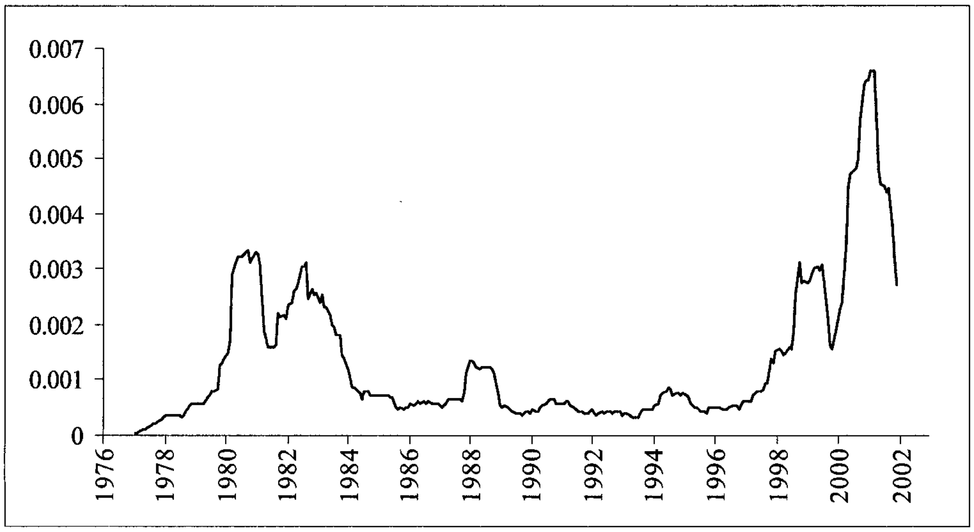
The top panel shows the annualized variance within each month of daily firm returns relative to the firm's subsector, calculated using equations (13)-(15) for the period January 1970 to December 2001. The bottom panel shows a backwards 12-month moving average of FIRM.

Figure 6: Canadian Market volatility MKT

Panel A: Market volatility



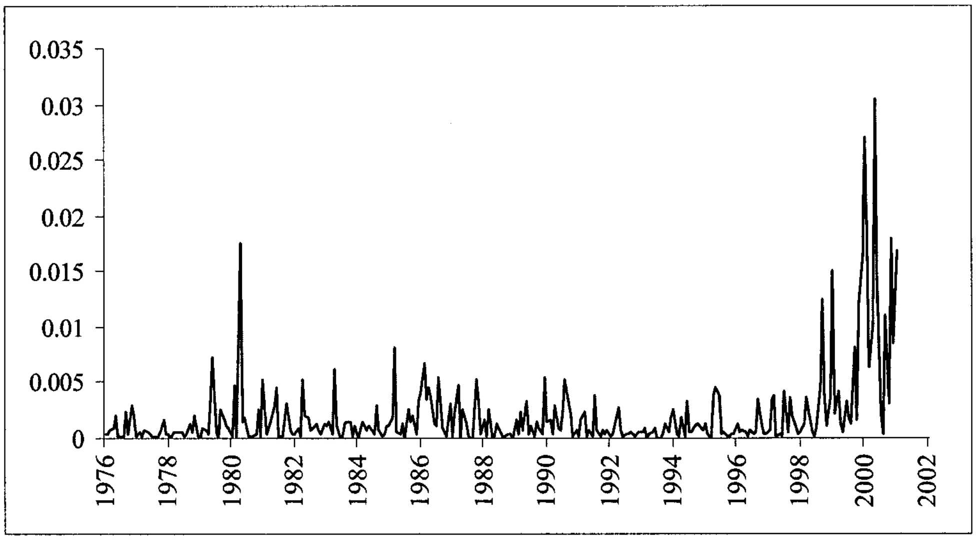
Panel B: Market volatility, MA(12)



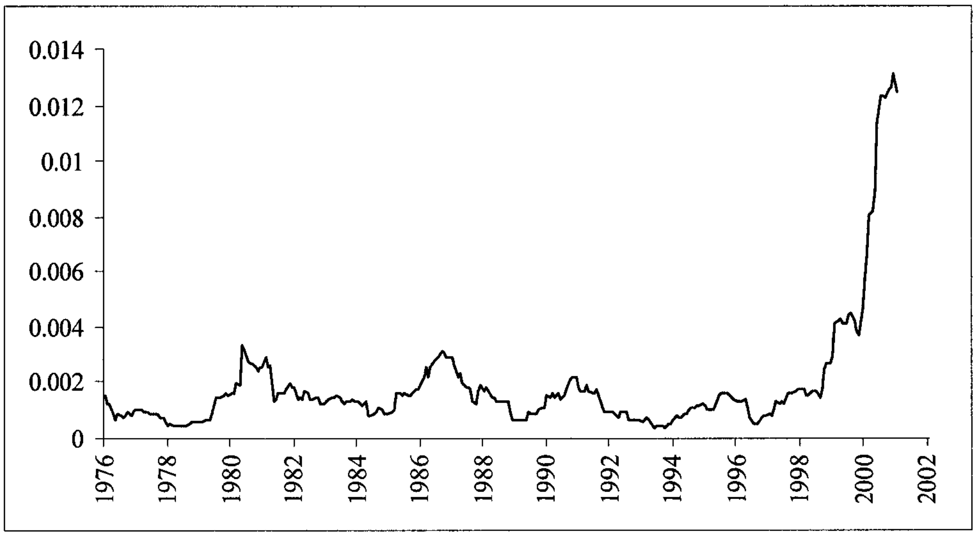
The top panel shows the annualized variance within each month of daily market returns, calculated using equation (10) for the period January 1976 to December 2001. The bottom panel shows a backwards 12-month moving average of MKT.

Figure 7: Canadian Subsector volatility SUB

Panel A: Subsector volatility



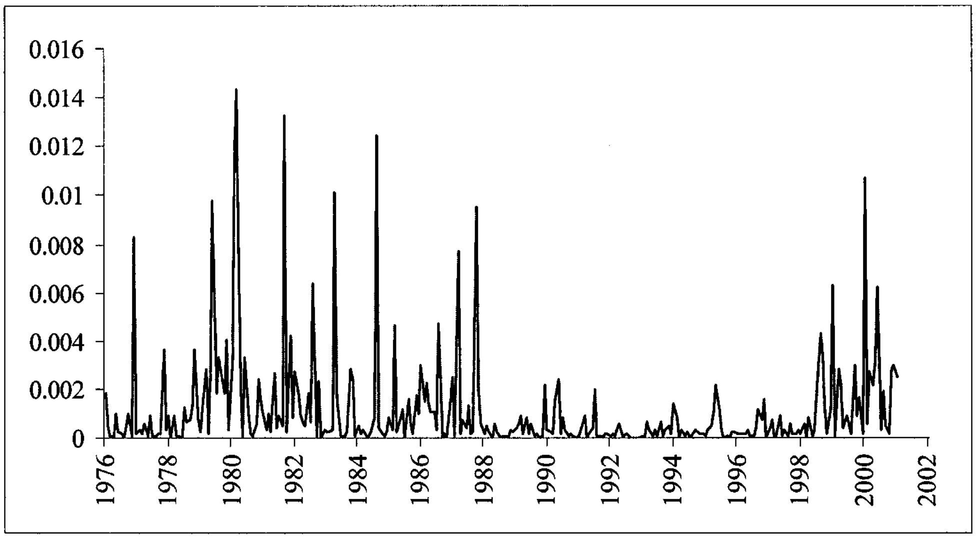
B: Subsector volatility, MA(12)



