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**THE STOCK PRICE PERFORMANCE OF RAILROAD COMPANIES
ASSOCIATED WITH MERGERS AND ACQUISITIONS**

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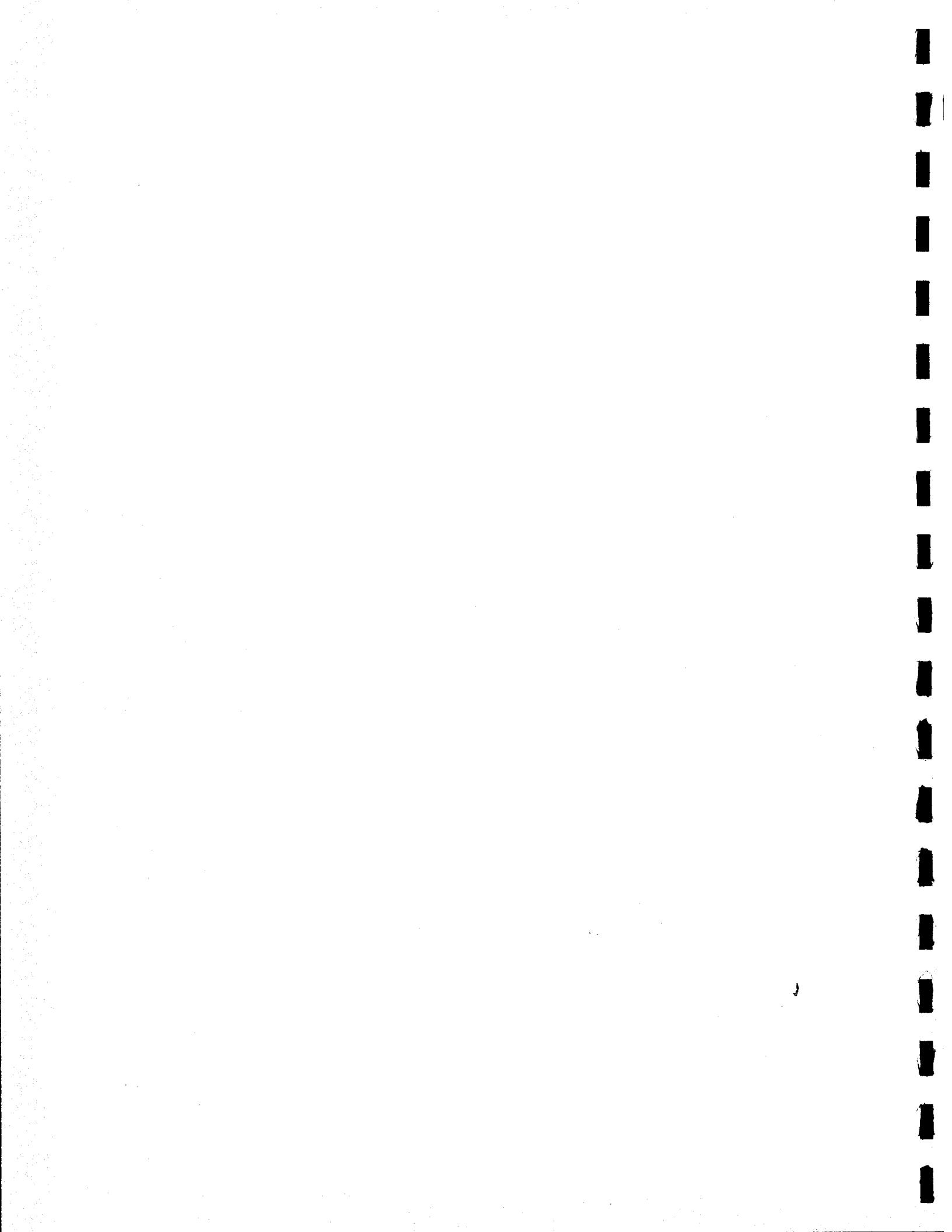
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16. Abstract This study investigates the abnormal returns of railroad merging firms and their industry counterparts around merger proposal and antitrust challenge announcements, in order to examine whether the increase in value of the merged firms emanates from the efficient gain effect or the market power gain effect. The empirical results of this study show that the stockholders of acquiring firms do not gain from mergers. In contrast, stockholders of acquired firms and industry counterparts earn significantly positive abnormal returns. These findings suggest that railroad mergers may result in gains from the exercise of greater market power. However, the acquiring firms' gain from improved operations and exercise of greater market power is limited, as hypothesized in a dominant firm model. On the other hand, the industry counterparts gain from an increase in market power and do not lose from the limited gain in merging firms' efficiency. The findings are consistent with the market power gain effect. The findings also suggest that both merging firms and their industry counterparts gained on the day the merging firms voluntarily called off the merger proposal. Furthermore, when the federal regulatory agency, the Interstate Commerce Commission (ICC), rejected a merger, both the merged firm and its industry counterparts had significantly negative abnormal returns. The empirical evidence suggests that a selective tightening of the antitrust policy governing railroad mergers may enhance consumer welfare.					
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The Stock Price Performance of Railroad Companies Associated with Mergers and Acquisitions

I. Introduction

Numerous empirical studies have investigated the effects of mergers on shareholder wealth. The results of these studies generally support the conclusion that mergers create synergistic gains. However the source of the gains remains unclear. Synergistic gains can arise from efficiency gains that eliminate redundancies when the merging firms are technologically or spatially proximate. These efficiency gains lead to lower marginal costs, consequently lowering output prices and increasing consumer surplus. Synergistic gains can also arise through the exercise of market power, with a concomitant reduction in consumer surplus. The finance literature, focusing on valuation effects of merger announcements, in general, supports the theory of efficiency gain effect in mergers and rejects the argument of market power gain effect.

The purpose of this study is to provide empirical evidence on the sources of synergistic gains associated with railroad mergers. During a period of increasing deregulation, the U.S. transportation industries have experience unprecedented reorganization and consolidation, resulting in fewer but larger firms in the industries. Whether these firms' pursuit to become larger is motivated by efficiency gains or exercise of market power has very different implications for industrial policy. Determining the actual source of increased shareholder wealth in mergers is important since regulatory agencies need to pay special attention to market power gains which are results of wealth transfers from consumers to the merged firms.

There are three main reasons for testing the efficiency gains and market power gains using railroad mergers. First, railroad mergers tend to be horizontal mergers. Since horizontal mergers increase market concentration, which in turn increases the probability of successful collusion, market power increases are likely to occur in the case of horizontal mergers. Second, horizontal mergers are also likely to generate efficiency gains through eliminating redundancies. Third, railroad mergers are more likely to affect the valuation of the other non-merging industry counterparts than the other corporate mergers. Unlike the other large industrial firms with

diversified business, railroad firms are more focused and normally generate a large fraction of the revenues from their railroad business. Therefore, the valuation effect of the other non-merging industry counterparts will be more prominent and can be used in this study to differentiate the efficiency gains from the market power gains associated with the railroad mergers.

The remainder of this paper is organized as follows. Section II provides the literature review, and section III presents the discussion of hypotheses. Section IV discusses the sample selection process, and section V provides a summary of the methodology. Section VI presents the results of our analyses, and section VII summarizes the contributions and conclusions of this research.

