The Valuation Effect of Government's Merger Challenges: Evidence from a Regulated Industry

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Earlier studies on horizontal mergers have failed to provide conclusive empirical evidence in support of the market power effect. In this study we examine the market power effect in the railroad industry using the two merger attempts made by Santa Fe and Southern Pacific in the 1980s. We find significantly negative stock price reactions of the merging and rival firms to the announcement of government's rejection of the second merger attempt. In addition, the negative stock price reaction of rival firms is mainly associated with rival firms that are similar to merging firms in terms of size and operating territory. These results present significant evidence of the existence of the market power effect for horizontal mergers in a regulated industry.

Introduction

Numerous studies have documented positive stock price reactions to rivals of acquisition targets (Eckbo 1983, 1992; Stillman 1983; Eckbo and Wier 1985, Mitchell and Mulherin 1996, and Song and Walking 2000). The explanations for the rivals' positive abnormal returns, however, are not conclusive. Eckbo (1983 and 1992), Stillman (1983), and Eckbo and Wier (1985) test the market power effect. They investigate stock abnormal returns to rival firms at the time of antitrust complaint announcements. If the rivals' positive stock abnormal returns had come from gains from market power, the antitrust complaints would bring negative stock price reactions to rival firms. Their studies find no significant negative abnormal returns on rival firms' stocks, which the authors claim is inconsistent with the market power effect hypothesized to be an important motivating factor in horizontal mergers. This

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empirical evidence leads Eckbo and Wier (1985) and Eckbo (1992) to reject the proposition that the mergers challenged by regulatory agencies would have had collusive, anticompetitive effects. Eckbo and Wier (1985) and Eckbo (1992) even suggest that the mergers challenged by antitrust authorities would have made the industries more efficient if they had been allowed.

Eckbo (1983) and Stillman (1983) explain that the positive valuation effect associated with merger proposal announcements may be due to positive information released by the merger, such as an in-play effect that rival firms are now more likely to be takeover targets. This explanation is supported by several pieces of evidence. First, Eckbo (1983) and Eckbo and Wier (1985) report that the initial gains to rival firms are not reversed in response to subsequent government's merger challenges. Second, Schumann (1990) reports that there is a 25 percent chance that the industry's relatively small firms become takeover targets conditional upon a horizontal and subsequently challenged merger proposal in the industry. Finally, Mitchell and Mulherin (1996) find that inter-industry patterns in the rate of mergers and takeovers are directly related to the economic shocks borne by the sample industries in their study. The rival firms' positive stock price responses to merger announcements could represent an anticipation of continuing consolidation throughout the entire industry. Song and Walking (2000) formalize the in-play effect and develop the acquisition probability hypothesis suggesting that rivals of acquisition targets earn abnormal returns because of the increased probability that they will be targets themselves. Their empirical evidence supports the predictions of their hypothesis. For example, rivals that become merger targets in the subsequent year earn significantly larger abnormal returns at the initial merger announcements.

Although the stock market evidence does not support the market power effect, the evidence in the product market in the regulated industries shows otherwise. Borenstein (1990) and Kim and Singal (1993) examine changes in airfares around airline mergers. They find that airfares on routes affected by a merger increase significantly relative to routes not affected by a merger. In addition, Kim and Singal (1993) find a positive relation between airfare changes and concentration changes, which is consistent with the market power effect. In the banking industry, Prager and Hannan (1998) find that deposit rates offered by merger banks and their local market rivals decline more than those offered by non-merger banks. They interpret this result as evidence that substantial mergers lead to increased market power in the banking industry.

In the railroad industry, Levin (1981) finds significant increases in rail rates when three railroads merge into two. Levin (1981) and Atkinson and Kerkvliet (1986) find significant rate increases as a result of mergers between two railroads. Evaluating the proposed merger of the Santa Fe and Southern Pacific railroads, Pitman (1990) finds that a serious loss of competition would likely have followed the merger. He estimates that $337 million would have been transferred from shippers to

railroads if the proposal were approved. All of these findings imply that the railroad mergers are likely to create to a certain extent a market power effect.

Other researchers have questioned the findings documented in the studies by Eckbo (1983), Stillman (1983), and Eckbo and Wier (1985). McAfee and Williams (1988) argue that the rival firms used by these studies are larger, multiproduct firms that derive only a small fraction of their revenues from the affected market. The antitrust challenge would naturally not have a big impact on these rival firms. Second, Prager (1992) suggests that the lack of evidence of a market power effect might be due to the strong deterrent effect of antitrust policy that prevailed in the sampling period of 1963 to 1981 chosen by these studies. Finally, Kim and Singal (1993) point out that the average period from the merger announcement to the antitrust challenge in Eckbo (1983) is about ten months. They argue that a ten-month period is simply too long to allow for a meaningful inference regarding the impact of an antitrust challenge on rivals' stock prices. In summary, these studies suggest that to test the market power effect, the sample should consist of unexpected merger challenges.