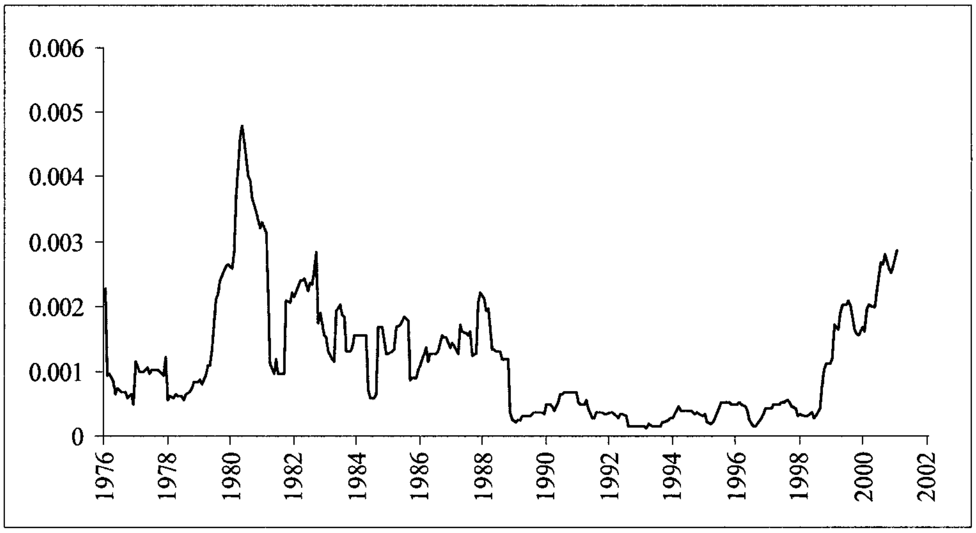
The top panel shows the annualized variance within each month of daily subsector returns relative to the market, calculated using equations (11) and (12) for the period January 1976 to December 2001. The bottom panel shows a backwards 12-month moving average of SUB.

Figure 8: Canadian Firm volatility FIRM

Panel A: Firm volatility



B: Firm volatility, MA(12)



The top panel shows the annualized variance within each month of daily firm returns relative to the firm's subsector, calculated using equations (13)-(15) for the period January 1976 to December 2001. The bottom panel shows a backwards 12-month moving average of FIRM.

Appendix A: List of US Companies

	PERMNO	Ticker	Company	SIC	Location
1	11571	XCL	X C L LTD	4910	Louisiana
2	10118	COHY	CONSOLIDATED HYDRO INC	4910	New York
3	10166	LLEC	LONG LAKE ENERGY CORP	4910	New York
4	10504	BPCO	BONNEVILLE PACIFIC CORP	4910	Utah
5	11933	SGII	S G I INTERNATIONAL	4910	California
6	72389	OXEC	OXFORD ENERGY CO	4910	Michigan
7	78026	NWPCC	NEW WORLD POWER CORP	4910	Connecticut
8	86275	INDYY	INDEPENDENT ENERGY HLDGS PLC	4910	Foreign
9	10137	AYE	ALLEGHENY ENERGY INC	4911	Maryland
10	11170	MEC	MIDAMERICAN ENERGY HLDGS CO	4911	Iowa
11	13688	PCG	P G & E CORP	4911	California
12	16599	BGR	BANGOR HYDRO ELECTRIC CO	4911	Maine
13	18411	SO	SOUTHERN CO	4911	Georgia
14	20853	UCM	UNICOM CORP HOLDING CO	4911	Illinois
15	21370	IPL	IPALCO ENTERPRISES INC	4911	Indiana
16	21928	IDA	IDACORP INC	4911	Idaho
17	22496	FPC	FLORIDA PROGRESS CORP	4911	Florida
18	22517	PPL	P P & L RESOURCES INC	4911	Pennsylvania
19	22541	GPU	G P U INC	4911	New Jersey
20	22859	DPL	D P L INC	4911	Ohio
21	22955	COC	COLUMBUS & SOUTHN OHIO ELEC CO	4911	Ohio
22	23026	FE	FIRSTENERGY CORP	4911	Ohio
23	23042	EDE	EMPIRE DISTRICT ELEC CO	4911	Missouri
24	23114	CPL	CAROLINA POWER & LIGHT CO	4911	North Carolina
25	23210	CVX	CLEVELAND ELECTRIC ILLUM CO	4911	Ohio
26	23405	GSU	GULF STATES UTILITIES CO	4911	Texas
27	23499	NES	NEW ENGLAND ELEC SYS	4911	Massachusetts
28	23501	POM	POTOMAC ELECTRIC POWER CO	4911	District of Columbia
29	23720	ILN	ILLINOVA CORP HOLDING CO	4911	Illinois
30	23827	LGE	L G & E ENERGY CORP	4911	Kentucky
31	23851	CSR	CENTRAL & SOUTH WEST CORP	4911	Texas
32	24010	ETR	ENTERGY CORP NEW	4911	Louisiana
33	24109	AEP	AMERICAN ELECTRIC POWER INC	4911	Ohio
34	24184	NMK	NIAGARA MOHAWK HOLDINGS INC	4911	New York
35	24192	PIN	P S I RESOURCES INC	4911	Indiana
36	24205	FPL	F P L GROUP INC	4911	Florida
37	24301	ATE	ATLANTIC ENERGY INC N J	4911	New Jersey
38	24416	IWG	IOWA ILLINOIS GAS & ELEC CO	4911	Iowa
39	24424	UTP	UTAH POWER & LIGHT CO	4911	Utah
40	24432	KLT	KANSAS CITY PWR & LT CO	4911	Kansas
41	24440	OGE	O G E ENERGY CORP	4911	Oklahoma
42	24491	TED	TOLEDO EDISON CO	4911	Ohio
43	24563	TXU	TEXAS UTILITIES CO	4911	Texas
44	24723	IPW	INTERSTATE POWER CO	4911	Iowa
45	25072	DQE	D Q E	4911	Pennsylvania
46	25283	SPS	SOUTHWESTERN PUBLIC SERVICE CO	4911	Texas
47	25443	PSD	PUGET SOUND ENERGY INC	4911	Washington
48	25523	KGE	KANSAS GAS & ELEC CO	4911	Kansas
49	26585	IES	I E S INDUSTRIES INC	4911	Iowa

