April 1986

Market Response to the Airline, Natural Gas and Trucking Deregulation Acts: An Empirical Analysis

P.R. Chandy
North Texas State University

Wallace N. Davidson
North Texas State University

Michael C. Walker
University of Cincinnati

MARKET RESPONSE TO THE AIRLINE, NATURAL GAS AND TRUCKING DEREGULATION ACTS: AN EMPIRICAL ANALYSIS

P.R. Chandy, Wallace N. Davidson and Michael C. Walker

Introduction

Industry deregulation comes about when particular interest groups call for it and legislators respond to their demands. Demands for deregulation will be more successful when a majority of interest groups with power to influence legislative decisions favor deregulation. Generally, the support of regulators and some members of a regulated industry will be required, if demands for deregulation are to be successful. [12]

Pressures for reform in regulation led to Congressional and regulatory commission actions in the late 1970s to deregulate certain aspects of several regulated industries in the United States, including the natural gas, trucking and airline industries. Debate over energy policy centered during 1977 on the problem of natural gas pricing, and in 1978, after considerable debate, the Natural Gas Policy Act (NGPA) was passed. The same year saw the passage of the Airline Deregulation Act (ADA). This bill was opposed by most airlines, but Alfred Kahn, the chairman of the Civil Aeronautics Board (CAB), successfully countered industry opposition and convinced Congress of the need for such legislation. The next major piece of deregulation legislation was enacted in 1980. The Motor Carrier Reform Act (MCRA) was designed and initiated by regulators (Interstate Commerce Commission) to stimulate competition by allowing more truckers to serve more customers, cover more routes and haul more goods.

This study presents a comparative empirical analysis of the impacts of these three major acts of deregulation. Specifically, we analyze the impact of these laws on the risk and return of the common stocks which are likely to be affected by the laws, examining the possible gains or losses for various interest groups that deregulation may cause.

Cable television was another major industry deregulated during this period. Because we could not get the necessary stock price data for cable television companies, we focused our study on natural gas, airline and trucking industries.

Major Provisions of the Three Deregulation Acts
Airline Deregulation Act

This act had a long history of discussion and hearings in Congress. The topic of deregulation of airlines first came up in Congress on August 10, 1970 [6], and the act finally was passed on October 24, 1978. The act phased out regulation of the airline industry by 1985. The major provisions of the act are:

1. Effective December 31, 1981, the airlines assumed responsibility for determining their own domestic routes and schedules.
2. As of January 1, 1983, airlines became free to set domestic fares and engage in price competition.
3. The CAB ceased to exist January 1, 1985.
4. Responsibility for overseeing relationships among domestic and foreign airlines was transferred to the Department of Transportation on January 1, 1985.
5. Airlines can enter new markets without CAB approval.

The airline industry vigorously opposed this bill. In two separate studies, Bailey [1] and Caves, Christensen, and Tretheway [4] point out that, since the passage of the bill, both the industry and the consumers have benefited substantially. Michel and Shaked [11] in their study of airline performance under deregulation, suggest that for nearly all airlines substantial gains accrued to shareholders during the months prior to deregulation. These gains were eliminated in the post deregulation period for all national airlines, yet increased for the regional carriers. Spiller [17] shows that the regulatory change which occurred in 1966 for the airline industry had differing impacts on different firms. Firms serving markets with low load-factor elasticity had larger gains in stock prices than firms with high load-factor elasticity.

Natural Gas Policy Act

Unlike the Airline Deregulation Act, the Natural Gas Policy Act (NGPA) had a shorter history of committees and hearings. Discussions on natural gas deregulation started January 10, 1977 [6]. The bill was passed finally in Congress and signed into law on November 10, 1978. Some of its major provisions are:
1. "Old gas" (gas from wells drilled on or before February 19, 1977) will be regulated in perpetuity, with ceilings indexed to inflation.
2. "New gas" (gas from wells drilled after February 19, 1977) price ceilings were raised gradually until 1985, when prices became fully decontrolled.
3. Prices were deregulated on November 1, 1979, for "special categories". This includes gas produced from wells deeper than 15,000 feet, from coal seams, from Devonian shale, or produced under conditions of unusual risk or cost.
4. No major changes were made in the regulatory status of natural gas pipeline companies or local gas utilities.

The NGPA made it possible for gas producers to raise the price of gas by amounts ranging from 7.2 percent to 300 percent, depending on the history and geology of the gas well and its pricing category. There was some opposition to this bill from the industry. Many small companies feared being driven out of business if the law were passed. Other companies favored the deregulation policies, but felt the act did not go far enough. While industry reaction to the act was mixed, consumer groups were in favor of the bill.