II. Literature Review

Motivations for Mergers

There is substantial evidence that synergistic gains constitute an important reason for gains to stockholders of merging firms¹. Two firms may merge for the purposes of achieving operating efficiencies or economies of scale. One means of achieving operating efficiencies is to combine two firms having complementary resources to eliminate duplicate facilities, operations, or departments. Two firms in the same line of business might also be merged in order to achieve economies of scale in production, distribution, or some other phases of their operation.

Economies of scale occur when the average unit cost of goods sold decreases as output expands. For example, by merging two railroad firms with overlapping routes, the merged firm can better coordinate scheduling and eliminate excess capacity. Railroad mergers therefore can achieve operating efficiencies through slashing duplicative headquarters staffs, rail routes, and repair shops. In addition, economies of scale can be achieved in railroad mergers through broadening the range of commodities hauled, expanding the territories served, and strengthening the management team.

Two firms may also merge for synergistic gains through the exercise of market power. Market

¹ See Jensen and Ruback (1983); Bradley, Desai, and Kim (1988); and Jarrell, Brickley, and Netter (1988) for empirical evidence.

power, sometimes referred to as monopoly power, can be defined as the ability to profitably raise price above the competitive level in a market. The railroad markets are generally characterized as markets dominated by a few firms with all firms producing a homogeneous product. If a railroad merger results in fewer but larger firms in the market, the merged firm with larger market share can profit from raising price in the market. The gain through exercise of market power in fact is the wealth transfer from consumers to the merged firm. Therefore, the increase in value of merging firms may be attributable to the efficiency gains, the market power gains, or the combination of the two.

Stock Market Evidence on Mergers

Empirical evidence on stock market reaction to merger announcements strongly indicates that shareholders of target firms gain from a successful takeover. This is not surprising given that target shareholders require a premium as an inducement to sell their shares to the acquiring firm. Jensen and Ruback (1983) reported that, on average, target share prices increased about 16 to 30 percent around the date of the announcement of a tender offer; in contrast, target share prices increased only about 10 percent in negotiated merger offers. A recent study by Jarrell, Brickley, and Netter (1988) found that these returns increased substantially during the 1980s to an average of about 53 percent.

Returns to bidders around tender offer announcements were mixed, and the average returns varied considerably over time. Jarrell and Poulsen (1989) reported that the announcement returns to bidders in tender offers dropped from a statistically significant 5 percent gain in the 1960s to an insignificant one percent loss in the 1980s. This finding could be attributed in part to regulations that were disadvantageous to the bidders and perhaps to increased competition among bidders for specific targets. One also can interpret this finding as an indication that either the number of bad mergers has been increasing or bidders have been paying too much in recent years.

With regard to looking at the combined values of the bidder and target firms, on average, there is a net gain to shareholders around the time of the merger announcements. Bradley, Desai, and

Kim (1988) found that successful tender offers increased the combined values of the merging firms for an average of about seven percent or \$117 million (stated in 1984 dollars), which suggests that mergers are, on average, value enhancing.

The Stock Market Evidence on Efficiency Gain Effect and Market Power Gain Effect

The empirical evidence on valuation effects of merger announcements in general supports the importance of efficiency gain effect and rejects the market power gain effect.² Eckbo (1983), Stillman (1983) and Eckbo and Wier (1985) examined the stock market reaction of industry counterparts at the announcements of horizontal mergers. Though they found significantly positive abnormal stock returns of industry counterparts, they explained this positive valuation effect as the positive information released by mergers, such as an “in play” effect, which means that industry counterparts are now more likely to become takeover targets. To separate the market power gain effect from the information effect, Eckbo and Wier (1985) further investigated stock market returns to industry counterparts at the time of an antitrust challenge to the merger. They found no statistically significant abnormal decreases in the stock prices of industry counterparts. The authors therefore claimed that market power gain effect was not an important motivating factor in their sample of mergers. Similarly, Slovin, Sushka, and Hudson (1991) studied airline mergers using stock prices and found no support for the market power gain effect in the post-deregulation period.

From these results it seems reasonable to infer that antitrust challenges of mergers should not be encouraged, except in the most blatantly anti-competitive cases. This policy conclusion may be inappropriate, however, for two reasons. First, the failure to find evidence of market power gain effect of mergers may reflect an inherent problem in applying the event study methodology in this context, as suggested by McAfee and Williams (1988). They argued that “a likely cause of

² The term “efficiency gains” actually includes all actions that reduce costs. Neither the studies cited here nor the present study makes an attempt to categorize the sources of these gains whether they arise out of economies of scale and scope or wealth transfers from employees, bondholders, or the government. Market power, however, refers to wealth transfers from consumers alone.

the failure is that the rivals were large, multi-product firms that derive only a small fraction of their revenues from the affected market.” Second, the lack of evidence of market power gain effect associated with mergers attempted between 1963 and 1981 (the period covered by these studies) may be due to the deterrent effect of antitrust policy. Mergers likely to have significant market power gain effect may not have been attempted because of anticipated antitrust prosecution. In either case, it is not clear that a more permissive merger policy would improve social welfare.³

Using the product market data to test for market power gain effect, Borenstein (1990) and Kim and Singal (1993) examined changes in airfares around airline mergers. They found that airfares on routes affected by a merger increased significantly relative to routes not affected by a merger. In addition, Kim and Singal (1993) found a direct relation between airfare changes and changes in concentration, which was consistent with the market power gain effect. They concluded that, while the airline mergers also lead to efficiency gains for the merging firms, the market power gain effect on airfares dominated the efficiency gain effect, and it led to the observed net increase in fares.

Studies on railroad mergers also provide some limited evidence for the market power gain effect. Analyzing a merger case incurred in 1901 involving two railroads, Prager (1992) found that the court’s decisions affected rival railroads as a whole, especially those engaged in direct competition with the merging railroads. Oum and Zhang (1997) found that returns to scale were mildly increasing in the airline industry and returns to scale were constant in the railroad industry. These findings imply that the railroad mergers were more likely to be motivated by market power gains than mergers of other industrial firms.

³ Schumann (1989) offered a third reason for skepticism concerning Eckbo and Wier’ policy conclusion. He argued that under certain circumstances the pattern of results obtained by Eckbo (1983) and Wier (1985) was not inconsistent with anti-competitive mergers.

The Changing Railroad Industry

For most of this century, the railroad companies were viewed as monopolies, and were regulated accordingly; rates were set system-wide, with no latitude for individual circumstances. In some situations, lightly traveled track had to be operated even when it was uneconomic. Because of this, the railroad industry had lost its competitive edge; union wages and work rules became less and less realistic, and capital improvements were deferred for lack of cash flows. During this time, the U.S. economy was changing; manufacturing was in decline, replaced by information and service industries, which weren't extensive users of rail transport. Truckers, meanwhile, using low cost labor and travelling on subsidized highways, accelerated the process of railroad industry decline by taking away large pieces of the rails' traffic base. The financial deterioration caused by all of these factors resulted in a series of bankruptcies in the 1960s and 1970s, and forced the government to take progressively more dramatic measures to save the railroad industry. A number of railroads were nationalized and merged. Several bills were passed in order to help the industry. These bills culminated with the Staggers Rail Act of 1981, which gave the railroads greatly expanded freedom to set rates and abandon non-economic tracks, and thereby, it was hoped, to survive.