	PERMNO	Ticker	Company	SIC	Location
50	27959	DUK	DUKE ENERGY CORP	4911	North Carolina
51	29807	BRS	BRASCAN LTD	4911	Foreign
52	30728	TNP	T N P ENTERPRISES INC	4911	Texas
53	31625	EDSE	E S E L C O INC	4911	Michigan
54	31764	ELPA	EL PASO ELECTRIC CO	4911	Texas
55	33937	MAP	MAINE PUBLIC SERVICE CO	4911	Maine
56	37161	TE	T E C O ENERGY INC	4911	Florida
57	40213	KU	K U ENERGY CORP	4911	Kentucky
58	41187	HE	HAWAIIAN ELECTRIC INDUSTRIES	4911	Hawaii
59	42198	SAV	SAVANNAH ELECTRIC & POWER CO	4911	Georgia
60	42710	CTP	C M P GROUP INC	4911	Maine
61	44142	CIV	CANADIAN INTERNATIONAL PWR LTD	4911	Foreign
62	44206	NU	NORTHEAST UTILITIES	4911	Massachusetts
63	44599	EUA	EASTERN UTILITIES ASSOC	4911	Massachusetts
64	45858	PGN	PORTLAND GENERAL CORP	4911	North Carolina
65	47052	CTU	CENTEL	4911	Illinois
66	47061	KSAIY	KANSAI ELECTRIC POWER INC	4911	Foreign
67	48389	UNS	UNISOURCE ENERGY CORP	4911	Arizona
68	48470	LAKE	LAKE SUPERIOR DIST PWR CO	4911	Foreign
69	51123	PCNH	PUBLIC SERVICE CO OF NH	4911	New Hampshire
70	53663	UIL	UNITED ILLUM CO	4911	Connecticut
71	54520	MOUT	MISSOURI UTILITIES CO	4911	Missouri
72	58587	FGE	FITCHBURG GAS & ELEC LT CO	4911	Massachusetts
73	60098	OTTR	OTTER TAIL POWER CO	4911	Minnesota
74	61946	BKH	BLACK HILLS CORP	4911	South Dakota
75	63503	CV	CENTRAL VERMONT PUB SVC CORP	4911	Vermont
76	63976	GMP	GREEN MOUNTAIN PWR CORP	4911	Vermont
77	65381	NPT	N E C O ENTERPRISES INC	4911	Rhode Island
78	69243	CX	CENTERIOR ENERGY CORP	4911	Ohio
79	70164	OBS	O BRIEN ENVIRONMENTAL ENERGY INC	4911	Pennsylvania
80	71811	SWEL	SOUTHWESTERN ELECTRIC SERVICE	4911	Texas
81	75290	ELE	ENDESA S A	4911	Foreign
82	76712	AES	A E S CORP	4911	Virginia
83	78242	BLP	COMPANIA BOLIVIANA DE ENERGIA EL	4911	Foreign
84	79709	UPEN	UPPER PENINSULA ENERGY CORP	4911	Michigan
85	80712	CHR	GENER S A	4911	Foreign
86	80717	EOC	EMPRESA NACIONAL DE ELECT CHILE	4911	Foreign
87	80787	SH	SHANDONG HUANENG POWER DEV LTD	4911	Foreign
88	81038	HNP	HUANENG POWER INTERNATIONAL INC	4911	Foreign
89	81040	KEP	KOREA ELECTRIC POWER CO	4911	Foreign
90	81558	MWH	BAYCORP HOLDINGS LTD	4911	Maine
91	81770	CPG	C M S ENERGY CORP	4911	Michigan
92	83981	CPN	CALPINE CORP	4911	California
93	85259	EBC	EDPERBRASCAN CORP	4911	Foreign
94	86136	SRE	SEMPRA ENERGY	4911	California
95	87146	NST	NSTAR	4911	Massachusetts
96	87280	NGG	NATIONAL GRID GROUP P L C	4911	Foreign
97	87438	EN	ENEL SOCIETA PER AZIONI	4911	Foreign
98	10001	EWST	ENERGY WEST INC	4920	Montana
99	11059	OGHS	ORCO INC	4920	Utah
100	11595	ETEX	EASTEX ENERGY INC	4920	Texas
101	11887	KCSG	K C S GROUP INC	4920	New Jersey

	PERMNO	Ticker	Company	SIC	Location
102	62084	KENT	KENT FINANCIAL SERVICES INC	4920	New Jersey
103	71395	SMGS	SEMCO ENERGY INC	4920	Michigan
104	76026	GVGC	GRAND VALLEY GAS CO	4920	Utah
105	80294	RGCO	R G C RESOURCES INC	4920	Virginia
106	81493	HSNR	HALSTEAD ENERGY CORP	4920	New York
107	82737	POCC	PENN OCTANE CORP	4920	California
108	83337	WISC	WISCONSIN SOUTHERN GAS CO	4920	Wisconsin
109	84110	MWHX	MARKWEST HYDROCARBON INC	4920	Colorado
110	84143	VGCO	VIRGINIA GAS CO	4920	Virginia
111	85278	CNGL	U S LIQUIDS INC	4920	Oklahoma
112	86921	TCLPZ	T C PIPELINES L P	4920	Massachusetts
113	20239	ELG	EL PASO CO	4922	Texas
114	24627	MIS	MISSISSIPPI RIVER CORP	4922	Mississippi
115	25232	OKE	ONEOK INC NEW	4922	Oklahoma
116	26542	TGT	TENNECO INC	4922	Connecticut
117	26788	TXG	TEXAS GAS RESOURCES CORP	4922	Texas
118	27940	TET	TEXAS EASTERN TRANSMISSION CORP	4922	Texas
119	33275	JUP	JUPITER INDUSTRIES INC	4922	Foreign
120	40409	GULF	GULF ENERGY & DEV CORP	4922	Oklahoma
121	40491	CGC	COLORADO INTERSTATE CORP	4922	Colorado
122	46404	FLG	FLORIDA GAS CO	4922	Florida
123	47095	CEI	CAROLINA ENERGIES INC	4922	South Carolina
124	48370	PNA	PIONEER CORP TX	4922	Texas
125	54010	MIDG	MIDWESTERN GAS TRANSMISSION CO	4922	Tennessee
126	54464	MRIV	MISSISSIPPI RIVER TRANSMISSION	4922	Mississippi
127	57779	NWP	NORTHWEST ENERGY CO	4922	Utah
128	61444	NLG	NATIONAL GAS & OIL CO	4922	Ohio
129	61671	VLO	VALERO ENERGY CORP	4922	Texas
130	62340	PGT	PACIFIC GAS TRANSMISSION CO	4922	California
131	62690	OEI	OCEAN ENERGY INC	4922	Texas
132	62703	ESK	E S K E Y INC	4922	Massachusetts
133	64143	AOG	AMERICAN OIL & GAS CORP	4922	New York
134	67774	TRP	TRANSCANADA PIPELINES LTD	4922	Foreign
135	75476	TENN	TENNESSEE NATURAL RESOURCES INC	4922	Tennessee
136	76442	MALV	MALVY TECHNOLOGY INC	4922	Texas
137	77481	EPG	EL PASO ENERGY CORP DEL	4922	Texas
138	77823	ENP	ENRON LIQUIDS PIPELINE LP	4922	Texas
139	79766	AQP	AQUILA GAS PIPELINE CORP	4922	Texas
140	81062	MGS	METROGAS S A	4922	Foreign
141	81067	TGS	TRANSPORTADORA DE GAS DEL SUR	4922	Foreign
142	81606	WGAS	WASHINGTON NATURAL GAS CO DE	4922	Washington
143	86217	VLP	VALERO NATURAL GAS PARTNERS LP	4922	Oklahoma
144	13821	PGL	PEOPLES ENERGY CORP	4923	Illinois
145	21514	SNT	SONAT INC	4923	Alabama
146	21821	CNG	CONSOLIDATED NATURAL GAS CO	4923	Virginia
147	22082	PEL	PANENERGY CORP	4923	Texas
148	23317	ENE	ENRON CORP	4923	Texas
149	24141	ANR	AMERICAN NATURAL RESOURCE CO	4923	Michigan
150	25313	CWLT	COMMONWEALTH NATURAL RES INC	4923	Delaware
151	25590	NFG	NATIONAL FUEL GAS CO N J	4923	New York
152	26614	SJI	SOUTH JERSEY INDS INC	4923	New Jersey
153	27756	MFS	MOUNTAIN FUEL SUPPLY CO	4923	Wyoming