2

Motor Carrier Reform Act

The Motor Carrier Reform Act had a long history of hearings in Congress. Discussion first started in Congress on November 13, 1975 [6], and the bill was signed into law on July 2, 1980. Some of the major provisions of this act are:

1. Trucking companies can raise or lower their rates up to 10 percent without approval from the ICC.
2. Trucking firms have reduced obligations to prove that their services would not pose a competitive threat to current carriers, a provision that makes it easier for new firms to enter the industry.
3. Many operating restrictions are eliminated. Some of these had forced truckers to take costly circuitous routes.
4. Collective rate fixing was abolished on July 1, 1984.

The trucking industry generally opposed these changes, apparently welcoming the protection from competition that members enjoyed prior to the enactment of the bill. In 1982, the American Trucking Association reported that since the passage of the law, revenues and net profits had declined. The industry's return on equity, which had averaged 14.3 percent from 1976 to 1979, dropped to 4.5 percent in 1980-1981 and to zero in 1982. Mabley and Strack [9] point out that this regulatory reform has benefited consumers through lower rates and better service, while Pustay [15] points out that the motor carrier industry will suffer a loss of wealth of about $5.1 billion because of this law.

Regulatory Theory and Effects

Until the early 1960s, most of the emphasis on the economics of regulation focused on the question of how decision makers and other members of society are affected by regulatory constraints. Since that time, there has been a surge of interest in the reasons why regulation comes into existence and on the process that determines the kind of regulatory constraints that exist in practice. A number of theories have been advanced to explain this development of regulation.

The generally accepted view of why regulation comes into existence was once the "public interest" theory, which assumed that regulation was a government response to public demands for the rectification of inefficient or inequitable practices by individuals and organizations. This theory would imply that consumers rather than producers benefit from regulation, while producers should benefit from deregulation. One would expect that a *positive reaction* of producers' stock prices to the announcement of *deregulation* acts to be evidence *supporting* the *public interest theory*. However, it is difficult to indentify the "public interest" in any public policy issue.

Following a seminal article by Stigler [18], a number of writers have argued that regulation is a government response to demands for regulation by particular interest groups and segments of society that seek to advance their perceived self-interest, sometimes at the expense of others [9, 13]. Stigler's theory, termed "capture theory," concludes that regulation provides benefits

3

to producers at the expense of consumers. This may well be consistent with what has happened under regulation in some of the older regulated industries such as trucking, airlines, and railroads. If the *capture theory* is correct, one would expect producers' stock prices to react *negatively* to announcement of *deregulation*.

Peltzman [14] has argued that regulators may choose to maximize their own political support for other objectives by balancing the demands of competing interest groups. The market will distribute more of the good to those whose effective demand is the greatest. Peltzman concludes that an increase in regulation provides a buffering effect ("*buffering hypothesis*") that decreases the risk of regulated firms' activities and stock returns. If this is true, we would expect the *systematic risks of producers* to be *higher* following the *deregulation laws* discussed in this paper.

The airlines and trucking industries opposed deregulation. Regulation in these two industries generally benefited the companies. Capture theory would explain the reason for regulation in these industries, because regulation kept prices high, and producers were better off. In these two industries one would expect negative impact on the stock returns after the deregulation acts.

In the case of natural gas, deregulation was intended primarily to allow the industry to earn higher returns that would make gas exploration more profitable. Contrary to practices in the other two industries, the effect of regulation in the natural gas industry was to hold prices down. Regulation in this industry falls under the Public Interest Theory. In this case, positive reaction to deregulation is expected.

Methodology and Data

Following Schwert's suggestion [16], we can measure the potential effects of the various deregulation acts through the use of stock return data. In an efficient market, any unanticipated information on changes in regulation will be reflected immediately in the market prices of common stocks. Our study examines the stock return behavior of companies that are likely to be affected by the passage of deregulation laws over a time period surrounding the passage of the laws.

In any event study dealing with legislation, it is often difficult to determine when significant new information reaches the market. We carefully checked *Wall Street Journal* articles for news items concerning the various deregulation acts. We also obtained detailed legislative histories from the *Congressional Quarterly*. From these sources, we subjectively chose dates upon which we believed significant information concerning the various acts reached market participants. We used two event dates for each piece of legislation: one date for the earliest date discussion on the law started in Congress, and the other for the date the bill was signed into law by the President. We did this to ensure that the problem of information leaks associated with laws and event studies would not be a major issue in our study. These two different event dates should produce results which are more reliable than

would be possible with a single event date. Table 1 shows the various firms, sample sizes, and event dates.