Beginning in the late 1970s, a number of railroads have consolidated in an attempt to gain market share and improve operating efficiencies. Although the rails are one of the most cost-effective means of moving freight, vast amounts of long-haul cargo continue to be moved by trucks and barges. One of the most often cited reasons for not moving long-haul freight by rail is that frequently shippers have to deal with more than one railroad and that the interchange between the rails often leads to unnecessary delays and duplicative billing processes. The railroad industry's efforts to improve service through greater cooperation between connecting carriers have also been disappointing. Many of the delays result from inefficiencies in yards and terminals, where freights are handed off from one railroad to another, and, sometimes, when one railroad gives priority to its own shipments over those originating on another. Seamless service has not yet been achieved.

The railroad managers, nonetheless, believe that merging two railroads will have the advantages of one philosophy of management, one agenda, one operating plan and a single implementation effort. In addition, mergers are expected to create opportunities to slash duplicative headquarters staffs, rail routes, and repair shops, broaden the range of commodities they haul, expand the territories they serve and strengthen management. As a result of mergers, the major railroads have closed down or sold off routes and cut employment.

Due to the monopolistic nature of the railroad industry, railroad mergers have been closely watched by the government agency. Prior to 1996, railroad mergers were governed by the Interstate Commerce Commission (ICC). Once a merger proposal was submitted for approval, the ICC would have thirty-one months to decide whether it would allow the merger to be carried out. The most important factor that drove the ICC decision was competition. When there was little overlapping track involved, protesting rivals could be satisfied by winning concessions on trackage rights and protection of interchange traffic. Combining two parallel railroads would, however, receive much closer scrutiny from the ICC.

III. Discussion of Hypotheses

To test the relative importance of efficiency gain effect and market power gain effect in railroad mergers, the abnormal stock returns around merger announcements of our railroad sample are examined. Specifically, the abnormal returns of both the merging firms and their industry counterparts at various event dates are measured and tested. These event dates include the first announcement dates of the merger proposals, the withdrawal date of one particular merger proposal in the sample, the ICC approval dates of the merger proposals, and the ICC rejection date of one merger proposal in the sample.

The Announcement Effects of Railroad Mergers

The predictions of cumulative adjusted returns (CAR) are determined, in part, by the oligopoly model assumed to represent railroad markets. Considering the market structure of railroads, it seems reasonable to assume that a dominant firm model, with a few firms producing a

homogeneous product, represents the pricing strategies of participants. Moreover, the test used in this study also rely on changes brought about by a merger in returns relative to control groups—thus the results herein would not be materially affected unless the heterogeneity of products changes concurrently with the merger.

Suppose a merger has a pure market power gain effect; that is, there are no efficiency gains, and a no-entry condition holds. A merger between the dominant firm and a fringe firm will result in a smaller output for the merged firm but at a higher price. However, each of the remaining fringe firms will increase its supply due to the higher market price. Thus, industry counterparts will benefit greatly from the market power gain effect of a merger (higher quantity at a higher price), whereas the increase in profits of the merged firm due to the higher price will be partly offset by the merged firm's reduction in quantity. Therefore, the adjusted returns accruing to the industry counterparts due to market power gain effect may be significantly greater than zero, the adjusted returns to the merging firms, however, may be close to zero.

If the assumption of no efficiency gains and the no-entry condition is relaxed, the merger-induced efficiency gains would then lower the marginal cost of the dominant firm even more. With no market power gain effect, the dominant firm is able to set a lower price to maximize its profit, forcing the industry counterparts to reduce both their price and quantity. Under the assumption of only efficiency gain effect, the adjusted returns accruing to the industry counterparts are expected to be negative, while the adjusted returns of the merging firms are expected to be positive.

In a merger between two firms on the competitive fringe instead of a merger between the dominant firm and a firm on the fringe, with no efficiency gains, there will be no change in the market price or quantity, since the dominant firm's price advantage continues unaffected. Therefore, the abnormal stock returns of the industry counterparts are zero. If a merger leads to efficiency gains in the merging firms, then the price advantage of the dominant firm is diminishing. The strength of the other industry counterparts is also reduced. Thus, the stock returns of the industry counterparts are expected to be negative.

In summary, a merger that makes the merged firm more efficient places the industry counterparts at a competitive disadvantage. A merger that increases the potential for exercising market power in the market benefits the merging firms and industry counterparts as well, while the benefit for the industry counterparts is greater than that for the merging firms under a dominant firm pricing model.

Based on the previous discussions, the following hypotheses are developed:

- A. Railroad mergers are value enhancing to merging firms due to the efficiency gain effect and/or market power gain effect.

Prediction: Abnormal returns of merging firms are positive.

Tests: Announcement period abnormal returns of acquiring and acquired firms.

- B. Railroad mergers can be either value enhancing (decreasing) to non-merging industry counterparts if market power gain effect (efficiency gain effect) dominates the efficiency gain effect (market power gain effect).

Predictions: Abnormal returns of non-merging industry counterparts are positive (negative) if market power gain effect (efficiency gain effect) dominates the efficiency gain effect (market power gain effect).

Test: Announcement period abnormal returns of non-merging industry counterparts.

The Precedent Effect of the Merger between Santa Fe and Southern Pacific

The twice-proposed merger of Santa Fe and Southern Pacific is a unique and interesting case that occurred during the sampling period for this study.⁴ On May 15, 1980, the *Wall Street Journal* (*WSJ*) disclosed that Southern Pacific was expected to announce sale of its railroad operations to Santa Fe, Southern Pacific's longtime rival. The next day, the *WSJ* reported that ICC was concerned about 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.

Three years after the failed merger attempt, Santa Fe and Southern Pacific tried again to merge their railroad operations. On October 28, 1983, Southern Pacific 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 to Santa Fe and Southern Pacific. On December 27, 1983, Santa Fe completed its merger with Southern Pacific into a new holding company, Santa Fe Southern Pacific, right after the ICC lifted its temporary order issued on December 15, 1983. But ICC ordered rail operations of both firms to remain separate pending inquiry. Finally on July 25, 1986, the ICC rejected the longstanding proposal of merging Santa Fe and Southern Pacific on the grounds that the anti-competitive problems outweighed potential benefits.⁵

The rejection was a big surprise even to the analysts who followed the railroad industry at that time and were very optimistic that the merger would go through. For example, the November 18, 1983, issue of *Value Line Investment Service* commented: "We expect the ICC to approve, probably with some concessions to competitors that will be acceptable to Southern Pacific and Santa Fe." On December 29, 1987, Santa Fe Southern Pacific officially ended the long episode by agreeing to sell Southern Pacific to Rio Grande Industries.⁶

⁴ This case is examined carefully in this study.

⁵ Santa Fe had already bought the shares of Southern Pacific and placed them in trust while the merger of the two railroads was considered by the ICC. On the stock market, the shares were traded as one firm, Santa Fe Southern Pacific.

⁶ Santa Fe was eventually acquired by Burlington Northern in 1995.

A chronology of all the events relating to the Santa Fe and Southern Pacific attempted merger case is included in the Appendix A. Two significant events are selected here based on the belief that occurrences of these two events provide potentially important information about the impact of anti-trust on railroad mergers pursuant to the merger. Those two events are the Call-Off event and Rejection event. The first event occurred on September 15, 1980 when Santa Fe and Southern Pacific agreed to call off the merger attempt after the ICC voiced its concerns. The second event occurred on July 25, 1986, at the ICC rejection of the second merger attempt. These two events are used to test the following two hypotheses concerning whether the call-off and ICC rejection of the merger between Santa Fe and Southern Pacific had a precedent effect on other railroad counterparts and future railroad mergers.