	PERMNO	Ticker	Company	SIC	Location
154	29196	NAE	NORAM ENERGY CORP	4923	Delaware
155	38893	CGP	COASTAL CORP	4923	Texas
156	40708	HAD	HADSON CORP NEW	4923	Oklahoma
157	41005	WE	WESTCOAST ENERGY INC	4923	Foreign
158	46391	HNG	HOUSTON NATURAL GAS CORP	4923	Texas
159	47001	EST	ENSTAR CORP DE	4923	Alaska
160	50753	NCN	NORTHERN & CENTRAL GAS LTD	4923	Foreign
161	51203	SUG	SOUTHERN UNION CO	4923	Pennsylvania
162	51596	KMI	KINDER MORGAN INC KANSAS	4923	Texas
163	57744	UER	UNITED ENERGY RES INC	4923	Texas
164	58043	NCG	NORTH CAROLINA NATURAL GAS CORP	4923	North Carolina
165	58472	E	TRANSCO COMPANIES INC	4923	Texas
166	68910	CGA	CORNERSTONE NATURAL GAS INC	4923	Texas
167	75304	NVA	NOVA CORP ALTA	4923	Foreign
168	76091	SUG	SOUTHERN UNION CO NEW	4923	Pennsylvania
169	76815	TRLA	TRANS LOUISIANA GAS CO	4923	Louisiana
170	79925	NGL	TRIDENT NGL HOLDING INC	4923	Texas
171	81594	DYN	DYNEGY INC	4923	Texas
172	82297	WKEN	WESTERN KENTUCKY GAS CO	4923	Kentucky
173	86303	NCX	NOVA CHEMICALS CORP	4923	Foreign
174	11587	ATNG	ALATENN RESOURCES INC	4924	Texas
175	11975	NGA	ASSOCIATED NATURAL GAS CORP	4924	Colorado
176	15553	ATG	A G L RESOURCES INC	4924	Georgia
177	16870	PET	PACIFIC ENTERPRISES	4924	California
178	17770	BGAS	BERKSHIRE GAS CO	4924	Massachusetts
179	21231	WGL	WASHINGTON GAS LT CO	4924	District of Columbia
180	23182	CPK	CHESAPEAKE UTILITIES CORP	4924	Delaware
181	24328	EQT	EQUITABLE RESOURCES INC	4924	Pennsylvania
182	24679	CLG	COLONIAL GAS CO	4924	Massachusetts
183	25056	ENS	ENSERCH CORP	4924	Texas
184	26470	AGA	ALABAMA GAS CORP	4924	Alabama
185	29285	DGAS	DELTA NATURAL GAS INC	4924	Kentucky
186	29605	DTXG	DETROIT TEXAS GAS GATHERING CO	4924	Texas
187	30518	DONOA	DONOVAN COMPANIES INC CL A	4924	Iowa
188	32943	EI	ENERGYNORTH INC	4924	New Hampshire
189	32986	EGAS	ENERGAS CO	4924	Texas
190	33575	ECGC	ESSEX COUNTY GAS CO	4924	Massachusetts
191	33806	LGS	LOUISIANA GENERAL SERVICES INC	4924	Louisiana
192	40782	MCG	MICHIGAN ENERGY RESOURCES CO	4924	Michigan
193	41232	CGF	CITY GAS CO FL	4924	Florida
194	46092	CHA	CHATTANOOGA GAS CO	4924	Tennessee
195	48274	GAS	NICOR INC	4924	Illinois
196	49971	PNY	PIEDMONT NATURAL GAS INC	4924	North Carolina
197	50710	ETX	ENTEX INC	4924	Texas
198	51633	IEI	INDIANA ENERGY INC	4924	Indiana
199	52556	GSV	GAS SEVICE CO	4924	Pennsylvania
200	54376	MGAS	MINNESOTA NATURAL GAS CO	4924	Minnesota
201	54624	MBLE	MOBILE GAS SERVICE CORP	4924	Alabama
202	56952	CGC	CASCADE NATURAL GAS CORP	4924	Washington
203	58202	BGC	BAY STATE GAS CO	4924	Massachusetts
204	58334	NWNG	NORTHWEST NATURAL GAS CO	4924	Oregon
205	58552	WGC	WISCONSIN GAS CO	4924	Wisconsin

	PERMNO	Ticker	Company	SIC	Location
206	59395	DEI	DIVERSIFIED ENERGIES INC DE	4924	Minnesota
207	60169	CTG	C T G RESOURCES INC	4924	Connecticut
208	61188	SWX	SOUTHWEST GAS CORP	4924	Nevada
209	61882	WIC	W I C O R INC	4924	Wisconsin
210	61890	HWR	WALKER HIRAM RES LTD	4924	North Carolina
211	64290	NUI	N U I CORP	4924	New Jersey
212	64450	NJR	NEW JERSEY RES	4924	New Jersey
213	64646	PGS	PUBLIC SERVICE CO OF NC INC	4924	North Carolina
214	67133	ATO	ALAMITO COMPANY	4924	Texas
215	67441	RGAS	ROCKY MOUNTAIN NAT GAS INC	4924	Colorado
216	75298	MCN	M C N ENERGY GROUP INC	4924	Michigan
217	75484	TEVA	TENNESSEE VIRGINIA ENERGY CORP	4924	Tennessee
218	78239	UGAS	UNION GAS SYS INC	4924	Kansas
219	78530	UCIT	UNITED CITIES GAS CO	4924	Tennessee
220	81569	WEG	WASHINGTON ENERGY CO	4924	Washington
221	85723	FAL	FALL RIVER GAS CO	4924	Massachusetts
222	10823	KSE	KEYSPAN ENERGY CORP	4925	New York
223	12781	LG	LACLEDE GAS CO	4925	Missouri
224	19407	BRCK	BROCKTON TAUNTON GAS CO	4925	Massachusetts
225	25284		COMMONWEALTH GAS CORP	4925	Massachusetts
226	33073	ENTR	ENTERPRISE TECHNOLOGIES INC	4925	California
227	35617	PVY	PROVIDENCE ENERGY CORP	4925	Rhode Island
228	43668	MDA	MAPCO INC	4925	Oklahoma
229	64418	CNE	CONNECTICUT ENERGY CORP	4925	Connecticut
230	84167	GEL	GENESIS ENERGY LP	4925	Texas
231	11048	POWR	ENVIRONMENTAL POWER CORP	4930	New Hampshire
232	32652	EFAC	ENERGY FACTORS INC	4930	New Jersey
233	37023	FPUT	FLORIDA PUBLIC UTILITIES CO	4930	Florida
234	45947	IUTL	IOWA SOUTHERN INC	4930	Iowa
235	50789	MDSN	MADISON GAS & ELECTRIC CO	4930	Wisconsin
236	62010	PENT	PENNSYLVANIA ENTERPRISES INC	4930	Pennsylvania
237	82694	EMCG	EMCOR GROUP INC	4930	Connecticut
238	83919	YORK	YORK RESEARCH CORP	4930	New York
239	84345	USEY	U S ENERGY SYSTEMS INC	4930	New York
240	86450	CEDC	CATALYST ENERGY DEV CORP	4930	New York
241	11674	DTE	DETROIT EDISON CO	4931	Michigan
242	15720	EIX	EDISON INTERNATIONAL	4931	California
243	17929	UGI	U G I CORP	4931	Pennsylvania
244	21776	PE	P E C O ENERGY CO	4931	Pennsylvania
245	21792	HOU	HOUSTON INDUSTRIES INC	4931	Texas
246	22437	CHG	C H ENERGY GROUP INC	4931	New York
247	22613	NCE	NEW CENTURY ENERGIES INC	4931	Colorado
248	22947	CIN	CINERGY CORP	4931	Ohio
249	23085	SCG	SCANA CORP	4931	South Carolina
250	23229	CMS	C M S ENERGY CORP	4931	Michigan
251	23448	VEL	VIRGINIA ELECTRIC & POWER CO	4931	Virginia
252	23536	WEC	WISCONSIN ENERGY CORP	4931	Wisconsin
253	23712	PEG	PUBLIC SERVICE ENTERPRISE GROUP	4931	New Jersey
254	23931	NSP	NORTHERN STATES POWER CO MN	4931	Minnesota
255	24002	CIV	CONECTIV INC	4931	Delaware
256	24053	WR	WESTERN RESOURCES INC	4931	Kansas
257	24096	NEG	ENERGY EAST CORP	4931	New York