In this study, the two merger attempts initiated by Santa Fe and Southern Pacific railroads in the 1980s are used to examine the stock market reactions to the proposed merger announcements and government's merger challenges on the merging firms and their rivals. When this merger was proposed, approval of railroad merger applications by the Interstate Commerce Commission (ICC) had been nearly automatic. There was no reason to believe that this merger would be challenged by government. Further, the rival diversification problem identified by McAfee and Williams (1988) would not be an issue in this study because railroads normally generated a high percentage of their revenues from their rail operations. Third, the period from the merger attempt announcement to the antitrust challenge was relatively short in this case. For example, the time period between the disclosure of the first merger attempt and the subsequent government objection was only two days.

More importantly, this case went through a complete round of regulatory interventions including ICC's challenge to the merging firms' first merger attempt, the ICC's block, the Department of Justice's opposition, and the ICC's eventual rejection of the second merger proposal. The government's interventions also prompted merging firms' defensive responses. Facing with the ICC's challenge, the merging firms called off their first merger attempt. In order to receive approval of their second merger proposal, Southern Pacific put its shares into an independent voting trust to facilitate the firm's merger with Santa Fe. But the good gesture was not enough to win government's approval of the merger. In July of 1986 the ICC stunned the railroad industry by denying the second merger application.

When the Santa Fe and Southern Pacific's merger was proposed, railroad firms had little reason to believe that anticompetitive mergers would be contested.[1] The government's rejection of this merger after a string of mega-railroad merger approvals made it clear that anticompetitive mergers would not be tolerated. The rejection also signaled a significant shift toward more regulation by the ICC that would deter railroads from contemplating combining with each other. It was not until 1994 that another big railroad merger went ahead, almost eight years after the ICC turned down Santa Fe and Southern Pacific's second merger application. The rejection of the Santa Fe and Southern Pacific's merger application really set an important precedent in the railroad industry. It is for this reason that we believe this case offers an ideal experimental laboratory to test the existence of the market power effect.

If a merger has the market power effect, the government's challenges to Santa Fe and Southern Pacific's merger applications would imply that railroads would not be able to gain the potential benefits they would otherwise receive. Therefore, we expect negative stock price reactions to the intervention events associated with merger attempts for Santa Fe, Southern Pacific, and other railroad firms. On the other hand, the actions taken by Santa Fe and Southern Pacific that either would facilitate government's approval of the merger or did not confront the government head-on would be beneficial for all railroads. We therefore expect positive stock price reactions to these events for Santa Fe, Southern Pacific, and other railroad firms.

History of the Santa Fe/Southern Pacific Merger Attempts

Since 1970, a parade of rail consolidations had occurred without any antitrust objections by the Department of Justice and the ICC. For instance, Chessie System and Seaboard Coast Line merged and became the giant system of CSX. Norfolk & Western and Southern railroads merged and became Norfolk Southern. Burlington Northern acquired St. Louis-San Francisco Railway, and Union Pacific acquired Missouri Pacific. CSX and Norfolk Southern dominated in the east part of the country, and Burlington Northern and Union Pacific occupied the west part of the country.

With this backdrop, Southern Pacific drew a plan to be united with Santa Fe. On May 14, 1980, The Wall Street Journal (WSJ) first disclosed that Southern Pacific was holding serious merger talks with another transportation company, which it declined to identify. The next day, The Wall Street Journal reported that Southern Pacific was expected to sell its railroad operations to Santa Fe, Southern Pacific's longtime rival. But on May 16, just two days after the first report on the merger, it

[1] In 1968, the ICC denied a merger proposal from the Chicago, Burlington & Quincy, the Great Northern and the Northern Pacific. That proposal, however, was revised and resubmitted in 1970 and approved. The result was the Burlington Northern.

was disclosed that the ICC was concerned with the anti-competitive aspect of the merger. Four months after the first report of the attempted merger, Santa Fe and Southern Pacific called off the attempted merger in a mutual move. Although the two companies declined to say why they had discontinued those negotiations, industry analysts said that the main reason might have been anticipated difficulties in obtaining the ICC's approval.

Three years after the first failed merger attempt, Santa Fe and Southern Pacific made another attempt to merge their railroad operations. The federal government appeared to have become much more receptive to railroad mergers at this time, and the ICC had just approved in September 1982 a merger of three large railroads: the Union Pacific, the Missouri Pacific, and the Western Pacific.

On September 27, 1983, The New York Times reported that Santa Fe and Southern Pacific asked that trading in their stocks be halted the day before, amid widespread expectation that the two firms would announce a newly negotiated merger. Santa Fe and Southern Pacific announced an agreement to merge all their rail operations according to newspapers reports on September 28. The combination, which would create the nation's third-largest railroad, would take place through a swap of some $5.2 billion of stock.

