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## Transportation Research Forum

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# Rail Rate and Revenue Changes Since the Staggers Act

by Ken Casavant, Eric Jessup, Marvin E. Prater, Bruce Blanton, Pierre Bahizi, Daniel Nibarger, Johnny Hill, and Isaac Weingram

*An examination of the effects of deregulation and the performance of the Surface Transportation Board (STB) under that deregulation usually includes an analysis of rail rates that have evolved since implementation of the Staggers Act of 1980 (Staggers Act). This paper examines the rail rate structure for agricultural commodities and compares it with rates for other commodities. Changes in agricultural rail rates are evaluated relative to shipment size and distance shipped to understand how they affect agricultural shippers. Railroads transferred costs to agricultural shippers and over-recovered fuel costs with surcharges. Shippers question the reasonableness of rail rates in the light of railroad revenue adequacy data.*

## INTRODUCTION

Individual agricultural producers in the short run are “price takers” rather than “price makers,” with little control in the short run over the price they receive for their products (Kohls 1967). Due to their numbers (many), relative size (small), the nature of their products (homogeneous with many substitutes), and lack of market power, they have little or no ability to influence the price they receive for their products, therefore, are usually unable to pass cost increases on to customers (USDA November 7, 2006). Agricultural producers are unique in that they typically bear the transportation costs, not the grain elevator, when grain is transported (Kohls 1967). Consequently, increases in transportation costs result in decreased producer profit (Montana Wheat & Barley Committee et al. 2006). For agricultural shippers with no cost-effective alternative to rail, and located far from markets, rail is the only viable transportation available and the rail rate determines the net price the producer receives (USDA November 2, 2006).

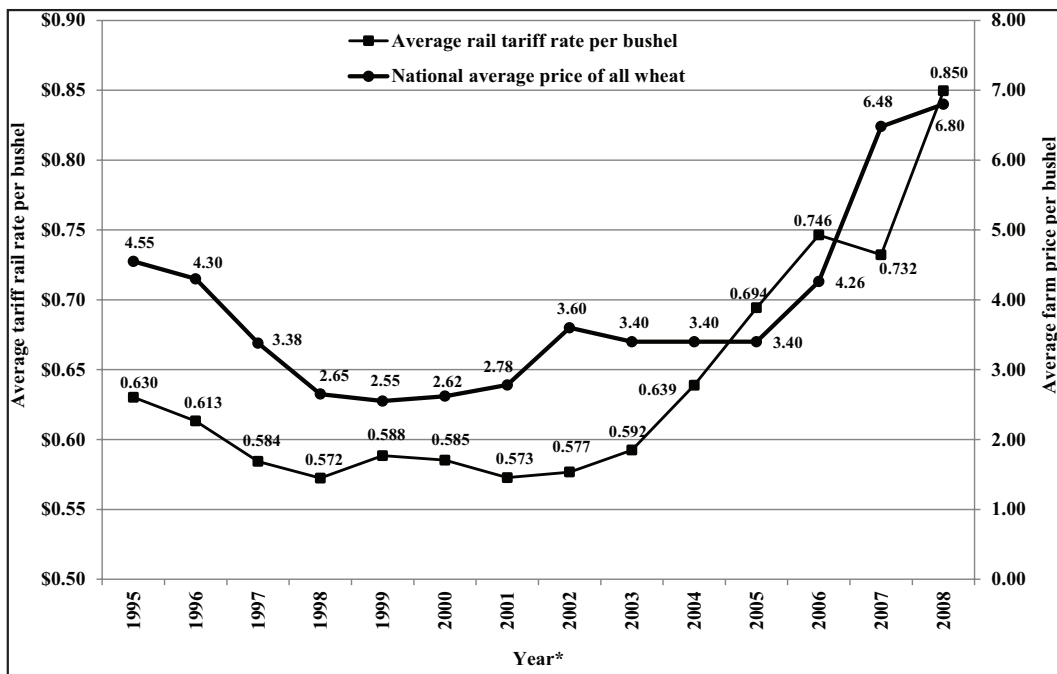
Lower prices and incomes hinder farmers from borrowing funds to purchase fertilizer, seed, and machinery, reducing economic prosperity in rural areas. Higher transportation costs also affect the competitive position of U.S. agricultural products in highly competitive export markets. The rates agricultural shippers pay for rail transportation can facilitate or inhibit American competitiveness in world agricultural markets (USDA November 2, 2006).