	PERMNO	Ticker	Company	SIC	Location
258	24117	CER	CILCORP INC	4931	Illinois
259	24221	CEG	CONSTELLATION ENERGY GROUP INC	4931	Maryland
260	24248	MPL	MINNESOTA POWER INC	4931	Minnesota
261	24299	SIG	SIGCORP INC	4931	Indiana
262	24352	IOR	IOWA RESOURCES INC	4931	Iowa
263	24360	KSE	KEYSPAN CORP	4931	New York
264	24379	RGS	R G S ENERGY GROUP INC	4931	New York
265	24467	SAJ	ST JOSEPH LIGHT & POWER CO	4931	Missouri
266	24969	AVA	AVISTA CORP	4931	Washington
267	24985	AEE	AMEREN CORP	4931	Missouri
268	25099	WPS	W P S RESOURCES CORP HOLDING CO	4931	Wisconsin
269	25144	BSE	BOSTON EDISON CO	4931	Massachusetts
270	25208	ENA	ENOVA CORP	4931	California
271	25524	ELSA	COMPANIA DE ALUMBRADO ELECTRIC	4931	Foreign
272	26606	UCU	UTILICORP UNITED INC	4931	Missouri
273	27385	ORU	ORANGE & ROCKLAND UTILS INC	4931	New York
274	27991	AZP	ARIZONA PUB SVC CO	4931	Arizona
275	38658	SRP	SIERRA PACIFIC RESOURCES NEW	4931	Nevada
276	42817	MWE	MIDWEST ENERGY CO	4931	Oklahoma
277	42833	PPW	PACIFICORP	4931	Oregon
278	46017	SRP	SIERRA PACIFIC RESOURCES	4931	Nevada
279	55511	PNM	PUBLIC SERVICE CO NM	4931	New Mexico
280	57269	CPN	C P NATIONAL CORP	4931	California
281	57277	CES	COMMONWEALTH ENERGY SYS	4931	Massachusetts
282	58406	NOR	NORTHWESTERN CORP	4931	South Dakota
283	58819	LNT	ALLIANT ENERGY CORP	4931	Wisconsin
284	64557	CNL	CENTRAL LOUISIANA ELEC INC	4931	Louisiana
285	64936	D	DOMINION RESOURCES INC VA	4931	Virginia
286	67360	UTL	UNITIL CORP	4931	New Hampshire
287	75950	YES	YANKEE ENERGY SYSTEM INC	4931	Connecticut
288	76492	MEC	MIDAMERICAN ENERGY HOLDINGS CO	4931	Iowa
289	85342	SPI	SCOTTISH POWER PLC	4931	Foreign
290	85904	CIV	CONECTIV INC	4931	Delaware
291	11404	ED	CONSOLIDATED EDISON CO NY INC	4932	New York
292	23835	MDU	M D U RESOURCES GROUP INC	4932	North Dakota
293	38762	NI	NISOURCE INC	4932	Indiana
294	24256	MTP	MONTANA POWER CO	4939	Montana
295	24870	CIP	CENTRAL ILLINOIS PUBLIC SVC CO	4939	Illinois
296	46623	CEL	CENTRAL LOUISIANA ELEC INC	4939	Louisiana
297	76646	TCK	F A TUCKER GROUP INC	4939	Illinois
298	10298	AQSI	AQUASCIENCES INTERNATIONAL INC	4940	New Jersey
299	26711	CONW	CONSUMERS WATER CO	4940	Maine
300	30411	DOMZ	DOMINGUEZ SERVICES CORP	4940	New Jersey
301	46288	JWAT	J W P INC	4940	New York
302	77625	WWTR	WESTERN WATER CO	4940	California
303	77828	BIRM	BIRMINGHAM UTILITIES INC	4940	Connecticut
304	83469	ARTNA	ARTESIAN RESOURCES CORP	4940	Delaware
305	88242	GWCC	G W C CORP	4940	Delaware
306	16117	UWR	UNITED WATER RESOURCES INC	4941	New Jersey
307	20750	CWT	CALIFORNIA WATER SERVICE GROUP	4941	California
308	23544	AWK	AMERICAN WATER WORKS INC	4941	New Jersey
309	23879	CITU	CITIZENS UTILITIES CO DEL	4941	Connecticut

	PERMNO	Ticker	Company	SIC	Location
310	23887	CITU	CITIZENS UTILITIES CO DEL	4941	Connecticut
311	26455	CWAT	CONNECTICUT WATER CO	4941	Connecticut
312	26463	CTWS	CONNECTICUT WATER SERVICE INC	4941	Connecticut
313	32281	ETW	E TOWN CORP	4941	New Jersey
314	43984	IWCR	I W C RESOURCES CORP	4941	Indiana
315	48435	LGNA	LAGUNA HILLS UTIL CO	4941	California
316	52898	PSC	GAS SEVICE CO	4941	Pennsylvania
317	53859	MSEX	MIDDLESEX WATER CO	4941	New Jersey
318	54199	SJW	S J W CORP	4941	California
319	57331	NHVN	NEW HAVEN WTR CO	4941	Connecticut
320	62295	WTR	AQUARION CO	4941	Connecticut
321	62842	EN	ENTERRA CORP	4941	Minnesota
322	63992	H	HELM RESOURCES INC	4941	Connecticut
323	71475	AWR	AMERICAN STATES WATER CO	4941	California
324	71782	SWWC	SOUTHWEST WATER CO	4941	California
325	81058	EPP	ENRON GLOBAL PWR & PIPELINES LLC	4941	Texas
326	86937	AZX	AZURIX CORP	4941	Texas
327	11340	CG	COLUMBIA GAS SYS INC	4942	Delaware
328	10011	ATCE	A T C ENVIRONMENTAL INC	4950	North Carolina
329	10164	CAAN	CAMBRIDGE ANALYTICAL ASSOC INC	4950	Massachusetts
330	10191	TXEL	TEXCEL INTERNATIONAL INC	4950	New York
331	10482	WRII	WASTE RECOVERY INC	4950	Texas
332	10484	WSTNA	WESTON ROY F INC NEW	4950	Pennsylvania
333	10515	FDGT	FLUOR DANIEL G T I INC	4950	Massachusetts
334	10634	SMTH	SMITH TECHNOLOGY CORP	4950	Maryland
335	10666	ENVS	ENVIROSURE MANAGEMENT CORP	4950	New York
336	11294	ENVI	ENVIROSAFE SERVICES INC	4950	Idaho
337	11334	ATTW	ATTWOODS PLC	4950	Foreign
338	11591	EESI	EASTERN ENVIRONMENTAL SVC INC	4950	Pennsylvania
339	11684	WHTI	WHEELABRATOR TECHNOLOGIES INC	4950	New Hampshire
340	11737	ADTX	ADVATEX ASSOCIATES INC	4950	New York
341	11791	CRIK	COMPLIANCE RECYCLING INDS INC	4950	Pennsylvania
342	11809	CLHB	CLEAN HARBORS INC	4950	Massachusetts
343	11858	GMGW	GERAGHTY & MILLER INC	4950	New York
344	12016	ECGI	ENVIRONMENTAL CONTROL GROUP	4950	New Jersey
345	12123	AURE	AURORA ENVIRONMENTAL INC	4950	South Dakota
346	12223	METC	METCALF & EDDY COMPANIES INC	4950	New York
347	25241	COES	COMMODORE ENVIRONMENTAL SVCS	4950	New York
348	40425	GNUC	G N I GROUP INC	4950	Texas
349	59935	ORFA	ORFA CORP AMERICA	4950	New Jersey
350	64902	QUAD	QUADREX CORP	4950	Florida
351	69286	CDCI	CHAMBERS DEVELOPMENT INC	4950	Pennsylvania
352	69358	ESCO	ENVIRONMENTAL SYSTEMS CO	4950	Tennessee
353	75491	DRTK	G T S DURATEK INC	4950	Maryland
354	75560	MCON	EMCON	4950	California
355	75743	ENCL	ENCLEAN INC	4950	Texas
356	75964	SENV	SECURITY ENVIRONMENTAL SYS INC	4950	California
357	76066	MUSA	MARTECH USA INC	4950	Delaware
358	76170	IWSI	INTEGRATED WASTE SERVICES INC	4950	New York
359	76345	ENSA	ENVIRONMENTAL SERVICES AMER INC	4950	New Jersey
360	76386	EFIL	ENVIROFIL INC	4950	Pennsylvania
361	76446	WSTC	WASTEC INC	4950	California