Industry analysts maintained that the main motive for combining the two rail lines would be the elimination of competition and duplication of services in carrying wheat, coal, automobiles, and other cargo through several regions of the West. Under the agreement, the two firms would become subsidiaries of a holding company, Santa Fe Southern Pacific Corp. The holding company would begin operating the natural resources operations and other non-rail businesses such as pipelines and trucking companies. The holding company would also operate one of the railroads, while the other rail line would be placed under a trusteeship until the ICC approved the merger. Although analysts considered the merger attempt a certainty, the unusual arrangement also caused some doubts. Even though this merger was expected to be approved quickly, regulatory approvals for other railroad mergers had taken more than two years, during which time none of the businesses of the other railroads were combined. Southern Pacific later announced that it would put all of its shares into an independent voting trust to facilitate the company's merger with Santa Fe before the ICC gave its official blessing. The voting trust was established to prevent any change in control or in the competitive situation of the railroads during the long period while the ICC was evaluating the transaction.

On December 15, 1983, The Wall Street Journal reported that the ICC issued a temporary cease and desist order of short duration in response to Union Pacific's petitions to keep the two railroads from merging. Santa Fe and Southern Pacific merged into a new holding company on December 23, 1983; hours after the ICC

lifted its temporary order blocking the merger.[2] But the ICC ordered rail operations of both firms to remain separate pending inquiry.

The Department of Justice, on October 23, 1985, concluded that the merger would substantially reduce competition and should be rejected by the ICC. On July 24, 1986, in a move that stunned the railroad industry, the ICC rejected the long-standing proposal of merging Santa Fe and Southern Pacific on the grounds that the anticompetitive problems outweighed potential benefits. In April 1987, Santa Fe Southern Pacific's chairman and chief executive John J. Schmidt resigned, apparently ousted by the directors displeased with the way the merger was handled. A proposal to reopen the proceeding was rejected by the ICC in July 1987. In December 1987, Santa Fe Southern Pacific agreed to sell the Southern Pacific railroad to Rio Grand Industries. Even Santa Fe itself did not escape the fate of being acquired by Burlington Northern in 1995.

Data

Daily stock return data are collected from the 2001 CRSP database for all railroad firms listed on the NYSE or AMEX during the period of May 1980 through July 1986. A chronology of events relating to the Santa Fe and Southern Pacific's merger proposals is constructed by checking all references to the Santa Fe and Southern Pacific in The Wall Street Journal Index, the New York Times Index, and the Lexus/Nexus Database. Event dates are selected based on the belief that occurrences of these dates provide potentially important information about the future of the Santa Fe and Southern Pacific's merger attempts. Because we examine the stock market reactions to the merger related events, the event dates are defined as the first stock market trading day when the event was disclosed to the public. We have identified nine events. Table 1 provides a list of the events, their descriptions, and the dates that the events were first reported in The Wall Street Journal or The New York Times.[3]

There were some other events that were related to these nine events. For example, The Wall Street Journal first reported the news circulated in the stock market about the second merger attempt of Santa Fe and Southern Pacific on September 27, 1983. Then the next day's Wall Street Journal detailed the terms of the merger. On

[2] In Table 1, the event date for this event was December 24, 1983 because December 24, 1983 was the first day that this event was published in the newspapers.

[3] We use the date that the news appeared on WSJ as the event date because the WSJ is used widely by investors. Yau, Ferri, and Sugrue (1994) conclude that the WSJ-based samples for corporate news items can be representative of cases not covered by the WSJ. Further, they show evidence indicating that the results of event studies using WSJ-based samples may support inferences about events not reported in the newspaper. We also checked the NYT Index to make sure that the dates that the relevant news appeared on the WSJ are indeed the earliest stock market trading dates.

October 5, 1983, The Wall Street Journal provided further information of the merger plan. In this case, we believe that the first newspaper article provides more new information than the two subsequent articles, and we only select the event reported on September 27, 1983.

Table 1—Important Events in the Santa Fe/Southern Pacific Merger Attempts

800514 (MERGER1)	Southern Pacific is holding serious merger talks with another transportation company that it declined to identify.
800516 (CHALLENGE)	Santa Fe Industries Inc.'s $1.2 billion plan for acquiring Southern Pacific faces federal scrutiny; Interstate Commerce Commission (ICC) chief says revamping of Western lines raises anti-competitive queries.
800915 (CALL-OFF)	The proposed merger of Santa Fe and Southern Pacific was called off in mutual move.
830927 (MERGER2)	Santa Fe and Southern Pacific merger seen; move could create major road in west; terms of the proposed merger were not available.
831028 (TRUST)	Southern Pacific will put all the shares of its railroad and trucking unit into an independent voting trust to facilitate the company's merger with Santa Fe Industries Inc.
831215 (BLOCK)	ICC issued a cease-and-desist order temporarily blocking the proposed merger of Santa Fe Industries Inc. and Southern Pacific Co.
831224 (UNBLOCK)	Santa Fe completed its merger with Southern Pacific into a new holding company, Santa Fe Southern Pacific, after the ICC lifted its temporary order blocking merger, but ICC ordered rail business of both firms to remain separate pending inquiry.
851023 (OPPOSITION)	Justice Department strongly opposed the proposed merger of the Santa Fe railroad with the Southern Pacific railroad, saying that the combination would eliminate or substantially reduce railway competition in parts of the US.
860725 (REJECTION)	The ICC in a move that stunned railroad industry rejected the longstanding proposal to merge Santa Fe and Southern Pacific railroads. ICC decided merger posed anti-competitive problems that out-weighed potential public benefits. Santa Fe Southern Pacific, which owns Santa Fe and holds Southern Pacific in trust, was order to sell one of both railroads.