C. The disapproval of the merger between Santa Fe and Southern Pacific has information content.

Predictions: Surrounding the disapproval date, the merged firm (SFSP) has negative abnormal returns. The abnormal returns of non-merging industry counterparts are negative (positive) if market power gain effect (efficiency gain effect) dominates the efficiency gain effect (market power gain effect).

Tests: The abnormal returns of the merged firm and non-merging industry counterparts surrounding the date of the ICC disapproval of the merger between Santa Fe and Southern Pacific.

D. Approvals would cause different stock market reactions before and after the ICC disapproval of the merger between Santa Fe and Southern Pacific.

Predictions: Market is expected to greet more favorably to ICC approvals of railroad mergers after the ICC rejection of the merger between Santa Fe and Southern Pacific.

Tests: The abnormal returns surrounding the ICC approval dates before and after the disapproval of the merger between Santa Fe and Southern Pacific.

IV. Data

The sample of railroad mergers was identified from several sources including (i) the *Wall Street Journal Index*, (ii) the *New York Times Index*, and (iii) the Center for Research in Security Prices (CRSP) stock files. From the *Wall Street Journal Index* and *New York Times Index*, all listings under the title of 'railroad' were read to identify all the railroad mergers initiated during 1977 – 1996. From the CRSP stock files, all the firms with the SIC code of 4011, which is the industry code for railroad firms, were identified. Then, the ending date of all the railroad firms in the CRSP file was checked. If a firm's ending date does not coincide with the most recent date for the returns available, it means that the firm has been delisted from the CRSP file and becomes a potential candidate for the sample of this study. The *Wall Street Journal Index* was used to find out if the firm is actually merged or acquired and thus can be included in the sample.

The Nexus/Lexus, the *Wall Street Journal Index*, and the *New York Times Index* were searched to find relevant information concerning the following merger related event dates: the first announcement dates, the ICC (or the Surface Transportation Board (STB)) approval dates, and other relevant dates including the merger completion dates. Since stock price reactions to merger announcements are examined, firms in the sample must be listed on the CRSP tape.⁷ Through these sampling procedures, fourteen mergers were identified for the sample. Of the 14 mergers initiated in this time period, one merger was rejected by the ICC, one merger proposal fell apart, and one merger was recently approved in June 1998. In two separate cases, the approval was not required from the ICC since the acquiring firm had already owned part of the acquired firm. The approval dates for the remaining nine mergers have been identified. The ICC approved eight mergers, and the STB approved one merger. The average time period between the first

⁷ The acquisition of Southern Pacific by Rio Grande Industries was not included in the sample, since Rio Grande was a privately owned firm at the time of acquisition.

announcement date and the ICC (or STB) approval date was 20.2 months, with 36 months being the longest and 9 months the shortest. In Appendix A, detailed information about important developments associated with each merger case is provided.

Moody's Transportation Guide is used for the merging firms' financial and operating data. Table 1 presents descriptive statistics of financial and operating characteristics for railroad acquiring and acquired firms. The track miles operated are 13,823 miles for the sample of acquiring firms and 8,940 miles for acquired firms. The difference in track miles operated is significant at the 0.05 level with a t-statistic of 2.285. The average number of employees for the sample of acquiring firms is also significantly larger than that for the sample of acquired firms at the 0.01 level with a t-statistic of 2.714. The average total revenues for the sample of acquiring firms is \$4,747 million compared with \$1,827 million for the sample of acquired firms. The market value of equity for the sample of acquiring firms is \$5,065 million vs. \$1,876 million for the sample of acquired firms. In sum, the average size of acquiring firms is significantly larger than that of acquired firms.

The debt ratio is measured by the ratio of long-term debt divided by the book value of net worth. The corresponding mean ratios are 0.607 for acquiring firms and 1.139 for the acquired firms. The average debt ratio for the sample of acquiring firms is smaller than that for the sample of acquired firms, with a t-statistic of -2.932. The operating margins (and operation ratios) between two samples are not significantly different from each other. In sum, those statistics indicate that acquiring firms tend to be larger and less leveraged than their counterparts in the sample of acquired firms.

V. Methodology

The hypotheses developed in the previous section are examined in an event study framework. The impact of a merger announcement on shareholders' wealth is captured by the abnormal returns accruing to the shareholders at the first announcement of the merger. The abnormal return, or market model adjusted abnormal return, for firm i on event day t is defined as: $AR_{it} =$

$R_{it} - (\alpha_i + \beta_i R_{mt})$, where R_{it} is the rate of return on security i for event day t and R_{mt} is the rate of return on the CRSP equally-weighted index on event day t . The coefficients, α_i and β_i , are ordinary least square estimates of the intercept and slope, respectively, of the market model regression. The market model is estimated using returns for event days $t = -136$ to $t = -16$ relative to the announcement day. The announcement day, $t = 0$, is defined as the first identifiable date in the *WSJI* or the Standard & Poor's Daily News Retrieval Service Data Base.

Abnormal returns, AR_{it} , are calculated for each security over the interval $t = -5$ to $t = +5$. For a sample of N securities, an average abnormal return (AAR) for each day is calculated as:

$$AAR_t = \frac{1}{N} \cdot \sum_{i=1}^N AR_{it}$$

The average cumulative abnormal return (ACAR) from day $T1$ to $T2$ is calculated as:

$$ACAR = \sum_{t=T1}^{T2} AAR_t$$

The test statistics are, respectively, the average standardized abnormal return (ASAR) and the average standardized cumulative abnormal return (ASCAR), as described in Dodd and Warner (1983). This technique avoids the problem of heteroskedasticity by standardizing each firm's abnormal return by dividing by the security return's estimated standard deviation. Thus, the standardized abnormal return for security i on day t is:

$$SAR_{it} = \frac{AR_{it}}{S_{it}}$$

in which

$$S_{it} = \sqrt{s_i^2 \left[1 + \frac{1}{D} + \frac{(R_{mt} - \bar{R}_m)^2}{\sum_{k=1}^D (R_{mk} - \bar{R}_m)^2} \right]}$$

where s_i^2 is the residual variance of firm i 's market model regression, D is the number of days in the period used to estimate the market model, R_{mt} is the market return on day t , and \bar{R}_m is the mean market return in the estimation period.

The $ASAR_t$ is defined as:

$$ASAR_t = \frac{1}{N} \cdot \sum_{i=1}^N SAR_{it}$$

Assuming cross-sectional independence of the individual abnormal returns, $ASAR_t$ is approximately distributed according to a normal distribution with zero mean and variance $1/N$.

Therefore, the statistic

$$Z_t = \sqrt{N} \cdot ASAR_t$$

is approximately unit normally distributed. The $ASCAR$ is defined as:

$$ASCAR = \sum_{t=T1}^{T2} ASAR_t$$

Assuming serial independence, the statistic

$$Z = \sqrt{\frac{2N}{T_2 - T_1 + 1}} \cdot ASCAR$$

is also distributed as a standard unit normal variable. The two statistics, Z_t and Z , are used to test the significance of average and cumulative average abnormal returns.