	PERMNO	Ticker	Company	SIC	Location
362	76512	LDMFB	LAIDLAW TRANSPORTATION LIMITED	4950	Foreign
363	76520	KRSC	KAISER VENTURES INC	4950	California
364	76801	VALE	VALLEY SYSTEMS INC	4950	Georgia
365	76852	MBLYA	MOBLEY ENVIRONMENTAL SVCS INC	4950	Texas
366	76861	CSMT	CONSUMAT SYSTEMS INC	4950	Virginia
367	76896	BWSI	BIOMEDICAL WASTE SYSTEMS INC	4950	Massachusetts
368	76919	WAST	WASTEMASTERS INC	4950	New York
369	76957	NMWS	NATIONAL MEDICAL WASTE INC	4950	Pennsylvania
370	77430	WPIN	WASTE PROCESSOR INDUSTRIES INC	4950	Texas
371	77811	GEGIE	GLOBAL SPILL MANAGEMENT INC	4950	Pennsylvania
372	78189	PESI	PERMA FIX ENVIRONMENTAL SVCS INC	4950	Florida
373	78215	UWST	UNITED WASTE SYSTEMS INC	4950	Connecticut
374	79017	TRCW	TRANSCOR WASTE SERVICES INC	4950	Florida
375	79723	NVIC	N VIRO INTERNATIONAL CORP	4950	Ohio
376	79999	MWDS	MED WASTE INC	4950	Florida
377	80116	CONT	CONTINENTAL WASTE INDUSTRIES INC	4950	Indiana
378	80273	SEPC	SEILER POLLUTION CONTROL SYS INC	4950	Ohio
379	81584	CBIZ	CENTURY BUSINESS SERVICES INC	4950	Ohio
380	82277	RECY	RECYCLING INDUSTRIES INC	4950	Colorado
381	82570	EXSO	CONSOLIDATED ECO SYSTEMS INC	4950	Arkansas
382	83318	SUPR	SUPERIOR SERVICES INC	4950	Wisconsin
383	83906	SRCL	STERICYCLE INC	4950	Illinois
384	85051	WWIN	WASTE INDUSTRIES INC	4950	North Carolina
385	85464	CWST	CASELLA WASTE SYSTEMS INC	4950	Vermont
386	85747	LOILY	LUNDIN OIL AB	4950	Foreign
387	86049	ATGC	A T G INC	4950	California
388	86097	WCNX	WASTE CONNECTIONS INC	4950	California
389	86562	CMCL	CHEMCLEAR INC	4950	Pennsylvania
390	87064	ECCO	EARTHCARE COMPANY	4950	Texas
391	91353	RDIS	RADIATION DISPOSAL SYS INC	4950	North Carolina
392	93025	WTEK	WASTE TECHNOLOGY CORP	4950	Florida
393	11237	AGRI	AGRIPOST INC	4952	Florida
394	91564	ROTO	ROTO ROOTER INC	4952	Ohio
395	11338	KVN	KIMMINS CORP NEW	4953	Florida
396	11955	WMI	WASTE MANAGEMENT INC DEL	4953	Texas
397	12003	CVD	CONVERSION INDUSTRIES INC	4953	California
398	12758	ECOL	AMERICAN ECOLOGY CORP	4953	Idaho
399	19183	BNER	BRENNER INDUSTRIES INC	4953	North Carolina
400	22972	CHME	CHEM NUCLEAR SYS INC	4953	Connecticut
401	23027	CFIX	CHEMFIX TECHNOLOGIES INC	4953	Louisiana
402	33508	ETT	ENVIRONM'L TREATMENT & TECHN	4953	California
403	46624	JIFY	ADVANCED ENERGY CORP	4953	Nevada
404	48443	LWSI	LAIDLAW INDUSTRIES INC	4953	Foreign
405	53786	BFI	BROWNING FERRIS INDUSTRIES INC	4953	Texas
406	54659		MOBILE WASTE CTLS INC	4953	Delaware
407	56371	NECT	NATIONAL ENVIRONMENTAL CTLS	4953	New Jersey
408	57381	WMX	WASTE MANAGEMENT INC NEW	4953	Illinois
409	64477	SK	SAFETY KLEEN CORP	4953	Texas
410	65956	RECS	RECLAMATION SYSTEMS INC	4953	Indiana
411	68494	ITX	INTERNATIONAL TECHNOLOGY CORP	4953	Missouri
412	69287	SCIT	SCIENTIFIC INC	4953	New Jersey
413	70471	CHW	CHEMICAL WASTE MGMT INC	4953	Illinois

	PERMNO	Ticker	Company	SIC	Location
414	71837	EEI	ECOLOGY & ENVIRONMENT INC	4953	New York
415	75070	INT	WORLD FUEL SERVICES CORP	4953	Florida
416	75091	RIE	RIEDEL ENVIRONMENTAL TECHS INC	4953	Oregon
417	75706	AMTI	AMERICAN MEDICAL TECHS INC	4953	Minnesota
418	76127	TTI	TETRA TECHNOLOGIES INC	4953	Texas
419	76162	FIL	SANIFILL INC	4953	Texas
420	76173	MAW	MID-AMERICAN WASTE SYSTEMS INC	4953	Delaware
421	76282	AN	AUTONATION INC DEL	4953	Florida
422	76887	AW	ALLIED WASTE INDUSTRIES INC	4953	Arizona
423	77491	NAR	NORTH AMERICAN RECYCLING SYS INC	4953	New York
424	78923	PHV	PHILIP SERVICES CORP	4953	Foreign
425	81286	WCSX	W C S INTERNATIONAL	4953	Foreign
426	81649	WASR	WASTE RESOURCES CORP	4953	California
427	82502	WW	WESTERN WASTE INDS	4953	California
428	85268	USL	U S LIQUIDS INC	4953	Texas
429	86228	RSG	REPUBLIC SERVICES INC	4953	Florida
430	90852	PACN	PACIFIC NUCLEAR SYS INC	4953	Washington
431	92479	TEV	THERMO ENVIRONMENTAL CORP	4953	Massachusetts
432	92639	UPC	U S P C I INC	4953	Pennsylvania
433	80103	THN	THERMORETEC CORPORATION	4955	Massachusetts
434	83586	CXI	COMMODORE APPLIED TECHS INC	4955	Virginia
435	75609	HAND	HANDEX CORP	4959	New Jersey
436	81769	ENV	C E T ENVIRONMENTAL SERVICES INC	4959	Colorado
437	10176	TECC	THERMAL EXPLORATION CO	4960	California
438	10642	MGEO	MUNSON GEOTHERMAL INC	4960	California
439	11718	UNTH	UNITED THERMAL CORP	4960	New York
440	50842	MAGE	MAGMA ENERGY INC	4960	California
441	50877	MGMA	MAGMA POWER CO NEW	4960	California
442	76658	OESI	O E S I POWER CORP	4960	Oregon
443	77886	PTUSA	POWERTEL U S A INC	4960	Georgia
444	91097	PWER	POWER RECOVERY SYS INC	4960	Massachusetts
445	75898	TPWR	THERMAL POWER CO	4961	California
446	80789	TGN	TRIGEN ENERGY CORP	4961	Texas
447	85570	ARID	ARIDTECH INC	4971	California
448	77798		PENNICHUCK CORP	4990	New Hampshire
449	79407	SYGR	SYNAGRO TECHNOLOGIES INC	4990	Texas
450	81192	TCK	THERMO ECOTEK CORP	4991	Massachusetts