Data Sources: Wall Street Journal Index, the New York Times Index, and the Lexus/Nexus Database

We choose all railroads with company information available in Moody's Transportation Manuals as the competing firms. The 1980 and 1983 manuals are used to find the mileage and major operating territories operated by each railroad. The two merger attempts occurred in two distinct time periods: the first from May 14, 1980 to September 15, 1980 and the second from September 27, 1983 to July 25, 1986. The competing firms are different in two time periods, depending on data availability.

We are able to identify 13 competing railroads for the first merger attempt and 10 railroads for the second merger attempt.

Methodology

The announcement dates for the two merger attempts are May 14, 1980 and September 27, 1983. We use a two-day event window, (-1, 0), to capture the announcement effect of the event. Day 0 is the date when news associated with an event is first appeared in The Wall Street Journal Index or the New York Times Index. When the news surfaces while the stock exchanges are open for trading, the news is initially impounded in the day t = -1 stock price. Otherwise, day t = 0 is the first trading day when the news is reflected in the stock price.

Following Prager (1992), we use a dummy-variable approach to examine the effects of developments in the Santa Fe/Southern Pacific merger attempts on merging firms and other railroads. The basic model of our examination is in the following form:

$$R_{it} = a_i + b_i R_{mt} + \sum_{j=1}^{n} d_{ij} D_{jt} + e_{it} \quad (1)$$

where:

R_{it} = Daily stock return of railroad firm i in day t, t is from 1 to T; 1 is the first day in the estimation period and T is the last day in the estimation period;

R_{mt} = Daily market return in day t, which is included to control for market movements;

D_{jt} = 1 during the one-day event window, t = -1, and 0 otherwise; or

D_{jt} = 1 during the one-day event window, t = 0, and 0 otherwise; or

D_{jt} = 1 during the two-day event window, t = -1 and 0, and 0 otherwise, j = 1 to 9 of the nine events that we identify in Table 1.

The equations are estimated jointly using the seemingly unrelated regression (SUR) approach for two groups of railroad firms. The group of merging firms includes Santa Fe and Southern Pacific (later on Santa Fe Southern Pacific) and the group of other railroad firms. The SUR is designed to simultaneously estimate a system of multiple regressions that may seem unrelated, but where the errors are potentially correlated between different equations. Schwert (1981) suggests that individual stock returns for firms in the same industry measured over a common time period are contemporaneously correlated because the firms will react similarly to any unanticipated event. We use the SUR approach to allow for the possibility of error correlations across firms. The estimation period for the first three events is from May 13, 1980 to September 15, 1980. For the last five events, the estimation period is from September 26, 1983 to July 25, 1986.

There are three events associated with the first merger attempt and six events associated with the second attempt. The CRSP doesn't have the return data for the

event UNBLOCK for either Santa Fe or Southern Pacific, as this event occurred during the interval between when Santa Fe and Southern Pacific were still trading separately and when Santa Fe Southern Pacific began to trade as a single entity. Therefore, the impact of the event UNBLOCK on stock returns cannot be estimated. We are left with eight events. Also on September 26, 1983, which is supposed to be t = -1 of the two-day event window for the first event of the second merger attempt, Santa Fe and Southern Pacific asked that trading in their stocks be halted, amid widespread expectation that two firms would announce a newly negotiated merger. We hence use September 27 and 28 of 1983 as t = -1 and t = 0 as the two-day event window for the same event.

Results

Merging Firms

In Table 2, we present the results of the impacts of Santa Fe and Southern Pacific's merger events on merging firms that include Santa Fe and Southern Pacific

Table 2—The Means of Estimated Coefficients and the P-value of an F-Test Testing the Hypothesis that All Estimated Coefficients Equal Zero from Seemingly Unrelated Regression Estimations for Santa Fe, Southern Pacific and Santa Fe Southern Pacific