VI. Results

The Announcement Effects of Railroad Mergers

Table 2 presents separately, for each day from $t = -5$ through $t = +5$, the daily AAR, the test statistic Z-value for the daily AAR and the number of positive and negative observations for 13 acquiring firms and acquired firms. The results indicate that merger announcements have significant impacts on stock prices of railroad firms. For example, the averages of the abnormal returns on the day preceding the announcement day, the announcement day, and the day following the announcement for the sample of acquiring firms are, respectively, -0.611, -0.994, and -1.20 percents. The test statistics (Z-value) are, respectively, -2.13, -2.10, and -2.69. The average cumulative abnormal return during the period $t = -1$ through $t = +1$ is -2.805 percent with a Z-value of -3.995, which is significant at the 0.01 level. The corresponding averages for the sample of acquired firms are 2.221, -0.17, and -0.023 percents ($Z_{-1} = 5.38$, $Z_0 = 0.015$ and $Z_1 = -0.10$). The average cumulative abnormal return during the period $t = -1$ through $t = +1$ is 2.028 percent with a Z-value of 3.056, which is significant at the 0.01 level. The numbers of positive and negative abnormal returns for the acquiring and acquired samples suggest that the reported results need not be attributed to the presence of outliers. In sum, the mergers are value-enhancing events to potential acquired firms, but not so for potential acquiring firms.

In an examination of stock price reactions to airline mergers, Singal (1996) documented both significantly positive abnormal returns to airline bidding firms and target firms. On the other hand, Slovin et al. (1991) found insignificant abnormal returns to acquiring firms, but significantly positive abnormal returns to airline target firms. The results of the present study are at variance with the results in Singal (1996) and Slovin et al. (1991). The difference could be

explained by the findings of Oum and Zhang (1997), who documented patterns of mildly increasing returns to scale in the airline industry and constant returns to scale in the railroad industry.

The impact of merger announcements on non-merging industry counterparts is also examined. For each merger attempt, a sample of non-merging industry counterparts is matched using SIC code of 4011. For 13 merger attempts, 216 industry counterparts are obtained. On average, there are 16.62 industry counterparts for each merger attempt. Table 3 presents, for each day from $t = -5$ through $t = +5$, the daily AAR, the cumulative abnormal return (CAR), the test statistic Z-value for the daily AAR, and the number of positive and negative observations for non-merging industry counterparts.

The results in Table 3 indicate that merger announcements also have significant impact on stock prices of non-merging industry counterparts. For example, the averages of the abnormal returns on the day preceding the announcement day, the announcement day, and the day following the announcement for the sample of acquiring firms are, respectively, 0.495, 0.051, and 0.088 percent. The test statistics (Z-value) are, respectively, 4.187, 0.996 and 0.722. The average cumulative abnormal return during the period $t = -1$ through $t = +1$ is 0.634 percent with a Z-value of 3.409, which is significant at the 0.01 level.

The finding that the acquiring firms do not gain while their industry counterparts gain is more consistent with the hypothesis of market power gain effect. This hypothesis predicts that a merger that increases the potential for exercise of market power in the market benefits the merging and industry counterparts alike, but the benefit of the industry counterparts is greater than that of the merging firms under a dominant firm pricing model.

The Precedent Effect of the Merger between Santa Fe and Southern Pacific

Table 4 presents the abnormal returns from day $t = -5$ to day $t = +5$ for Santa Fe and Southern Pacific around the Call-Off event.⁸ Interestingly, both firms incur large and positive abnormal

⁸ Since there is only one announcement in each sample, the daily average abnormal return is simply daily abnormal return.

returns. The cumulative abnormal return from $t = -1$ to $t = +1$ for Santa Fe is over 10 percent vs. 6.91 percent for Southern Pacific. The magnitude of the abnormal returns indicates that this is a significantly positive development for both firms.

Table 5 shows the impact of the Call-Off event on counterparts of Santa Fe and Southern Pacific. Consistent with the findings of the stock price impacts on Santa Fe and Southern Pacific, industry counterparts' stock prices also react positively to the Call-Off event. On $t = 0$ (the date that the Call-Off event appeared on the WSJ), the AAR for industry counterparts is 1.311 percent with a Z-value of 2.63. On $t = 1$, the AAR for industry counterparts is 2.412 with a Z-value of 4.460. Both are significant at the 0.01 level. The cumulative abnormal return from $t = -1$ to $t = +1$ for industry counterparts is 3.367 percent with a Z-value of 3.667, which is also significant at the 0.01 level. In sum, the announcement of the Call-Off event provides favorable information to both merging firms and industry counterparts.

The impacts of the Rejection event on the merged firm (Santa Fe Southern Pacific) and their industry counterparts are also tested. Table 6 shows the AAR and Z-value for the merged firm and their industry counterparts. The patterns of average abnormal returns and Z-values for the merged firm and their industry counterparts are very similar. On day $t = -1$, both groups suffer significantly negative abnormal returns. The negative abnormal returns continue onto $t = 0$. The three-day ($t = -1$ to $t = +1$) cumulative abnormal returns for the merged firm and industry counterparts are, respectively, -5.923 percent with a Z-value of -2.317 and -1.814 percent with a Z-value of -1.852 .

In the most general terms, the outcomes of the Call-Off event and Rejection event were similar; the merger attempts failed. But the patterns of stock price reactions are quite different from each other. The impacts of the Call-Off event on the merging firms and industry counterparts are both positive, while the impacts of the Rejection event on the merged firm and industry counterparts are both negative. Since the Call-Off event occurred after the ICC voiced its concerns on the merger, it appears that Santa Fe and Southern Pacific voluntarily withdrew the merger proposal to avoid the potential objection by the ICC. In the case of the Rejection event, on the other hand, they were forced to annihilate the merger because of the ICC objection. In the Call-Off event,

the stock market welcomed the railroads' decision not to put the proposal into the test. In the Rejection event, however, the market responded negatively to the ICC first rejection decision to a railroad merger in a long period of time.

The results presented above suggest that the Santa Fe – Southern Pacific case was an important development in antitrust policy because of (1) the precedent it has established for future railroad mergers, and (2) the effect on the nature of competition in the railroad market. Both of these effects are evident in the responses of other railroads' stock prices to this case. Results for other railroads as a whole are consistent with this study's assumption that developments in this case have an important precedent effect.

To gain further insight into the stock price reactions of merging railroad firms, the analyses presented in Table 2 is repeated, excluding Santa Fe from the sample of acquiring firms and Southern Pacific from the sample of acquired firms. As shown in Table 7, for the acquiring firms, the CAR from -1 to +1 improves from -2.805 percent when Santa Fe is included to -1.6 percent when Santa Fe is excluded; the difference is significant at the 0.01 significance level. For the acquired firms, the three-day (-1 to +1) CAR increases from 2.028 percent to 4.123 percent, and the difference is also significant at the 0.01 significance level. It is therefore concluded that the market somehow is able to identify and respond less favorably to a merger proposal that is more likely to be rejected by the ICC.