The costs of rail transportation to market represent a significant percentage of the average on-farm price because grain and oilseeds are bulk commodities with a low value in proportion to their weight (Figure 1). For example, average rail tariff rates as a percent of the farm price of wheat have varied from 11.3% in 2007, when wheat prices were high, to 23.1% in 1999, when wheat prices were low. Rail transportation costs for individual movements of agricultural products have been as much as 40% of the delivered price (USDA 2005).

Despite these concerns, rates for land transportation of agricultural commodities in the United States remain among the lowest in the world. Although rail rates for agricultural commodities have not fallen as much as rates for some other products (such as coal) (GAO 2006), Figure 1 shows that the rail transportation cost during 2007, as a percentage of the price of a bushel of wheat, was at a 14-year low.

This paper evaluates changes in agricultural rail rates relative to shipment size and distance shipped to understand how they affect agricultural shippers. Since the Staggers Act, railroads have transferred costs to agricultural shippers and over-recovered fuel costs with surcharges. Captive agricultural shippers question the reasonableness of rail rates in light of railroad revenue adequacy data.

**Figure 1: Wheat–Average Rail Tariff Compared to Average Farm Price\***



\*Marketing year ending May 31.

Sources: STB Confidential Waybill Sample  
USDA, NASS, Crop Value Summary

## LITERATURE REVIEW

For nearly 100 years, the performance of railroads reflected the constraints put on them by federal regulation. The Interstate Commerce Commission Act of 1887 (ICC Act) created the Interstate Commerce Commission (ICC). The ICC implemented the provisions of the ICC Act, working for “just and reasonable” rates without price discrimination. The regulatory environment created by the ICC Act and subsequent statutes required railroads to employ cost-of-service pricing and to price at average cost, with some variation usually allowed by commodity and length of haul.

Pervasive regulation interfered with the ability of railroads to react to competitive situations and efficiently manage their firms. Rate adjustments were slow, innovations were stymied, and rationalization of rail infrastructure was expensive and time-consuming (Gallamore 1999). The unwieldy regulatory framework, along with increased competition from other modes—in part due to government promotion of competing transportation modes—led to a loss of market share of intercity freight and the attendant revenue (GAO 1990). The railroads were unable to maintain their infrastructure, were close to bankruptcy, and were not competitive.

Regulatory reform happened slowly. The most important legislation was the Staggers Act of 1980. Railroads seized on their new regulatory freedom to actively pursue profits and return on investment using differential pricing, cost efficiencies, abandonment of un-remunerative rail lines, mergers with other railroads, and the rate innovations of contracts and multiple-car pricing (Gallamore 1999).

Railroads have also successfully controlled and reduced costs by abandoning rail lines, creating short line railroads, reducing labor in operations and administration, making longer hauls, increasing traffic density on rail lines, and using new technologies imaginatively (Gallamore 1999, Prater and Klindworth 2000). Increasing shipment and car sizes, running directionally,<sup>1</sup> and sharing dispatching have also contributed to efficiency.

Railroads adopted differential pricing to use their capacity efficiently and recover their high fixed and common costs. If a railroad charged the same prices to all shippers, some shippers would find it more profitable to ship by another mode. As these shippers withdrew, the railroad would have to raise prices on its remaining customers to cover its fixed costs. Differential pricing also gives railroads the flexibility to react to differences in modal competition (Prater and Klindworth 2000).

Consequently, the variable cost of providing rail transportation serves only as a floor below which rates should not go and bears little relationship to individual rail rates. Instead, rail rates are based on the price and service characteristics of competing transportation modes, the railroad's own price and service characteristics, and the railroad's cost.

With differential pricing, shippers are charged different rates for the same service based on the shipper's dependence upon rail service. Differential pricing results in unequal rates and revenue-to-variable cost ratios for different commodities, geographical locations, and producers, even in similar circumstances. Consequently, with differential pricing, captive shippers bear a higher proportion of a railroad's fixed and common costs than non-captive shippers (Prater and Klindworth 2000).

The Staggers Act relies on competition to limit rail rates, but includes rate appeal procedures to limit the rates railroads could charge captive shippers (who have no competitive transportation choice). A shipper must meet three conditions to appeal rail rates (USDA and USDOT 2010):

- Shippers may appeal only tariff rates.<sup>2</sup> The STB has no jurisdiction over contract rates and rates for exempt movements.<sup>3</sup>
- The movement must have a revenue-to-variable cost ratio that exceeds 180%.
- The shipper must show that the railroad has market dominance, which is the lack of effective intermodal and rail-to-rail competition.