Appendix B: List of Canadian Companies

	Ticker	Company	SIC	Location
1	ACO.X	ATCO LTD. CL 'I' NV	4911	Alberta
2	ACO.Y	ATCO LTD. CL 'II'	4911	Alberta
3	CU	CANADIAN UTILITIES LTD. CL 'A' NV	4911	Alberta
4	KHD	CANADIAN HYDRO DEVELOPERS INC. J	4911	Alberta
5	SXI	SYNEX INTERNATIONAL INC. J	4911	BC
6	TEK.A	TECK COMINCO LIMITED CL 'A'	4911	BC
7	TEK.B	TECK COMINCO LIMITED CL 'B'	4911	BC
8	EMA	EMERA INCORPORATED	4911	Nova Scotia
9	BPP	BICC PHILLIPS INC.	4911	Ontario
10	CEX	CONWEST EXPLORATION COMPANY LTD	4911	Ontario
11	CEX.A	CONWEST EXPLORATION CO. LTD. CL 'A'	4911	Ontario
12	GLZ	GREAT LAKES POWER INC.	4911	Ontario
13	MEC	MARITIME ELECTRIC COMPANY LTD.	4911	Ontario
14	S	SHERRITT INTERNATIONAL CORP. RV	4911	Ontario
15	BLX.A	BORALEX INC. CL 'A'	4911	Quebec
16	FTS	FORTIS INC.	4911	Newfoundland
17	AEC	ALBERTA ENERGY COMPANY LTD.	4922	Alberta
18	ANG	ALBERTA NATURAL GAS CO. LTD.	4922	Alberta
19	AXL	ANDERSON EXPLORATION LTD.	4922	Alberta
20	ENB	ENBRIDGE INC.	4922	Alberta
21	HSE	HUSKY ENERGY INC.	4922	Alberta
22	IHE	INTERHOME ENERGY INC.	4922	Alberta
23	OAK	OAKWOOD PETROLEUMS LTD.	4922	Alberta
24	OAK.A	OAKWOOD PETROLEUMS LTD. CL 'A' NV	4922	Alberta
25	PCE	PANCANADIAN ENERGY CORPORATION	4922	Alberta
26	PCP	PANCANADIAN PETROLEUM LTD.	4922	Alberta
27	SU	SUNCOR ENERGY	4922	Alberta
28	TRP	TRANSCANADA PIPELINES LTD.	4922	Alberta
29	TWE	TRANSWEST ENERGY INC.	4922	Alberta
30	UTC	UNITED CANSO OIL & GAS LTD.	4922	Alberta
31	IMO	IMPERIAL OIL LTD.	4922	Ontario
32	IMO.B	IMPERIAL OIL LTD. CL 'B'	4922	Ontario
33	ALA	ALTAGAS SERVICES INC.	4923	Alberta
34	DMP	DOME PETROLEUM LTD.	4923	Alberta
35	WSH	WILSHIRE ENERGY RESOURCES INC. J	4923	Alberta
36	BCG	BC GAS INC.	4923	BC
37	PNG.A	PACIFIC NORTHERN GAS LTD. CL 'A' NV	4923	BC
38	BGS	BG PLC ADS	4923	Ontario
39	UEI	UNION ENERGY INC.	4923	Ontario
40	GZM	GAZ METROPOLITAIN INC.	4923	Quebec
41	NVC	NOVERCO INC.	4923	Quebec
42	CZR	CZAR RESOURCES LTD.	4924	Alberta
43	HG.A	HOME OIL 'A'	4924	Alberta
44	HG.B	HOME OIL CO. LTD. CL. B	4924	Alberta
45	SDX	STAMPEDER EXPLORATION LTD.	4924	Alberta
46	CDH	CANADIAN HYDROCARBONS	4924	Manitoba
47	CGT	CONSUMERS' GAS CO. LTD. (THE)	4924	Ontario
48	CGT	CONSUMERS' GAS CO. LTD. (THE)	4924	Ontario

	Ticker	Company	SIC	Location
49	HWR	WALKER RESOURCES LTD. HIRAM	4924	Ontario
50	AKR.A	ATCOR RESOURCES LTD. CL 'A' NV	4925	Alberta
51	AKR.B	ATCOR RESOURCES LTD. CL 'B'	4925	Alberta
52	PCA	PETRO-CANADA	4925	Alberta
53	SCZ	SUGAR CREEK OIL & GAS INC. J	4925	Alberta
54	CPX	CALPINE CANADA HOLDINGS LTD. EXCH.	4939	Alberta
55	NPD	NEW PROVIDENCE DEV. CO. LTD.	4941	Ontario
56	AEM	ANADIME CORPORATION J	4953	Alberta
57	AGR	AGRA INC.	4953	Alberta
58	BME	BROMLEY-MARR ECOS INC. J	4953	Alberta
59	BVR.A	BOVAR INC. CL 'A'	4953	Alberta
60	CPA	CONOR PACIFIC ENVIRONMENTAL TECH.	4953	BC
61	NLC	NATIONAL CHALLENGE SYSTEMS INC.	4953	BC
62	RWI	REPUBLIC INDUSTRIES INC.	4953	Ontario
63	WMX	WMX TECHNOLOGIES INC.	4953	Ontario
64	BBL.A	BRAMPTON BRICK LTD. CL 'A' SV	4953	Ontario
65	BEV	BENNETT ENVIRONMENTAL INC. J	4953	Ontario
66	ECX	AMERICAN ECO CORPORATION J	4953	Ontario
67	ELI	ELI ECO LOGIC INC. J	4953	Ontario
68	HME.A	HYDROMET ENVIR'L RECOVERY LTD.	4953	Ontario
69	MLX	MARSULEX INC.	4953	Ontario
70	PSC	PHILIP SERVICES CORPORATION	4953	Ontario
71	QNO	QUNO CORPORATION	4953	Ontario
72	VTN.A	VITRAN CORP. INC. CL 'A'	4953	Ontario
73	VUE	VIVENDI UNIVERSAL EXCHANGECO INC EX.	4953	Quebec
74	NAL	NEWALTA CORP.	4959	Alberta
75	EVM	ENVIRONMENTAL RECLAMATION INC. J	4959	Ontario

Appendix C: Jensen Alphas using the S&P 500

The α_{1p} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p}D + \beta_{1p}R_{mt} + \beta_{2p}R_{mt}D + \varepsilon_{pt}$ where α_{1p} is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the S&P 500 over the Treasury bill rate, D is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period

	GAS	COMB	WATER	ELEC
OTHER	0.14	0.45	0.68	0.48
p-value	*0.714*	*0.235*	*0.068**	*0.202*
GAS		0.49	0.61	0.53
p-value		*0.000****	*0.000****	*0.000****
COMB			0.38	0.10
p-value			*0.029***	*0.189*
WATER				0.29
p-value				*0.425*

Panel B: Period before deregulation

	GAS	WATER	COMB	ELEC
OTHER	-1.21	0.24	-0.54	-0.53
p-value	*0.125*	*0.781*	*0.496*	*0.501*
GAS		0.62	0.57	0.58
p-value		*0.015***	*0.003****	*0.004****
WATER			0.01	0.03
p-value			*0.984*	*0.952*
COMB				0.02
p-value				*0.825*

Panel C: Period after deregulation

	OTHER	COMB	ELEC	WATER
GAS	0.77	0.57	0.62	0.69
p-value	*0.000****	*0.000****	*0.000****	*0.000****
OTHER		1.01	1.00	0.68
p-value		*0.013***	*0.014***	*0.087**
COMB			0.15	0.59
p-value			*0.137*	*0.003****
ELEC				0.46
p-value				*0.016***

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix D: Jensen Alphas using the CRSP EW

The α_{1p} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p} D + \beta_{1p} R_{mt} + \beta_{2p} R_{mt} D + \varepsilon_{pt}$ where α_{1p} is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the CRSP EW over the Treasury bill rate, D is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period

	COMB	WATER	OTHER	ELEC
GAS	0.33	0.45	0.54	0.39
p-value	*0.006****	*0.001****	*0.000****	*0.002****
COMB		0.26	0.27	0.11
p-value		*0.143*	*0.155*	*0.128*
WATER			0.27	0.11
p-value			*0.155*	*0.128*
OTHER				0.01
p-value				*0.964*