	Estimated Coefficients and P-values for Event Variables		
	Event Window = -1	Event Window = 0	Event Window = -1, 0
Panel A: First Merger Attempt			
MERGER1	0.0192*	0.0134	0.0270***
(800514)	(0.098)	(0.266)	(0.007)
CHALLENGE	-0.0501***	-0.0196*	-0.0415***
(800516)	(0.000)	(0.097)	(0.000)
CALL-OFF	0.0138	0.0288**	0.0237**
(800915)	(0.233)	(0.017)	(0.017)
Panel B: Second Merger Attempt			
MERGER2	-0.0550***	-0.0453***	-0.0503***
(830927)	(0.000)	(0.000)	(0.000)
TRUST	0.0132	0.0128	0.0127*
(831028)	(0.222)	(0.242)	(0.093)
BLOCK	-0.0185*	-0.0001	-0.0098
(831215)	(0.086)	(0.969)	(0.197)
OPPOSITION	-0.003	-0.0262*	-0.0148
(851023)	(0.842)	(0.090)	(0.164)
REJECTION	-0.070***	-0.0301*	-0.0503***
(860725)	(0.000)	(0.052)	(0.000)

The estimated coefficients are the average daily abnormal returns during the various event periods. Panel A reports the results for the three events in the first merger attempt which covered the period of May 14, 1980 to September 15, 1980. Panel B reports the results for the five events in the second merger attempt which covered the period of September 27, 1983 to July 25, 1986.

*** Significant at the 0.01 significance level

** Significant at the 0.05 significance level

* Significant at the 0.10 significance level

(later on Santa Fe Southern Pacific). The statistics presented include the mean values of all the estimated coefficients and the p-value of an F-test that captures any effect an event had on stock prices of the group of merging firms. We use three alternatives for the event windows. They are t = -1, t = 0, and t = -1, 0.

The results presented in Table 2 indicate that the signs of the estimated coefficients for t = -1 and t = 0 are consistent with each other. Our discussions of the results are focused on two-day event window (t = -1,0), as it is likely, as we indicated before, that the market reaction might be impounded in day t = -1 stock prices or t = 0 stock prices depending on the timing of the news release associated with the events. If the news release occurs before the closing of the market, the impact of the event will be impounded in day t = -1 stock prices. Otherwise, it will be reflected in day t = 0 stock prices.

Among the eight events, six events generate significant coefficients for the merging firms. The estimated coefficient for MERGER1 is 0.027, which is significant at the 0.01 significance level. This piece of evidence is consistent with a host of other merger-related studies. For example, a recent study by Mulherin and Boone (2000) finds an average target return of 20.2 percent in the 3-day window around the acquisition announcement offsetting a slightly negative but insignificant bidder return.[4]

The announcement of the ICC's challenge to the first merger attempt (CHALLENGE) was a significant blow to the shares of Santa Fe and Southern Pacific. The estimated coefficient of -0.0415 is significant at the 0.01 significant level. The announcement of merger call-off (CALL-OFF) caused a positive impact on the stock returns of the merging firms. The estimated coefficient of 0.024 is significant at the 0.05 significance level. But the magnitude of the estimated coefficient is smaller than the absolute magnitude of the estimated coefficient associated with the CHALLENGE event.

The market power hypothesis argues that a merger can increase the monopolistic power for merging and rival railroads. When a merger is terminated, the market power hypothesis would suggest that merging firms should suffer negative abnormal returns. In this case, however, Santa Fe and Southern Pacific did not terminate the merger attempt voluntarily. Instead, they called off their first merger attempt after the ICC voiced its concerns on the merger. It appeared that Santa Fe and Southern Pacific withdrew the merger proposal to avoid the potential rejection of the ICC. If we combine the positive $CAR_{-1, 0}$ associated with the CALL-OFF and the negative $CAR_{-1, 0}$ associated with the CHALLENGE, the net $CAR_{-1, 0}$ is still negative for Santa Fe and Southern Pacific. In essence, Santa Fe and Southern Pacific recovered part of

[4] In our study, Santa Fe was the bidder and Southern Pacific was the target because it was Southern Pacific that planned to sell the rail operation to Santa Fe.

the negative returns they lost associated with the CHALLENGE event through the CALL-OFF event.

Independent from the first merger attempt, the market power hypothesis would predict that the merging firms should experience positive stock returns when the second merger attempt was announced. The market could not forget the challenge issued by the ICC to Santa Fe and Southern Pacific's first merger attempt. Conditioning on the outcome of the first merger attempt, the market power hypothesis could suggest negative stock price reactions to Santa Fe and Southern Pacific's second merger attempt. This would be especially the case if the stock market had doubts that the ICC would approve the second merger attempt. The worst-case scenario could be more regulations on the whole industry. In this scenario, other railroad firms would also suffer from consequences of the rejection of the second merger proposal. Indeed, the shares of Santa Fe and Southern Pacific were negatively affected when Santa Fe and Southern Pacific announced their second merger attempt in 1983. The estimated coefficient associated with this event is –0.0503, which is significant at the 0.01 significance level. The market's reaction to the event of MERGER2 was in sharp contrast to its reaction to the event of MERGER1. The stock market's reaction incorporated the reservations that the market had about the outcome of the second merger attempt.