In the early years of deregulation, intramodal competition may have been sufficient to yield a competitive rail grain rate structure. However, rail mergers and line abandonments have reduced intramodal competition considerably, resulting in an oligopolistic market structure that may allow railroads considerably more pricing freedom.

Thus, although differential pricing offers shippers the benefit of having viable and stable rail service, reaction to rail deregulation from shippers has not been all positive. Shippers feel responsiveness to shipper needs has been lost, rail costs have been shifted to the shipper, overall rail service and capacity have decreased, rates are generally increasing, and rates have been "unfair and inequitable" in some corridors and for some commodities. Such shippers often charge that railroads unreasonably raise their rates to levels that are far beyond those that should be charged (Montana Wheat & Barley Committee et al. 2005; NGFA 2005; USDA 2005).

Numerous papers (cited below) discuss railroad industry competition and pricing, providing varying degrees of analysis as to the impact of competition within the industry. Many of these papers are regional in scope, investigate the impact of deregulation after the Staggers Rail Act of 1980, and the majority were written in the decade after enactment. The following is not a complete survey of the prior research related to railroad competition, but instead emphasizes the interaction between railroad competition and rail grain transportation prices.

Babcock, Sorenson, Chow, and Klindworth (1985) investigated the impact of the Staggers Act on Kansas agriculture. The study found substantial railroad rate reductions in the four-year period of 1981 through 1984. The pattern of rate changes suggested the presence of both intramodal and intermodal transportation competition. Tariff rates to the Gulf of Mexico during this period dropped 34% compared with a 64% increase in the four years preceding the Staggers Act.

MacDonald (1987) used regression analysis of the 1983 waybill sample data to examine the rail rates for corn, wheat, and soybeans. Rates were negatively related to tonnage, distance, and volume of the shipments. Also, rates were negatively related to increased intramodal competition (the reciprocal of the Herfindahl Index) and rail rates increased with distance to waterways.

A later study (MacDonald 1989) uses waybill data from 1981 through 1985 to analyze rail rates and competition for corn, wheat, and soybeans. MacDonald found that when rail service goes from a monopoly to a duopoly, rail rates decline 18%. The addition of a third competing railroad resulted

in an additional 11% decrease in rail rates. Also, he found that shippers located 400 miles from barge access paid rail rates that were 40% higher than those located 100 miles from barge access. Finally, MacDonald calculated inverse Herfindahl-Hirschman indices for each crop reporting district (CRD) and concluded that each CRD was characterized by rail oligopolies.

Chow (1986) studied post-Staggers rail grain rates for the Central Plains region. His analysis indicated an overall reduction in wheat rail rates of 34.5% in the five-year period after enactment of the Staggers Act, with the most significant reductions occurring in movements to the export markets.

Kwon, Babcock, and Sorenson (1994) examined the impacts of the Staggers Act in the latter half of the 1980s and found that railroads practiced differential pricing for intra Kansas and export shipments of wheat. They discovered substantial differences in the factors affecting the revenue-to-variable cost ratios for intra Kansas wheat movements versus that of Kansas export wheat movements. Revenue-to-variable cost ratios increased steadily from 1986 through 1989, but this could have been caused by diminishing export demand.

Fuller, Bessler, MacDonald, and Wohlgenant (1987) found deregulation to have had a significant effect on rail corridors linking Kansas and Texas with Gulf ports and a relatively modest effect on the corridor linking Indiana with East Coast ports. Real rail rates declined \$.37 per bushel in the Kansas corridor and \$.31 per bushel in the Texas corridor during the 1981-1985 period. In the Indiana corridor, real rail rates were estimated to decrease \$.08 per bushel. Railroad deregulation had little statistically significant effects on real rail rates from Iowa and Illinois to the Gulf ports.