If the ICC rejection carries enough weight in the market, the market would be expected to react more favorably to the ICC approvals of railroad mergers after the date of the Rejection event (July 25, 1986) than those before the Rejection date. This proposition is tested by dividing the approvals of mergers into two groups, using July 25, 1986, as the demarcation. Table 8 presents daily abnormal returns surrounding the ICC approval dates from day $t = -5$ to day $t = +5$ for those two groups. For the group obtaining ICC approvals before July 25, 1986, the three-day CAR is -1.792 percent with a Z-value of -1.523. For the group obtaining ICC approvals after July 25, 1986, the three-day CAR is 1.701 percent with a Z-value of 1.446. The difference in three-day CAR between these two groups is significant at the 0.01 significance level. The results indicate

that the approvals granted by the ICC are valued more by the market after the date of the Rejection event.

VII. Conclusion

This study measures daily abnormal returns to railroad merging firms and their major counterparts around merger proposal and antitrust challenge announcements, to examine whether the merger gains emanate from the efficiency gain effect or the market power gain effect. The efficiency gain effect proposes that the merged firm becomes more efficient through economies of scale and elimination of redundancies. A more efficient merged firm then places its industry counterparts at a competitive disadvantage. Subsequent antitrust challenge by regulatory agency will reverse the expectation of efficiency gain of merging firm, and the counterparts will have positive abnormal returns. On the contrary, the basic proposition under the market power gain effect is that the counterparts can expect to benefit from the news of a merger that significantly reduces the costs of enforcing a tacit collusive agreement within the railroad industry. Subsequent news that the merger is challenged by the regulatory agency will reverse the expectations of monopoly rents, causing the counterparts to show negative abnormal returns.

The empirical results of this study show that the stockholders of acquiring firms do not gain from mergers. In contrast, stockholders of acquired firms and industry counterparts earn significantly positive abnormal returns. These findings suggest that railroad mergers are consistent with the market power gain effect. However, the acquiring firms' gains from exercise of greater market power are limited. Both merging firms and their industry counterparts gained on the day the merging firms voluntarily called off the merger proposal. However, when the ICC rejected a merger, both the merged firm and its industry counterparts had significantly negative abnormal returns. These results indicate that the market welcomes a railroad's decision not to put a merger proposal into the test when there is potential objection by the government agency. In the ICC rejection event, however, the market responds negatively.

To gain more insights into the efficacy of the ICC approvals, this study examines the announcement effects of acquiring firms using the date of the ICC rejection of a merger

involving Santa Fe and Southern Pacific to divide the entire sample into two. The stock returns surrounding the ICC approvals after the date of the ICC rejection are significantly higher than the stock returns of the ICC approvals before the date of the ICC rejection. The results suggest that the market took the ICC approvals for granted before the first ICC rejection ever occurred and valued the ICC approvals more after the historical rejection.

In summary, this study provides empirical evidence consistent with the market power gain effect as hypothesized in a dominant firm model. While the merging firms' gains from improved operations and exercise of greater market power are limited, the industry counterparts gain from an increase in market power and do not lose from the limited gain in merging firms' efficiency. These results suggest that a selective tightening of the antitrust policy governing railroad mergers may enhance consumer welfare.

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Appendix

Sample of Railroad Mergers and Chronicle of Important Events

*Burlington Northern
and St Louis-San
Francisco Railway Co
(Burlington Northern)*
2-2-77

St Louis-San Francisco Railway Co and Burlington Northern Inc. issue joint statement saying two companies initiating studies into the feasibility of unification.

9-26-77

Burlington Northern Inc. agree in principle to acquire St Louis-San Francisco Railway Co; each share of latter would be exchanged for 0.95 share of Burlington Northern common, \$12.50 of newly created 8.5% non-voting preferred stock.

12-29-77

St Louis-San Francisco Railway Co and Burlington Northern Inc. submit to ICC formal application for permission to carry out their previously announced plan to merge.

5-10-78

Shareholders of St Louis-San Francisco Railway Co approve previously announced merger of road into Burlington Northern Inc; merger is subject to ICC approval.

4-18-80

ICC approves merger of St Louis-San Francisco Railway Co and Burlington Northern; move creates longest road in US history.

*Chessie System and
Seaboard Coast Line
(CSX)*

9-7-78

Chessie System holds merger talks with Seaboard Coast Line Industries Inc.

11-17-78

Chessie System and Seaboard Coast Line Industries Inc. plan to merge in transaction having current market value of over \$1 billion.

2-14-79

Shareholders of Chessie System and Seaboard Coast Line Industries Inc. approve their previously announced merger plan.

9-25-80

ICC approves the Chessie System and Seaboard Coast Line Industries Inc. merger in a transaction with a current market value of about \$1.7 billion. The system would rank No. 1 in terms of assets and revenues among the nation's railroads and No. 2 in miles of track. The 27,000-mile system would stretch from Florida to Ontario.

*Union Pacific and
Missouri Pacific &
Western Pacific
(Union Pacific)*

1-9-80

Union Pacific plans to acquire Missouri Pacific Corp with a package of stocks currently totaling about \$1 billion.

1-22-80

Union Pacific offers about \$25 mm to buy Western Pacific following bid for Missouri Pacific Corp.

9-14-82

ICC approves merger of three railroads, Union Pacific, Missouri Pacific, and Western Pacific. The merged road, Union Pacific, will be nation's third largest rail system.

*Norfolk & Western
and Southern (Norfolk
Southern)*

4-6-79

Southern Railway and Norfolk & Western Railway Co. begin to study merger in defensive move against proposed merger of Chessie System and Seaboard Coast Line.

6-3-80

Southern Railway and Norfolk & Western Railway Co. proposed a \$2 billion merger, in response to big consolidations announced in 1980.

7-23-80

Southern Railway and Norfolk & Western Railway directors formally approve their previously announced merger; shareholders will vote on the plan Nov. 7 and the lines expect to file the merger application with the ICC in December.

11-10-80

Shareholders of Southern Railway and Norfolk & Western Railway, in separate meetings, approve the proposed merger into a new holding company.

12-5-80

ICC votes to approve proposed merger of Norfolk & Western Railway and Southern Railway; formal approval due soon for planned 18,000 mile, 21-state railway line.

*Santa Fe and Southern
Pacific (Santa Fe
Southern Pacific)*

- 5-15-80 Southern Pacific expected to announce May 15 sale of its railroad to Santa Fe, Southern Pacific's longtime rival.
- 5-16-80 Santa Fe Industries Inc's \$1.2 billion plan for acquiring Southern Pacific faces federal scrutiny; ICC chief says revamping of Western lines raises anti-competitive queries.
- 9-15-80 The proposed merger of Santa Fe and Southern Pacific is called off in mutual move; industry analysts expected proposal to fail due to long-standing rivalry.
- 9-27-83 Santa Fe and Southern Pacific merger is anticipated; move could create major road in west; terms of the proposed merger are not available.
- 9-28-83 Santa Fe Industries and Southern Pacific plan to merge, with stockholders of each company swapping their stock for shares in a newly formed holding company; the value of the transaction is about \$5.2 billion.
- 10-5-83 Santa Fe and Southern Pacific agree on a merger plan through which each will become a unit of a new holding company, Santa Fe Southern Pacific Corp; merger valued at \$5.2 billion.
- 10-28-83 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.
- 12-15-83 ICC issues a cease-and-desist order temporarily blocking the proposed merger of Santa Fe Industries Inc. and Southern Pacific Co.; the commission wants to study the total ramifications of the merger.
- 12-27-83 Santa Fe completes its merger with Southern Pacific into a new holding company, Santa Fe Southern Pacific, after the ICC lifts its temporary order blocking merger, but ICC orders rail business of both firms to remain separate pending inquiry.
- 2-22-84 Santa Fe Southern Pacific projects that a merger of its railroad units could generate annual savings of at least \$250 mm; merger