Panel B: Period before deregulation

	OTHER	WATER	COMB	ELEC
GAS	0.34	0.17	0.42	0.42
p-value	*0.164*	*0.438*	*0.015***	*0.014***
OTHER		-0.37	-0.58	-0.57
p-value		*0.622*	*0.389*	*0.398*
WATER			-0.58	-0.57
p-value			*0.389*	*0.398*
COMB				0.01
p-value				*0.928*

Panel C: Period after deregulation

	GAS	ELEC	WATER	OTHER
COMB	0.16	0.21	0.62	0.79
p-value	*0.404*	*0.033***	*0.004****	*0.001****
GAS		0.46	0.60	0.89
p-value		*0.005****	*0.000****	*0.000****
ELEC			0.45	0.64
p-value			*0.023***	*0.003****
WATER				0.87
p-value				*0.075**

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix E: Jensen Alphas using the CRSP VW

The α_{1p} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p}D + \beta_{1p}R_{mt} + \beta_{2p}R_{mt}D + \varepsilon_{pt}$ where α_{1p} is the portfolio's alpha, R_{pt} is the excess return of portfolio *p* over the Treasury bill rate, R_{mt} is the excess return on the CRSP VW over the Treasury bill rate, *D* is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period

	OTHER	COMB	WATER	ELEC
GAS	0.48	0.37	0.46	0.41
p-value	*0.001****	*0.002****	*0.001****	*0.001****
OTHER		0.37	0.46	0.41
p-value		*0.002****	*0.001****	*0.001****
COMB			0.25	0.10
p-value			*0.150*	*0.209*
WATER				0.19
p-value				*0.597*

Panel B: Period before deregulation

	GAS	COMB	WATER	ELEC
OTHER	-1.11	0.01	-0.71	-0.71
p-value	*0.146*	*0.990*	*0.358*	*0.362*
GAS		0.39	0.43	0.44
p-value		*0.093**	*0.023***	*0.024***
COMB			-0.07	-0.05
p-value			*0.892*	*0.924*
WATER				0.01
p-value				*0.867*

Panel C: period after deregulation

	COMB	ELEC	OTHER	WATER
GAS	0.45	0.50	0.57	0.66
p-value	*0.004****	*0.002****	*0.000****	*0.000****
COMB		0.15	0.51	0.51
p-value		*0.145*	*0.013***	*0.017***
ELEC			0.37	0.42
p-value			*0.053**	*0.037***
OTHER				0.51
p-value				*0.282*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix F: Jensen Alphas using the TSE 300

The α_{1p} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p}D + \beta_{1p}R_{mt} + \beta_{2p}R_{mt}D + \varepsilon_{pt}$ where α_{1p} is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the TSE 300 over the Treasury bill rate, D is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period		
	WEST	**CENTRAL**
EAST	0.54	0.48
p-value	*0.010****	*0.021***
WEST		0.10
p-value		*0.102*
Panel B: Period before deregulation		
	WEST	**CENTRAL**
EAST	0.14	-0.02
p-value	*0.690*	*0.959*
WEST		0.03
p-value		*0.933*
Panel C: Period after deregulation		
	WEST	**CENTRAL**
EAST	0.54	0.48
p-value	*0.010****	*0.021***
WEST		0.10
p-value		*0.636*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix G: Jensen Alphas using the CFMRC EW

The α_{1p} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p}D + \beta_{1p}R_{mt} + \beta_{2p}R_{mt}D + \varepsilon_{pt}$ where α_{1p} is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the CFMRC EW over the Treasury bill rate, D is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period		
	WEST	**CENTRAL**
EAST	0.58	0.54
p-value	*0.010****	*0.021***
WEST		-0.13
p-value		*0.564*
Panel B: Period before deregulation		
	WEST	**CENTRAL**
EAST	0.09	-0.12
p-value	*0.802*	*0.762*
WEST		-0.38
p-value		*0.258*
Panel C: Period after deregulation		
	WEST	**CENTRAL**
EAST	0.84	0.84
p-value	*0.002****	*0.003****
WEST		0.05
p-value		*0.850*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix H: Jensen Alphas using the CFMRC VW

The α_{1p} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p}D + \beta_{1p}R_{mt} + \beta_{2p}R_{mt}D + \varepsilon_{pt}$ where α_{1p} is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the CFMRC VW over the Treasury bill rate, D is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period		
	WEST	**CENTRAL**
EAST	0.54	0.49
p-value	*0.009****	*0.018*
WEST		0.07
p-value		*0.745*
Panel B: Period before deregulation		
	WEST	**CENTRAL**
EAST	0.21	0.02
p-value	*0.560*	*0.964*
WEST		0.09
p-value		*0.790*
Panel C: Period after deregulation		
	WEST	**CENTRAL**
EAST	0.74	0.69
p-value	*0.004****	*0.007****
WEST		0.14
p-value		*0.595*

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix I: Jensen Alphas using the TSE 300

The α_{1p} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p} D + \beta_{1p} R_{mt} + \beta_{2p} R_{mt} D + \varepsilon_{pt}$ where α_{1p} is the portfolio's alpha, R_{pt} is the excess return of portfolio *p* over the Treasury bill rate, R_{mt} is the excess return on the TSE 300 over the Treasury bill rate, *D* is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period		
	GAS	**OTHER**
ELEC	0.38	0.34
	*0.056***	*0.100**
GAS		0.21
		0.339

Panel B: Period before deregulation		
	GAS	**OTHER**
ELEC	0.44	0.56
	0.287	*0.178*
GAS		0.12
		0.700

Panel C: Period after deregulation		
	ELEC	**OTHER**
GAS	0.36	0.38
	0.153	*0.153*
ELEC		0.35
		0.140

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix J: Jensen Alphas using the CFMRC EW

The α_{1p} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p}D + \beta_{1p}R_{mt} + \beta_{2p}R_{mt}D + \varepsilon_{pt}$ where α_{1p} is the portfolio's alpha, R_{pt} is the excess return of portfolio p over the Treasury bill rate, R_{mt} is the excess return on the CFMRC EW over the Treasury bill rate, D is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period		
	GAS	**OTHER**
ELEC	0.19	0.21
	0.336	*0.319*
GAS		0.14
		0.533
Panel B: Period before deregulation		
	OTHER	**GAS**
ELEC	0.04	0.03
	0.906	*0.938*
OTHER		0.43
		0.506
Panel C: Period after deregulation		
	ELEC	OTHER
GAS	0.25	0.43
	0.345	*0.127*
ELEC		*0.353*
		0.159

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Appendix K: Jensen Alphas using the CFMRC VW

The α_{Ip} of the different portfolios by period are presented in this table. The OLS regression equation used to obtain the alpha is $R_{pt} = \alpha_{1p} + \alpha_{2p}D + \beta_{1p}R_{mt} + \beta_{2p}R_{mt}D + \varepsilon_{pt}$ where α_{Ip} is the portfolio's alpha, R_{pt} is the excess return of portfolio *p* over the Treasury bill rate, R_{mt} is the excess return on the CFMRC VW over the Treasury bill rate, *D* is a dummy variable, and β_p is the unconditional measure of risk.

Panel A: Full period		
	GAS	**OTHER**
ELEC	*0.369*	*0.321*
	*0.062**	*0.122*
GAS		*0.176*
		0.411

Panel B: Period before deregulation		
	GAS	**OTHER**
ELEC	*0.444*	*0.554*
	0.291	*0.179*
GAS		*0.129*
		0.641

Panel C: Period after deregulation		
	ELEC	**OTHER**
GAS	*0.336*	*0.357*
	0.186	*0.182*
ELEC		*0.333*
		0.168

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.