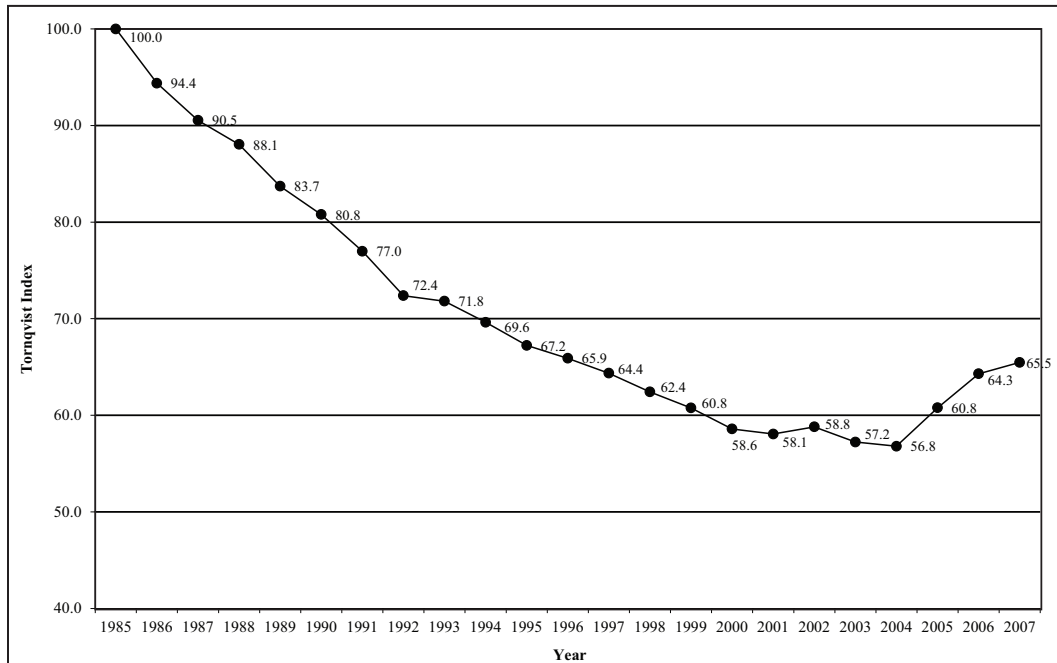
Koo, Tolliver, and Bitzan (1993) examined railroad pricing behavior in North Dakota, which is often considered a captive railroad shipping market. The region has unique transportation characteristics that include limited intermodal competition due to great distances to barge-loading facilities and to major domestic and export markets. They found that distance, volume, weight per car, intramodal competition, and intermodal competition had significant negative effects on rail rates.

Thompson, Hauser, and Coughlin (1990) evaluated the pre- and post-Staggers effect of competition on railroad revenue-to-variable cost ratios for export shipments of corn and wheat. The regression results for corn were less significant than those of wheat. There was a lack of identifiable differences in pre- and post-Staggers pricing, which may be attributable to the close correlation between changes in operating factors, such as shipment size, and destination opportunity. They concluded that their results did not indicate a clear effect of the Staggers Rail Act on rail rate competitiveness.

Wilson and Wilson (2001) examined rail rates for barley, corn, sorghum, wheat, and soybeans moved by rail. The explanatory variables include commodity ton-miles, commodity prices, average length of haul, and a non-linear specification of deregulation that allows the effects to phase in over time. They found that commodity prices have positive effects on rail rates and length of haul has a strong negative effect. The results indicate a large negative effect on rates from deregulation, which dissipate with time.

The STB waybill rate data are used in Figure 2 to examine the real revenue per ton-mile for the period 1985 to 2007. The STB uses the Tornqvist Index to track rail rates. The Tornqvist index measures the change in prices in commodity categories and assigns a percentage weight to each category based on its share of total revenue. The index is essentially the weighted average of price changes within the various commodity categories. Both the prices within the various commodity categories and the weights assigned to each category can vary (STB 2009).

The downward pressure on rates identified above as a result of railroad efficiency improvements and competitive pricing is evident. From 1985 to 2004 the rail rate index fell almost continuously, with only a slight increase being noted in 2002. However, as frequently stated to the STB by shippers, the years since 2004 have seen rapidly increasing rates for shippers. Starting in 1985, rail rates dropped about 10% in the first two years, continued dropping at nearly that rate through 1992, and then declined at a slower rate during the period between 1992 and 2000. Over the next few

**Figure 2: STB Rail Rate Index 1985 to 2007; Real Revenue Per Ton-Mile (1985=100)**

Source: STB, Study of Railroad Rates: 1985-2007

years, the rates hovered in a narrow range, varying both positively and negatively until 2004. From 2004 to 2007 the rate index increased nearly 15%, from 56.8 to 65.5 (STB 2009).