- could also capture \$220 mm a year in freight revenue from other Western railroads.
- 10-23-85 Justice department strongly opposed the proposed merger of the Santa Fe railroad with the Southern Pacific railroad, saying the combination would eliminate or substantially reduce railway competition in parts of the US.
- 7-25-86 In a move that stunned railroad industry, the ICC rejects the longstanding proposal to merge Santa Fe and Southern Pacific railroads. ICC decides 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, is ordered to sell one of both railroads.
- 9-3-86 Santa Fe Southern Pacific Files with the ICC to reopen its request to merge its two railroads, the Santa Fe and Southern Pacific.
- 7-1-87 ICC, ending one of longest-running sagas in modern railroad history, refuses to reconsider its 1986 rejection of the proposed merger of the Southern Pacific and Santa Fe railroads. Decision will force Santa Fe Southern Pacific Corp., the parent of both railroads, to sell at least one of the railroads.
- 9-28-87 Rio Grande Industries intends to make a bid for Southern Pacific in order to merge carrier with its Denver & Rio Grande Western Railroad unit.
- 8-9-88 ICC is expected Aug. 9 to approve \$1.02 billion sale of Santa Fe Southern Pacific unit Southern Pacific Transportation to Rio Grande Industries, closing five-year controversy. The approval is expected despite objections from Kansas City Southern Industries, which offered \$1.25 billion in cash and notes for Southern Pacific.
- 8-10-88 The ICC approves the \$1.02 billion sale of Santa Fe Southern Pacific Corp's Southern Pacific railroad to Rio Grande Industries.
- 12-29-87 Santa Fe Southern Pacific agrees to sell Southern Pacific to Rio Grande Industries for \$1.02 billion.

*Union Pacific and
Missouri-Kansas-
Texas (Union Pacific)*

11-17-86

Union Pacific files with the ICC to buy the M-K-T railroad from Katy Industries Inc for \$110 mm.

5-17-88

ICC approves Union Pacific Corp's proposed purchase of the Missouri-Kansas-Texas Railroad, commonly known as the Katy line, as it is a unit of Katy Industries.

*Canadian Pacific and
Soo Line (Canadian
Pacific)*

10-20-89

Canadian Pacific Corp. proposes acquiring the 44% of Soo Line Corp. it does not already own for \$19.50 a share, or about \$1.9 mm.

1-25-90

Canadian Pacific Corp. completes its offer for the shares of Soo Line Corp it did not previously own.

*Kansas City Southern
and MidSouth Corp
(Kansas City
Southern)*
9-22-92

Kansas City Southern (KCS) agrees to buy MidSouth Corp for a premium of 219.3 mm, or 20.5 a share. The acquisition would give KCS a company with 4 rail subsidiaries operating about 1200 track miles in Louisiana, Mississippi, Alabama and Tennessee.

6-7-93

The ICC approves KCS's acquisition of MidSouth Corp. effective immediately. Under the agreement, MidSouth holders will receive \$20.50 for each of their shares; KCS currently holds about a 40% stake in MidSouth.

*Illinois Central and
Kansas City Southern*
7-20-94

Illinois Central, announcing the 2nd major railroad merger in 3 weeks, has tentatively agreed to acquire Kansas City Southern Industries rail operations for about 686.4 million. The merger would link two North-South routes that traverse the nation's midsection, creating what would be the nation's 7th largest railroad following current industry consolidation, with annual revenues of more than \$1 billion.

10-25-94

Illinois Central's plan to acquire Kansas City Southern rail operations collapses after the companies fail to reach agreement on final terms.

*Burlington Northern
and Santa Fe
(Burlington Northern
Santa Fe)*

7-1-94

Burlington Northern agrees to acquire Santa Fe for \$2.7 billion in stocks to create the nation's largest railroad. The combination would be a 33,000-mile Western railroad strong in both bulk commodity shipments and the rapidly expanding business of moving truck containers.

2-8-95

Shareholders of Santa Fe and Burlington Northern approve Burlington Northern's \$4 billion acquisition of Santa Fe, moving the companies another step toward overtaking Union Pacific as the nation's largest railroad.

7-1-95

Burlington Northern's \$4 billion acquisition of Santa Fe clears final major hurdle, winning approval from ICC to create nation's largest railroad; the new company will be called Burlington Northern Santa Fe Corp.

*Union Pacific and
Chicago & North
Western (Union
Pacific)*

3-8-95

In a SEC filing, Union Pacific announces that it is considering buying the remaining shares of Chicago & North Western (CNW) it does not already own. Union Pacific owns 29.5% of CNW.

3-13-95

Union Pacific agrees to buy the 70% of CNW that it does not already own for \$1.1 billion, positioning itself to do battle with the larger Burlington Northern Santa Fe Corp.

6-26-95

Union Pacific completes its \$1.1 billion acquisition of CNW by merging CNW with a wholly owned unit.

*Union Pacific and
Southern Pacific
(Union Pacific)*

8-3-95

Union Pacific is in talks to acquire Southern Pacific for more than \$3.5 billion. The combination will make Union Pacific once again the nation's largest railroad.

8-4-95

Forging the nation's largest railroad, UPC agrees to purchase Southern Pacific Rail Corp for about \$3.9 billion, or \$25 a share in cash and stock. The combined railroad would be a powerhouse in the western two-third of the nation, with 35,000 miles of tracks operating in 25 states.

12-1-95

Union Pacific projects that it would reap annual savings and revenue gains from its acquisition of Southern Pacific of \$750 million, or 50 percent more than the \$500 million previously expected. If the combination is approved, it would create the nation's largest railroad

7-1-96

Surface Transportation Board is expected to approve the \$3.9 billion combination of Union Pacific and Southern Pacific to form the nation's largest railroad.

7-5-96

In approving Union Pacific Corp.'s \$3.9 billion takeover of Southern Pacific Railway Corp. with only modest conditions, the Surface Transportation Board lays the groundwork for additional rail-industry consolidations. The vote on July 3, 1996 was a major victory for Union Pacific. The STB says the substantial benefits outweigh the competitive concern.

9-12-96

Union Pacific and Southern Pacific Rail Corp complete their \$5.4 billion merger, creating the nation's largest railroad. The combined company, based in Bethlehem, PA, has \$10 billion in revenue and over 30,000 miles of routes in the West.

*CSX, Norfolk and
Conrail*

10-16-96

CSX agrees to acquire Conrail for cash and stock value at \$8.1 billion. The deal would create the second largest railroad and could force more giant railroad mergers.

10-24-96

Norfolk Southern launches a bidding war for Conrail Inc, with a surprisingly large \$9.1 billion tender offer, which was aimed at derailing CSX \$8 billion friendly bid for Conrail.

6-8-98

The Surface Transportation Board (STB) approved the takeover of Conrail by CSX Corp. and Norfolk Southern while demanding only minimal changes in the \$10 billion merger plan.

Table 1

Summary Statistics of Railroad Acquiring Firms and Acquired Firms from 1977 to 1998.