When Santa Fe and Southern Pacific announced that they would put their shares in a trust (TRUST) to facilitate the merger process, the market responded positively. The estimated coefficient associated with this event is 0.0127, which is significant at the 0.1 significance level. The estimated coefficients associated with the next two events, BLOCK and OPPOSITION, are not significant at the 0.1 significance level, although the signs of the coefficients are both negative.

The ICC rejection of the merger proposal dealt a major blow to shares of the holding company Santa Fe Southern Pacific. The estimated coefficient associated with the event REJECTION is –0.0503, which is significant at the 0.01 significance level. The rejection was probably a surprise to the market, as the railroad industry analysts expected that the ICC would approve the merger with some concessions from Santa Fe and Southern Pacific.

Our overall results are consistent. The events that had negative consequence for the merger generally resulted in negative stock price reactions. The events that were helpful for the merger generally resulted in positive stock price reactions. The only exception is the first event in the second merger attempt, MERGER2. The market might hold a pessimistic view of the merger attempt, considering the outcome of the first merger attempt. It turns out that the stock market had accurately predicted the demise of the second merger attempt from the beginning.

Other Railroads

Table 3 reports the results of the impacts of Santa Fe and Southern Pacific's merger events on other railroad firms. Again, we will focus our discussions on the results using a two-day event window. In general, the signs of the coefficients are consistent with the signs of abnormal returns accruing to Santa Fe and Southern Pacific. The signs of the coefficients associated with MERGER1, CALL-OFF, and TRUST events are positive, and the signs of the coefficients associated with CHALLENGE, MERGER2, BLOCK, OPPOSITION, and REJECTION are negative. The p-values indicate that the coefficients are negatively significant for the events of MERGER2 and REJECTION at the 0.1 and 0.01 significance levels and positively significant for the event of CALL-OFF at the 0.1 significance level. The magnitudes of the estimated coefficients are 0.008 for the event CALL-OFF, -0.0058 for the event MERGER2, and –0.0107 for the event REJECTION, respectively.

Table 3—The Means of Estimated Coefficients and the P-value of an F-Test Testing the Hypothesis that All Estimated Coefficients Equal Zero from Seemingly Unrelated Regression Estimations for Other Railroads

	Estimated Coefficients and P-values for Event Variables		
	Event Window = -1	Event Window = 0	Event Window = -1, 0
Panel A: First Merger Attempt			
MERGER1	-0.0025	0.0071	0.0024
(800514)	(0.663)	(0.210)	(0.576)
CHALLENGE	-0.0040	-0.0087	-0.0063
(800516)	(0.482)	(0.123)	(0.136)
CALL-OFF	0.0023	0.0137**	0.0081*
(800915)	(0.684)	(0.016)	(0.057)
Panel B: Second Merger Attempt			
MERGER2	-0.0039	-0.0075*	-0.0058*
(830927)	(0.399)	(0.098)	(0.099)
TRUST	-0.0007	0.0039	0.0016
(831028)	(0.887)	(0.834)	(0.648)
BLOCK	0.0036	-0.0066	-0.0015
(831215)	(0.443)	(0.155)	(0.659)
OPPOSITION	-0.0018	-0.0037	-0.0027
(851023)	(0.706)	(0.433)	(0.405)
REJECTION	-0.0151***	-0.0064	-0.0107***
(860725)	(0.001)	(0.173)	(0.002)

The estimated coefficients are the average daily abnormal returns during the various event periods. Panel A reports the results for the three events in the first merger attempt which covered the period of May 14, 1980 to September 15, 1980. Panel B reports the results for the five events in the second merger attempt which covered the period of September 27, 1983 to July 25, 1986.

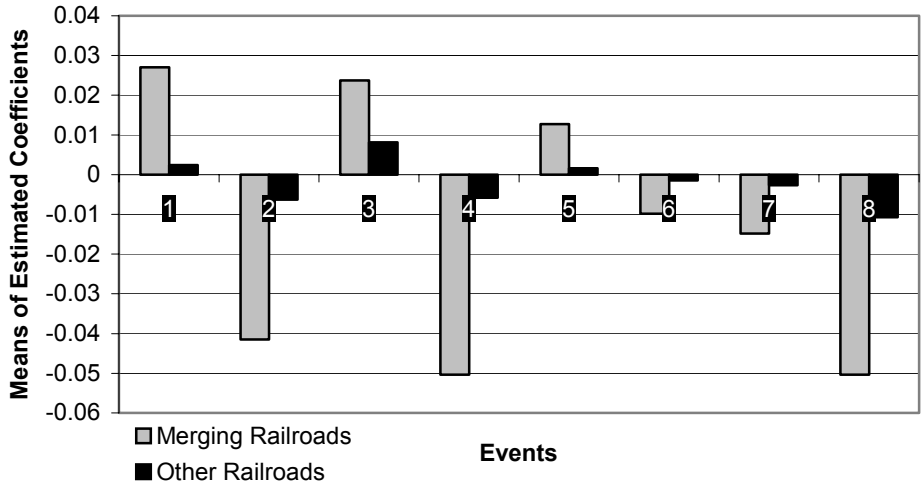
*** Significant at the 0.01 significance level
** Significant at the 0.05 significance level
* Significant at the 0.10 significance level