Table 1

SAMPLE INFORMATION

Act	Firms in Sample	Sample Size	Event Dates*
Airline Deregulation Act	Airlines	32	August 10, 1970 October 24, 1978
Natural Gas Policy Act	Production Distribution Transmission	8 37 23	January 10, 1977 November 10, 1978
Motor Carrier Reform Act	Trucking	42	November 13, 1975 July 2, 1980

*The first date shown represents the date the bill was first introduced in Congress. The second date represents the date the bill was finally signed into law by the President.

Data were collected from CRSP daily return tapes and the *Wall Street Journal*. Only firms for which complete stock price (return) data were available over the entire time period are included in the study. Also, only firms trading on either the New York or American Stock Exchanges were used in the study.

Market Reaction Tests

To test the market's reaction to the event dates, we used two models. The first model is the market model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + E_{it} \tag{1}$$

where
R_{it} = rate of return on security i at time t (including dividends and capital gains)

R_{mt} = rate of return on the value weighted (CRSP) market index at time t

E_{it} = random disturbance term

α_i = intercept

β_i = slope or beta coefficient

Time zero was defined as the day the law was signed in the first analysis and as the day the first discussion on the law originated, in the second analysis. Estimates of α_i and β_i from the market model were obtained for each stock using a first pass regression of 120 days from time -180 to -60 days. Using the estimates of the parameters, the actual returns were compared to the predicted returns for each day over the time period -59 to $+60$, for

each of the stocks. This provided us with estimates of abnormal returns using the formula:

$$AR_{it} = R_{it} - (a_i + b_i R_{mt}) \qquad (2)$$

where AR_{it} = abnormal return for security i at time t

R_{it}, R_{mt} = actual returns for security and market at time t

a_i, b_i = parameter estimates for α_i and β_i, respectively, obtained from the first pass regression as shown in equation (1)

The AR_{it} are added and averaged across all firms at each point in time to provide us with Average Residuals $(\overline{AR}_t)$:

$$\overline{AR}_t = 1/n \sum_{i=1}^{n} AR_{it} \qquad (3)$$

The $\overline{AR}_t$ are cumulated at each time period, to provide Cumulative Average Residuals (CAR_t):

$$CAR_t = \sum_{t=-60}^{k} \overline{AR}_t \qquad (4)$$

To confirm the results of the analysis above, we used a second model: the average return model, in which we assume that α_i is 0 and β_i is 1. Brown and Warner [3] indicate that this model performs at least as well as the market model in event studies. Brennan [2] suggests that simple models perform at least as well as more complex models. The other steps explained for the market model in equations (2), (3) and (4) also apply here.

Shifts in Risk Parameters

Deregulation is a major event in the life of any company or industry. It could change the risk-return characteristics of the companies affected by deregulation. We use the dummy regression model to determine if and (or) changed due to the passage of the law. This model is represented as follows (see Gujarate [7]):

$$R_{it} = \alpha_{1i} + \alpha_{2i}D + \beta_{1i}R_{mt} + \beta_{2i}R_{mt}D + E_{it} \qquad (5)$$

where D = dummy variable, which equals 0 before the event date and 1 after the event date

α_{1i}, α_{2i} = intercept before and after the event

β_{1i}, β_{2i} = slope values before and after the event

If the coefficient α_{2i} and/or β_{2i} is significantly different from zero, a shift in the intercept and/or slope is said to have occurred. This technique is appropriate to use when there is reason to believe that the event under study may have caused a change in the stochastic process that generates security returns. The pre-event period includes returns from -180 to -60 days. The post-event period includes returns from 60 to 180 days. Sixty days on either side of the event were excluded from study to prevent any noise in the data

6

that might have been caused by passage of the acts from affecting the results. This model was applied for each law, and each of the two event dates.

RESULTS
Airline Industry
Abnormal Returns

Table 2 presents the results of CAR analysis for the airlines industry. The results of both models are identical around both event dates. The market's reaction definitely was *negative*. There appears to be a decrease in CARs during the 60 days prior to the event dates. The market continues to react *negatively* following the events, but the drifts are neither large nor statistically significant.