	Mean	Median	Maximum	Minimum
Acquiring Firms				
Track Miles	13823	14283	25000	2536
Number of Employers	36444	38500	76400	2920
Total Revenues	4747	3990	12020	565
Market Value of Equity	5065	3418	13297	530
Debt Ratio	0.607	0.539	0.954	0.299
Operating Margin	0.234	0.216	0.359	0.098
Operation Ratio	0.795	0.780	0.902	0.682
Acquired Firms				
Track Miles	8940	10250	16000	12
Number of Employers	19380	19000	56300	590
Total Revenues	1827	1679	3686	107
Market Value of Equity	1876	998	6790	86
Debt Ratio	1.139	0.946	3.270	0.599
Operating Margin	0.227	0.232	0.387	0.109
Operation Ratio	0.812	0.800	0.890	0.745

Market value of equity equals the number of common shares outstanding times price per share two days prior to the call announcement.

Table 2

Daily Average Abnormal Stock Returns (AAR's) Surrounding the First Announcement Dates for Railroad Acquiring Firms Acquired Firms from 1977 to 1996.

DAY	Acquiring Firms		Acquired Firms	
	AAR	Z-Value	AAR	Z-Value
-5	0.00156	0.551	0.00570	0.793
-4	0.00660	1.533	-0.00710	-1.154
-3	-0.00012	-0.012	-0.00321	-0.736
-2	0.00303	-0.774	0.00215	0.200
-1	-0.00611	-2.130	0.02211	5.381
0	-0.00994	-2.099	-0.00170	0.015
1	-0.01200	-2.694	-0.00023	-0.103
2	-0.00263	-0.610	0.02223	4.310
3	-0.00326	-0.455	-0.00392	-0.499
4	0.00607	1.940	-0.00012	0.106
5	0.00370	1.069	0.00172	0.576

Table 3

Daily Average Abnormal Stock Returns (AAR's) and Cumulative Abnormal Returns Surrounding the First Announcement Dates for Non-merging Rival Firms.

DAY	AAR	CAR	Z-Value	Positive/ Negative
-5	-0.00101	-0.00101	0.51402	120/096
-4	-0.00047	-0.00148	-0.36224	79/137
-3	0.00109	-0.00040	1.33941	116/100
-2	-0.00121	-0.00161	-1.19356	94/122
-1	0.00495	0.00334	4.18731	109/107
0	0.00051	0.00385	0.99562	114/102
1	0.00088	0.00473	0.72220	114/102
2	0.00208	0.00681	0.78698	92/124
3	-0.00025	0.00656	-0.22199	97/119
4	0.00052	0.00707	0.94747	106/110
5	0.00123	0.00831	1.42015	110/106

Table 4

Daily Average Abnormal Stock Returns (AAR's) surrounding the Merger Cancellation Day for Acquiring Firm (Santa Fe) and Acquired Firm (Southern Pacific).

DAY	Acquiring Firm		Acquired Firm	
	AAR	Z Value	AAR	Z-Value
-5	-0.00789	-0.50484	-0.00129	-0.14827
-4	-0.02208	-1.41288	-0.01486	-0.73345
-3	-0.00782	-0.49925	-0.00562	-0.43289
-2	-0.00343	-0.21879	0.00125	0.00172
-1	0.00343	0.21975	0.00818	0.53991
0	0.05211	3.33406	0.02985	2.01533
1	0.05256	3.35450	0.03112	2.38164
2	0.01652	1.05189	0.00587	0.33776
3	0.01122	0.71773	0.00613	0.41828
4	0.00456	0.29112	-0.00199	-0.21212
5	0.02261	1.44650	0.00987	0.91119

Table 5

Daily Average Abnormal Stock Returns (AAR's) and Cumulative Abnormal Returns Surrounding the Merger Call-Off Date for Non-merging Rival Firms.

DAY	AAR	CAR	Z-Value	Positive/Negative
-5	-0.01209	-0.01209	-1.84841	3/7
-4	-0.00280	-0.01488	-0.74643	4/6
-3	-0.00103	-0.01591	-0.38651	4/6
-2	-0.00652	-0.02244	-1.07514	3/7
-1	-0.00356	-0.02599	-0.74392	3/7
0	0.01311	-0.01289	2.63416	7/3
1	0.02412	0.01124	4.45956	9/1
2	0.00575	0.01699	1.49655	8/2
3	-0.00377	0.01322	-0.70304	3/7
4	-0.00470	0.00852	-0.93621	3/7
5	0.00414	0.01265	1.02758	6/4

Table 6

Daily Average Abnormal Stock Returns (AAR's) surrounding the ICC Rejection of Merger Day for Merged Firm (Santa Fe Southern Pacific) and Rival Firms.

Day	Merged Firm		Rival Firms	
	AAR	Z-Value	AAR	Z-Value
-5	-0.02765	-1.85812	-0.00842	-1.07150
-4	0.00479	0.32065	0.00180	0.25811
-3	0.09007	6.06865	-0.00083	-0.11068
-2	-0.02812	-1.89353	-0.00267	-0.60450
-1	-0.06416	-4.28226	-0.01848	-3.43167
0	-0.01980	-1.33506	-0.00081	-0.13246
1	0.02473	1.60493	0.00115	0.35622
2	0.02422	1.59741	-0.00564	-0.98770
3	0.05125	3.41624	0.00631	1.28148
4	0.03305	2.22683	-0.00105	-0.22887
5	-0.00779	-0.52410	-0.00977	-2.13086

Table 7

Daily Average Abnormal Stock Returns (AAR's) Surrounding the First Announcement Dates for Railroad Acquiring Firms (Excluding Santa Fe) and Acquired Firms (Excluding Southern Pacific) from 1977 to 1996.

DAY	Acquiring Firms		Acquired Firms	
	AAR	Z-Value	AAR	Z-Value
-5	0.00376	0.907	0.00795	1.042
-4	0.00732	1.585	-0.00586	-0.846
-3	-0.00175	-0.280	-0.00738	-1.373
-2	-0.00234	-0.641	-0.00459	-0.931
-1	-0.00591	-1.943	0.02213	5.172
0	-0.00457	-1.228	0.01492	2.679
1	-0.00552	-1.508	0.00418	0.580
2	-0.00075	-0.281	0.02704	4.784
3	-0.00052	-0.043	-0.00206	-0.126
4	0.00762	2.178	0.00021	0.174
5	0.00334	0.992	-0.00431	-0.371

Table 8

Daily Average Abnormal Stock Returns (AAR's) Surrounding the ICC Approval Dates before Rejection event day (July 25, 1986) for Railroad Acquiring Firms.

DAY	Before July 25, 1986		After July 25, 1986	
	AAR	Z Value	AAR	Z Value
-5	-0.01176	-1.32178	-0.00147	-0.15887
-4	0.00035	0.00776	-0.00123	-0.16696
-3	0.02488	2.92517	0.00281	0.38109
-2	-0.01291	-1.44323	-0.00329	-0.48005
-1	0.01003	0.51703	0.00119	0.22527
0	-0.01155	-1.28150	0.00919	1.32421
1	-0.01640	-1.87331	0.00663	0.95549
2	-0.00339	-0.27427	-0.00211	-0.26805
3	-0.00206	-0.08008	-0.00230	-0.34930
4	0.00079	0.15422	0.01261	2.06586
5	0.01115	1.23257	0.00569	0.91256