So far, the evidence on other railroads is consistent with the evidence on merging firms. The events which have positive (or negative) impacts on the returns of

merging firms also have positive (or negative) impacts on the returns of other railroads. This is consistent with the predictions of the market power effect. It suggests that any event that increases the probability of collusion will benefit both merging firms and rivals in the same industry. Therefore, the signs of abnormal stock returns of merging firms and other railroads associated with merger events will be consistent with each other according to the predictions of the market power effect. On the other hand, the efficiency gain effect would suggest that any event that is beneficial for the merging firms would be harmful for other railroads. This effect predicts that each event's impact on the stock returns of merging firms and other railroads will be opposite to each other.

Figure 1 uses two series of bar charts to show the magnitudes of the estimated coefficients for the eight events in the Santa Fe and Southern Pacific's two merger attempts. The lighter bars represent the impact of the merger events on merging firms, and the darker bars represent the impact of the merger events on other railroads. The patterns of the two series are consistent, and the difference is in the magnitudes of the bars. In each case, the magnitude of the lighter bars is greater than the magnitude of the darker bars. This indicates that the eight events have the same direction impact on the stock returns of the group of merging firms and the group of other railroads, although the impact is stronger on the stock returns of merging firms.

Figure 1—Estimated Coefficients for Eight Event Variables in the Santa Fe and Southern Pacific Merger Attempts



The effect of the Santa Fe and Southern Pacific merger attempts would not be equally felt by all railroads. The Interstate Commerce Commission has long recog-

nized that the railroad industry has barriers to entry and exit (Baumol, Panzar, and Willig, 1988). The barriers to entry and exit are mainly due to the immobility of railroad assets. The railroad industry has often been characterized as a classical oligopoly in which each of a limited number of larger rails has enough strength to affect the market, but not enough to ignore the reactions of their competitors. [See Fitzsimmons and Knudsen (1991) and Sun and Tang (2001).] The consolidated railroad system of Santa Fe and Southern Pacific would have ranked as the nation's second largest in terms of track mileage and gross revenue.[5] If the merger were approved by the ICC, larger railroads would have benefited more from the collusions among railroads. The stock prices of larger railroads would also respond more strongly to government's merger challenges and merging firms' responses. Therefore, we hypothesize that the stock abnormal returns documented in Table 3 would be different among larger and smaller railroads. For events of MERGER1, CALL-OFF, TRUST, larger railroads would have more positive abnormal returns than smaller railroads. For other events, larger railroads would have more negative abnormal returns than smaller railroads.

In an effort to capture these differences among firms, we separate all the railroad firms in our sample into two sub-samples using the median mileages operated by railroad firms. We use mileage instead of revenues because railroads often operate other types of non-rail businesses such as natural resources, pipeline, and trucking. Mileage would be a better measure of the size of a railroad's rail operation. The railroads operated more mileages than the median are classified as larger firms, and others are classified as smaller firms. For the first merger attempt, the median mileage operated by all competing firms was 9,561 miles. The average mileage operated by smaller railroads was 3,479 miles, and larger railroads operated an average of 15,851 miles. For the second merger attempt, the median mileage operated by all competing firms was 10,989 miles. The average mileage operated by smaller railroads was 5,078 miles, and larger railroads operated an average of 19,051 miles. In both cases, the average mileage operated by larger railroads is significantly greater than that operated by smaller railroads at the 0.01 significance level. Santa Fe and Southern Pacific operated more miles than the medians in both merger attempts. We estimate Equation 1 separately for larger railroads and smaller railroads. The results are presented in Table 4.

For the first merger attempt, the p-values indicate that none of the estimated coefficients for the sample of smaller firms is significant. For the larger firms, the mean of all estimated coefficients is –1.52 percent for the CHALLENGE event. The associated p-value of 0.011 allows us to reject the hypothesis that all coefficients equal zero at the 0.05 significance level. On the other hand, the mean of all estimated

[5] Burlington Northern was the largest railroad in terms of track mileage and CSX was the largest in revenues.

Table 4—The Means of Estimated Coefficients and the P-value of an F-Test Testing the Hypothesis that All Estimated Coefficients Equal Zero from Seemingly Unrelated Regression Estimations Separately for Larger and Smaller Railroads

	Estimated Coefficients and P-values for Event Variables with Two-Day Event Window	
	Larger Railroads	Smaller Railroads
MERGER1	-0.0018	0.0060
(800514)	(0.763)	(0.271)
CHALLENGE	-0.0152**	0.0013
(800516)	(0.011)	(0.808)
CALL-OFF	0.0134**	0.0035
(800915)	(0.026)	(0.516)
MERGER2	-0.0071*	–0.0044
(830927)	(0.099)	(0.404)
TRUST	0.0057	–0.0025
(831028)	(0.194)	(0.636)
BLOCK	-0.0026	-0.0005
(831215)	(0.551)	(0.927)
OPPOSITION	0.0018	–0.0073
(851023)	(0.681)	(0.165)
REJECTION	-0.0137***	-0.0078
(860725)	(0.002)	(0.137)

The estimated coefficients are the average daily abnormal returns during the various event periods

*** Significant at the 0.01 significance level

** Significant at the 0.05 significance level

* Significant at the 0.10 significance level

coefficients is a positive 1.34 percent for the CALL-OFF event. The associated p-value of 0.026 allows us to reject the null hypothesis that all coefficients equal zero at the 0.05 significance level.