Shifts in Market Model Parameters

As Table 3 shows, only one firm had a shift in alpha (out of 32), while 10 firms had a significant change in systematic risk around the passage date. All the firms that showed significant shifts experienced an increase in systematic risk. This suggests that for about a third of the firms in the sample, there was a significant change in the risk-return characteristics. We proceeded to use the post-event (passage of bill) beta in the market model to compute the pre- and post-event ARs and CARs in order to determine the effect of the shift in beta on the reported CAR values. The results (not shown here) indicate that, in general, there was no significant difference in the pattern of ARs or CARs as a result of the post-beta adjustment. Even though there was an increase in the beta subsequent to the event, for some firms, this did not materially affect the patterns of AR or CAR reported earlier.

Natural Gas Industry
Abnormal Returns

Tables 4 and 5 show the results of the abnormal return analysis for natural gas production, transmission and distribution companies. Table 4 uses the date the natural gas bill was introduced as the event date, while Table 5 uses the date of the law's passage as the event date. The results indicate that generally the abnormal returns are quite small and not significantly different from zero around either the introduction date or signing date. The Cumulative Average Residuals also are generally small and negative during the sample period. The results are very similar for both models (the market model and the average return model) as well as both event dates.

These results indicate that neither the introduction nor the passage of the bill had any significant impact on the returns of various firms that make up the natural gas industry. There is neither a large single increase in stock returns nor a drift in returns over time.

7

Table 2

AIRLINE INDUSTRY

DATE WHEN BILL WAS FIRST INTRODUCED

Event Time (Days)	Market Model			Average Return Model		
	Abnormal Return	Cumulative Abnormal Return	t test result	Abnormal Return	Cumulative Abnormal Return	t test result
-60	-0.008	-0.008	-0.514	-0.007	-0.007	-0.418
- 5	-0.022	-0.173	-0.780	-0.025	-0.081	-0.873
- 2	0.004	-0.194	0.103	0.007	-0.106	0.158
- 1	0.000	-0.194	0.014	0.001	-0.104	0.051
0	0.008	-0.185	0.251	0.010	-0.094	0.298
1	-0.016	-0.201	-0.452	-0.019	-0.114	-0.559
2	-0.030	-0.232	-0.967	-0.033	-0.147	-1.116
5	0.038	-0.207	0.673	0.052	-0.111	0.925
60	-0.007	-0.306	-0.503	-0.003	-0.081	-0.143

DATE WHEN BILL WAS PASSED

Event Time (Days)	Abnormal Return	Cumulative Abnormal Return	t test result	Abnormal Return	Cumulative Abnormal Return	t test result
-60	-0.009	-0.009	-0.43	-0.006	-0.006	-0.28
- 5	-0.023	-0.284	-0.81	-0.025	-0.114	-0.87
- 2	0.004	-0.307	0.09	0.007	-0.139	0.16
- 1	0.000	-0.307	0.00	0.002	-0.137	0.05
0	0.007	-0.300	0.23	0.010	-0.127	0.30
1	-0.017	-0.316	-0.47	-0.019	-0.147	-0.56
2	-0.032	-0.348	-0.97	-0.033	-0.180	-1.12
5	0.037	-0.325	0.70	0.053	-0.144	0.93
60	-0.015	-0.474	-0.52	-0.011	-0.099	-0.39

NOTE
For the sake of brevity, only some dates are shown in these Tables. For more detailed information, contact the authors.

Table 3

Shifts in Market Model
Parameters (alpha = 0.05)
Event Date: Passage of Bill

Industry	Sample Size	Shifts in alpha		Shifts in beta	
		number	percent	number	percent
Natural Gas					
Production	8	0	0.0	0	0.0
Transmission	23	0	0.0	3	13.0
Distribution	37	0	0.0	3	8.1
Trucking	42	0	0.0	6	14.3
Airline	32	1	3.1	10	31.3

NOTE
Similar results were obtained using the event date "Introduction of Bill". These are not reported here.

Table 4

NATURAL GAS INDUSTRY

Summary of the Results Obtained for Production,
Transmission and Distribution Companies

DATE WHEN BILL WAS INTRODUCED

Production Companies

Event Time	Market Model			Average Return Model		
	Abnormal Return	Cumulative Abnormal Return	t test	Abnormal Return	Cumulative Abnormal Return	t test
-60	-.004	-.004	-0.36	-.002	-.002	-0.21
- 5	-.001	.008	-0.19	.001	.014	0.13
- 2	.003	.012	0.55	.006	.024	0.89
- 1	-.002	.009	-0.35	-.001	.024	-0.10
0	.002	.012	0.23	.001	.025	0.13
1	-.001	.010	-0.27	.000	.025	0.01
2	.002	.013	0.31	.001	.026	0.12
5	-.006	.008	-0.64	-.007	.022	-0.73
60	-.004	.000	-0.62	-.002	.011	-0.31

Transmission Companies

Event Time	Abnormal Return	Cumulative Abnormal Return	t test	Abnormal Return	Cumulative Abnormal Return	t test
-60	-.005	-.005	-0.53	-.003	-.003	-0.32
- 5	.001	.007	0.09	-.000	.028	-0.04
- 2	-.007	.004	-0.52	.000	.031	0.02
- 1	-.004	-.000	-0.45	.000	.031	0.04
0	-.003	-.003	-0.32	-.001	.031	-0.09
1	.001	-.003	0.06	-.004	.026	-0.39
2	-.005	-.007	-0.40	-.004	.022	-0.37
5	-.006	-.012	-0.57	-.002	.039	-0.15
60	-.005	-.029	-0.39	-.003	.052	-0.22

Distribution Companies

Event Time	Abnormal Return	Cumulative Abnormal Return	t test	Abnormal Return	Cumulative Abnormal Return	t test
-60	-.002	-.002	-0.13	.000	.000	0.00
- 5	-.003	-.007	-0.29	.003	.021	0.39
- 2	-.004	-.013	-0.31	-.001	.028	-0.09
- 1	.001	-.012	0.09	-.003	.025	-0.09
0	.001	-.011	0.10	.003	.028	0.30
1	.002	-.009	0.17	-.003	.024	-0.31
2	-.001	-.010	-0.08	.003	.027	0.24
5	-.002	-.006	-0.13	.004	.032	0.41
60	-.004	-.016	-0.52	-.001	.033	-0.13

NOTE
For the sake of brevity, only some dates are shown in the tables. For
additional information, contact the authors.

Table 5

NATURAL GAS INDUSTRY

Summary of the Results Obtained for Production, Transmission, and Distribution Companies

DATE WHEN BILL WAS PASSED

Production Companies

	Market Model			Average Return Model		
Event Time	Abnormal Return	Cumulative Abnormal Return	t test	Abnormal Return	Cumulative Abnormal Return	t test
-60	-0.002	-0.002	-0.14	-0.004	-.004	-0.27
- 5	0.010	-0.014	0.43	0.008	-.011	0.33
- 2	-0.003	-0.026	-0.20	-0.004	-.020	-0.30
- 1	0.006	-0.020	0.34	0.005	-.015	0.31
0	0.006	-0.014	0.30	0.004	-.010	0.22
1	0.003	-0.011	0.29	.006	-.004	0.77
2	0.001	-0.011	0.09	.003	-.001	0.32
5	0.010	0.000	0.58	.007	.002	0.42
60	-0.003	0.028	-0.24	-0.001	-.001	-0.10

Transmission Companies

-60	0.006	0.006	0.47	-0.003	-.003	-0.21
- 5	0.002	-0.060	0.11	-0.002	.002	-0.10
- 2	-0.002	- .057	-0.17	-0.006	.011	-0.44
- 1	0.004	- .061	0.38	0.004	.015	0.34
0	.003	- .064	0.23	0.000	.015	-0.01
1	- .004	- .059	-0.29	.007	.022	.50
2	- .005	- .056	-0.46	.001	.023	0.10
5	.010	- .047	0.58	.004	.026	0.23
60	- 0.007	- 0.007	-0.47	-0.001	-.035	-0.08

Distribution Companies

-60	0.001	0.001	0.08	-0.003	-.003	-0.19
- 5	-0.002	-0.066	-0.10	-0.006	.037	-0.34
- 2	0.001	- .061	0.05	-0.003	.059	-0.25
- 1	- .001	- .062	-0.12	- .002	.058	- .15
0	- .001	- .063	-0.10	- .005	.053	- .42
1	.000	- .063	0.01	0.014	.067	.97
2	- .009	- .073	-0.45	- .001	.066	- .07
5	.002	- .071	0.17	-0.005	.050	- .43
60	- .003	- .043	-0.24	0.005	.064	0.39

NOTE
For the sake of brevity, only some dates are shown in the Table. For additional information, please contact the authors.