For the smaller railroads in the second merger attempt, none of the p-values allows us to reject the hypothesis that all coefficients equal zero. For the larger firms, the coefficient for the MERGER2 event is significantly negative at the 0.1 level and the coefficient for the REJECTION event is significantly negative at the 0.01 level. Apparently, the results presented in Table 3 are mainly driven by the larger firms. This is consistent with our prediction that the merger challenges and Santa Fe and Southern Pacific's responses would cause larger abnormal returns on the stocks of larger railroads.

It is also likely that the railroads operating in the similar territories, such as Santa Fe or Southern Pacific, would be affected more by Santa Fe and Southern Pacific's merger attempts and government's interventions. We, therefore, use Moody's Transportation Manuals to identify the major operating territories of each rival railroad. The entire sample is divided into railroads operating in the western part of the nation (west railroads) and other areas of the country (other area railroads). We re-estimate Equation 1 separately for west railroads and other area railroads and the results are presented in Table 5. The results indicate that indeed the west railroads were affected more by the events associated with Santa Fe and South-

ern Pacific merger attempts. The estimated coefficient associated with the event CALL-OFF is significantly positive at the 0.05 significance level for the west railroads. The estimated coefficient associated with the event REJECTION is significantly negative at the 0.01 significance level for the west railroads. The coefficient associated with the same event is also significantly negative at the 0.1 significance level for other area railroads.

Table 5—The Means of Estimated Coefficients and the P-value of an F-Test Testing the Hypothesis that All Estimated Coefficients Equal Zero from Seemingly Unrelated Regression Estimations Separately for West and Other Area Railroads

	Estimated Coefficients and P-values for Event Variables with Two-Day Event Window	
	West Railroads	Other Area Railroads
MERGER1	0.0069	0.0003
(800514)	(0.215)	(0.956)
CHALLENGE	-0.0045	-0.0074
(800516)	(0.386)	(0.192)
CALL-OFF	0.0124**	0.0053
(800915)	(0.019)	(0.344)
MERGER2	-0.0042	-0.0066
(830927)	(0.436)	(0.121)
TRUST	0.0020	0.0014
(831028)	(0.682)	(0.736)
BLOCK	-0.0042	-0.0004
(831215)	(0.385)	(0.926)
OPPOSITION	-0.0026	-0.0028
(851023)	(0.589)	(0.510)
REJECTION	-0.0194***	-0.0070*
(860725)	(0.000)	(0.096)

The estimated coefficients are the average daily abnormal returns during the various event periods.
*** Significant at the 0.01 significance level
** Significant at the 0.05 significance level
* Significant at the 0.10 significance level

Conclusions

Previous studies have suggested different hypotheses as the motives for horizontal mergers. Empirical literature examining the market power effect hypothesis has been inconclusive. This study intends to shed a new light into the understanding of the merger motives using the two merger attempts made by Santa Fe and Southern Pacific railroads. Our results provide new evidence in support of the market power effect hypothesis in horizontal mergers such as the one involving Santa Fe and Southern Pacific.

The market power effect is examined using the reactions of the non-merger railroads' stock prices to the events associated with the two merger attempts. The result shows that the stock prices of both the merging and non-merging firms responded favorably to the announcement when Santa Fe and Southern Pacific called off the first merger attempt. This is contrary to the existing finding of negative stock price

reaction associated with cancellations of merger attempts for target firms. [See Akhigbe, Borde, and Wyhte (2000).] The stock market and investors were apparently relieved that Santa Fe and Southern Pacific did not act recklessly and forced the ICC to reject the merger proposal. When Santa Fe and Southern Pacific announced their second merger attempt, the stock prices of other railroads responded unfavorably along with the stock prices of Santa Fe and Southern Pacific. It appears that the market was predicting that this merger would not sustain the government's scrutiny. When the final rejection verdict was delivered, all railroads' stock prices suffered a big blow. The market behaved as if future similar merger attempts would fare unfavorably with government. In fact, there were no any major railroad mergers proposed until 1994 after ICC's rejection of the merger attempt of Santa Fe and South Pacific in 1986. Apparently, any government's action making a merger less likely can have an industry-wide effect. When we separate the sample into larger and smaller railroads or west and other railroads, the testing results provide further evidence supporting the market power effect hypothesis.

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