10

Shifts in Market Model Parameters

Table 3 shows the results of the dummy regression model for the dates the various bills were passed. (Tests were done using both event dates, date of introduction as well as passage.) For the natural gas industry as a whole, there was no statistically significant shift in alpha. There was some shift in beta in the case of transmission and distribution companies, but this occurred in only a few companies (three of 23 transmission firms and three of 37 distribution firms). We believe this indicates that deregulation has had no significant effect on the risk-return characteristics of firms in the natural gas industry.

Trucking Industry
Abnormal Returns

Table 6 presents the results of the CAR analysis for the trucking industry. If there had been no reaction to the Motor Carrier Reform Act, we would expect the CARs to fluctuate around zero. If the market had viewed passage of the law to have a significant effect on the risk-return attributes of the trucking companies, one would expect a reaction following the event. Such a reaction, if positive, would be evidenced by one or a succession of positive average residuals, a rising CAR.

The CARs around the introduction date indicate a positive reaction in the market place, as the rising trend shows. From day 0 to day 60, there is an increase of *at least* 100 percent in CARs (depending on which model one believes). The upward movement in CAR begins at approximately $t = -5$ and peaks at $t = +55$.

The pattern of ARs and CARs around the passage date is only slightly different from the pattern seen around the introduction date. The ARs stay negative longer around the passage date than around the introduction date. The market took a little longer to recognize the implications of the bill when it finally was signed into law. The trend in ARs is again upward, as for the introduction date. The ARs were not statistically significant around both event dates.

Shifts in Market Model Parameters

Table 3 shows the results of the dummy regression model for the event date. There was no shift in alpha. About 14 percent of the firms showed a significant shift in beta, and all of them showed an increase in systematic risk. Given that only a few firms showed a significant change in systematic risk, this seems to indicate a lack of any significant effect of deregulation on the risk-return characteristics of firms in the trucking industry.

Implications
Airline Industry

The market's reaction was quite negative to this event. Based on the information we know now, with some major airlines going bankrupt, it appears as if the market anticipated the impact of the provisions of the bill

Table 6

TRUCKING INDUSTRY

A: DATE WHEN BILL WAS FIRST INTRODUCED

Event Time (Days)	Market Model			Average Return Model		
	Abnormal Return	Cumulative Abnormal Return	t test	Abnormal Return	Cumulative Abnormal Return	t test
-60	-0.004	-0.004	-0.217	-0.004	-0.004	-0.21
- 5	0.001	-0.008	0.050	0.000	0.022	0.01
- 2	0.003	0.006	0.171	0.002	0.030	0.10
- 1	0.005	0.011	0.172	0.001	0.031	0.02
0	0.002	0.013	0.082	0.003	0.034	0.11
1	0.004	0.017	0.159	0.005	0.039	0.20
2	0.001	0.018	0.001	0.000	0.039	0.02
5	0.005	0.019	0.022	0.002	0.048	0.10
60	0.009	0.038	0.352	0.012	0.067	0.43

B: DATE WHEN BILL WAS PASSED

Event Time (Days)	Market Model			Average Return Model		
-60	-0.004	-0.004	-0.17	-0.006	-0.006	-0.26
- 5	-0.003	-0.021	-0.16	-0.005	-0.059	-0.25
- 2	0.005	-0.016	0.29	0.006	-0.053	0.30
- 1	-0.005	-0.021	-0.27	-0.006	-0.059	-0.34
0	0.001	-0.020	0.05	-0.001	-0.059	-0.03
1	-0.001	-0.021	-0.03	-0.003	-0.062	-0.11
2	0.003	-0.018	0.10	0.002	-0.060	0.07
5	0.004	0.008	0.14	0.005	-0.033	0.20
60	0.007	0.128	0.32	0.006	0.054	0.27

NOTE

For the sake of brevity, only some dates are shown in these tables. For additional information, contact the authors.

in a negative fashion. The airline industry vigorously opposed this bill when it was introduced in Congress. Bailey [1] and Caves [4] pointed out that consumers would be the major beneficiaries of this bill and that there would be substantial losses to several firms within the industry. In a recent three year period since 1979, airlines have suffered losses in excess of $1.5 billion. Factors such as fuel price increases (especially since the beginning of the Iran-Iraq war in September 1978) and substantial capital expenditures may also have contributed to some of the losses. These results would *support* the *capture theory* of regulation.

About one-third of the firms in the industry showed a significant shift in their systematic risk subsequent to the passage of the bill. All these firms showed an *increase* in the level of systematic risk. These results provide some *support Peltzman's buffering hypothesis*. Greater competition, removal of price regulation, greater freedom to enter new markets by airline firms, and other factors, however, may have subjected airline firms to greater risks. We cannot rule out the possibility that factors other than deregulation may have been responsible for the changes in systematic risks observed here.

Natural Gas Industry

Did windfall gains accrue to stockholders of natural gas production, transmission, or distribution companies? Based on the results obtained here, the answer is no. The impact of the law is negligible at best. This may be because deregulation did not actually occur, as state rules and regulations replaced federal rules. There was neither a pattern of abnormal returns nor a drift in stock returns. There was no major structural change in the return generating processes for the portfolios examined.

In terms of economic theory, our results *fail to support either the capture or public interest theories of regulation*. The results indicate that the natural gas industry showed neither significant gains nor losses resulting from the passage of the NGPA. It is possible that some subset of producers may have gained from the regulatory change, while others lost. These two effects might have offset each other.

Our analysis of the impact of the NGPA on systematic risk showed that there was no significant shift in systematic risk. This result *fails to support Peltzman's buffering hypothesis*. It is possible that the final version of the bill signed into law did not contain changes substantial enough to cause major shifts in the risk structure of the industry. It is also possible that factors other than deregulation were present, that offset the shifts in systematic risk caused by the deregulation act. Needham [12] suggests that some medium sized companies were likely to be affected in a negative fashion by the act, while some larger firms were likely to benefit. These two effects might have offset each other. Consumers generally favored this bill, while industry groups opposed it.

Trucking Industry

We believe that no windfall gain accrued to the shareholders in companies in the trucking industry. The market correctly anticipated the final ver-

sion of the bill as more information became available from the various committees considering the bill. At the early stages of the discussion, the market appears to have viewed the bill as being favorable to the industry. Over time, as more information leaked out, the market seems to have confirmed its opinion. This evidence seems to *support* the *public interest theory* of regulation, because the reaction of stock prices (or returns) to the bill was positive, implying that producers were expected to gain at the expense of consumers. This supports the results of a study by Mabley and Strack [9], which show that subsequent to deregulation producers actually benefited because of increased competition and higher revenues.

There was a small increase in the systematic risk of trucking firms subsequent to the passage of the bill. However, we believe that for a majority of the firms, there was no significant shift in systematic risk. There may have been *some* change in the risk level of the industry due to increased competition and partial removal of price regulations, for these changes might subject the industry to greater risks. Our results do not show this to be true for a majority of trucking firms.

Limitations

There are several limitations to the results of this study. Identifying the appropriate event date is a problem in studies dealing with the passage of any law. Legislation generally is debated over a period of time, so the effect of any law on shareholder wealth may be gradual. In the case of the laws discussed in this study, however, this may not be a major issue. First, discussion on deregulation was both open and fierce, with opposition and support from various interest groups. The passage of each bill was not assured until very close to the time the law finally was passed. Even after the passage of the bill, the impact of a change in regulation is not easily interpretable by shareholders because a lot depends upon how (or whether) the laws are implemented. For example, each time the natural gas legislation came to a roll call in the House or the Senate, the votes were extremely close. No one voting could predict the outcome. Second, the final version of the law that actually was passed differed considerably from the earlier versions. Hence, the event date used here did reflect a specific event. Using two different event dates for each law, we came up with fairly similar results. We also repeated the study using weekly stock returns for a period of 25 weeks prior to the event. These results (not shown) confirmed the results obtained using daily data.

A second possible limitation of our results is that deregulation was not a significant event from the stockholders' point of view. This, however, would be hard to believe.

A third limitation is the presence of factors other than deregulation that may have been responsible for our results. We used standard statistical techniques and verified the results with the market model and the average return model, with identical results for both models. It is possible that both models were inadequate in capturing the impact of the law, but we do not believe

that to be so. Even though there are pitfalls in using financial data to measure the effects of regulatory change, we have no acceptable methodology in finance to measure the impact of regulatory change on risk and return without using financial data.

It is possible that other economic shocks influenced the industries examined in the study during the period surrounding the event dates. A search of the *Wall Street Journal Index*, however, revealed no other major news item of relevance to the industries examined around that period. It is also important to recognize that types of deregulation which took place in the three industries studied here were not at all the same.

Conclusions

This paper has examined the effect of deregulation of natural gas, trucking, and airline industries upon the stock returns of the firms in each industry. We did not find any significant stock price reaction to the news regarding the introduction or passage of the Natural Gas Policy Act. This may be explained by two facts: long term focus of the legislation and uncertainty concerning implementation of the law. We also did not find any significant shift in the systematic risk of natural gas firms. These results fail to support either the capture or public interest theories of regulation.

The results of our analysis for the trucking industry indicated that the market reacted positively to the passage of the bill, thereby supporting the public interest theory of regulation. There was, on average, no significant shift in systematic risk of the firms in the trucking industry subsequent to the passage of the bill.

As for the airline industry, there was significant (negative) stock price reaction to the news regarding the introduction and passage of the Airline Deregulation Act. This supports the capture theory. About a third of the firms in this industry experienced an increase in systematic risk, subsequent to the passage of the bill. This supports Peltzman's buffering hypothesis.

This study demonstrates that because regulation and its implementation can take many forms, the *impact* of *deregulation* on *stock returns* is by *no means general*. In the case of the airline industry, deregulation had a negative impact on shareholder wealth, with the subsequent problems in the industry that were, in part, anticipated at the time of deregulation. There could have been other factors (not captured here) which influenced the perceived financial condition of the airline industry. In another case, natural gas deregulation, there was no apparent impact on shareholder wealth at all, while the impact was positive in the case of the trucking industry. As deregulation benefited some firms and not others these results are not surprising.

If one believes that the analysis of stock return data is more effective than other methods of assessing the effects of regulatory change [16], then our study has shown some interesting results about stock prices during periods of deregulation for some major industries that have been regulated heavily for several years. Future studies of the impact of regulatory change upon

stock returns may provide more powerful tests, if information dates can be determined very precisely.

REFERENCES

1. Bailey, E.M., "Deregulation of Airlines," in *Regulation and Deregulation* edited by J. Backman, Bobbs-Merrill Co., 1981, pp. 122-148.

2. Brennan, M., "The Sensitivity of Efficient Hypothesis to Alternate Specifications of the Market Model," *Journal of Finance*, September 1979, pp. 312-331.

3. Brown, S.J., and J.B. Warner, "Measuring Security Price Performance," *Journal of Financial Economics*, 1980, pp. 6-32.

4. Caves, D.W., L.R. Christensen, and M.W. Tretheway, "Airline Productivity Under Deregulation," *Regulation*, November-December 1982, pp. 25-28.

5. Chen, A. and G. Sanger, "An Analysis of the Impact of Regulatory Change: The Case of Natural Gas Deregulation," unpublished working paper, Ohio State University, 1983.

6. *Congressional Quarterly*, various issues.

7. Gujarati, D., "Use of Dummy Variables in Testing for Equality Between Sets of Coefficients in Linear Regression," *The American Statistician*, 1970, pp. 18-21.

8. Hunnicutt, J.E., "Deregulation: A Progress Report," *Management Focus*, July-August 1983, pp. 3-15.

9. Mabley, R.A. and W.D. Strack, "Deregulation: A Green Light for Trucking Efficiency," *Regulation*, July-August 1982, pp. 36-42.

10. MacAvoy, P., *Regulated Industries and the Economy*, Norton Publishing Co., 1981, pp. 91-116.

11. Michel, A. and I. Shaked, "Airline Performance Under Deregulation: The Shareholders Perspective," *Financial Management*, Summer 1984, pp. 5-14.

12. Needham, D., *The Economics and Politics of Regulation*, Little Brown and Co., 1983.

13. Panzar, J.C., "Regulation, Deregulation and Economic Efficiency," *American Economic Review*, December 1979, pp. 311-316.

14. Peltzman, S., "Toward a More General Theory of Regulation," *Journal of Law and Economics*, August 1976, pp. 212-245.

15. Pustay, M.W., "Regulatory Reform and the Allocation of Wealth," *Quarterly Review of Economics and Business*, Spring 1983, pp. 19-28.

16. Schwert, G., "Using Financial Data to Measure the Effects of Regulation," *Journal of Law and Economics*, April 1981, pp. 121-158.

17. Spiller, P.T., "The Differential Impact of Airline Regulation on Individual Firms: An Empirical Analysis," *Journal of Law and Economics*, October 1983, pp. 655-689.

18. Stigler, G., "The Theory of Economic Regulation," *Bell Journal of Economics and Management Science*, April 1971, pp. 121-158.

P.R. Chandy is an Associate Professor of Finance at North Texas State University. Wallace N. Davidson is an Associate Professor of Finance at North Texas State University. Michael C. Walker is an Associate Professor and Chairman of the Department of Finance at the University of Cincinnati.