Various studies (GAO 1990, GAO 2006, Christensen 2008) have agreed with the findings that overall rail rates decreased substantially from the mid-1980s to the early 2000s. The causes of the decrease included:

- The rationalization of the rail network, with abandonments and creations of short line or regional railroads decreasing costs while maintaining much of the original traffic.
- The increase in trainload shipments.
- The shifts to larger-capacity rail cars and technology innovations.

The recent STB study of railroad rates from 1985 to 2007 (2009) found that “inflation-adjusted rates” increased from 2005 to 2007. The STB wrote: “This represents a significant change from prior years, given that inflation-adjusted rail rates declined in every year but one from 1985 through 2004.” The STB further elaborated: “In fact, adjusting for the purchasing power of the dollar, shippers spent \$7.8 billion more in 2007 than they would have if the rate levels of 2004 had remained in place.” The STB rate study (2009) further points out that well over half the increase in rail rates between 2004 and 2007 could be attributed to higher fuel costs. Yet, even after consideration of fuel costs, railroad rates have been steadily increasing during the last few years (STB 2009).

The Government Accountability Office (GAO) has reported that the percentage of traffic in tons traveling at rates above a revenue-to-variable cost ratio (R/VC) of 300, which is substantially above the statutory jurisdiction level of 180, has generally increased from 1985 through 2005 (GAO 2007). The share of tonnage traveling at rates over 300% R/VC increased from 6.1% in 2004 to 6.4% in 2005.

This paper examines the R/VC for railroad grain and oilseed movements and railroad rates for grain and oilseed movements by shipment size and distance. Railroad fuel surcharges are also examined and found to exceed the growth in railroad fuel costs. Finally, railroad revenue adequacy is examined relative to railroad industry costs and merger premiums.

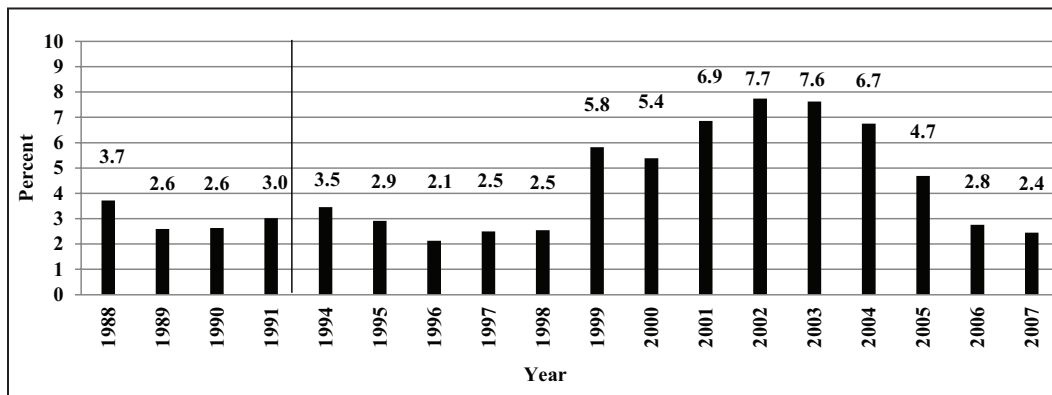


## RECENT RAIL RATE LEVELS

This study calculated average R/VC ratios for grain and oilseed tariff rates by dividing the freight revenue field in the Confidential Waybill Sample by the variable cost field. The variable costs are calculated for the waybill sample by the STB using its Uniform Rail Costing System.

Figure 3 shows a slight downward trend from 1988 to 1998 in the percent of grain and oilseed tonnage traveling above an R/VC of 300%. The increase in the percentage of tons moving at R/VC greater than 300% began in 1999 and peaked at 7.7% in 2002, then decreased to 2.8% in 2006 and to 2.4% in 2007. The vertical line in figures 3 and 4 denotes the lack of waybill data for 1992 and 1993.

**Figure 3: Percent of Grain and Oilseed Tons Moved at Tarrieff Rates with R/VC Greater Than 300%**



Source: USDA analysis of STB Waybill Sample

In some states, however, a much greater percentage of grain and oilseed tonnage moves at R/VC ratios greater than 300% (Figure 4). These states include Iowa, Montana, and North Dakota. The high percentage of rail rates exceeding a R/VC of 300% for Montana shippers from 1998 through 2004 could be due to its distance from intermodal competition and the fact that one railroad handles 95% of the rail movements of grain. However, rates and R/VC ratios for movements of agricultural commodities can differ from state to state for numerous reasons, and can change significantly from year to year as Figure 4 shows.

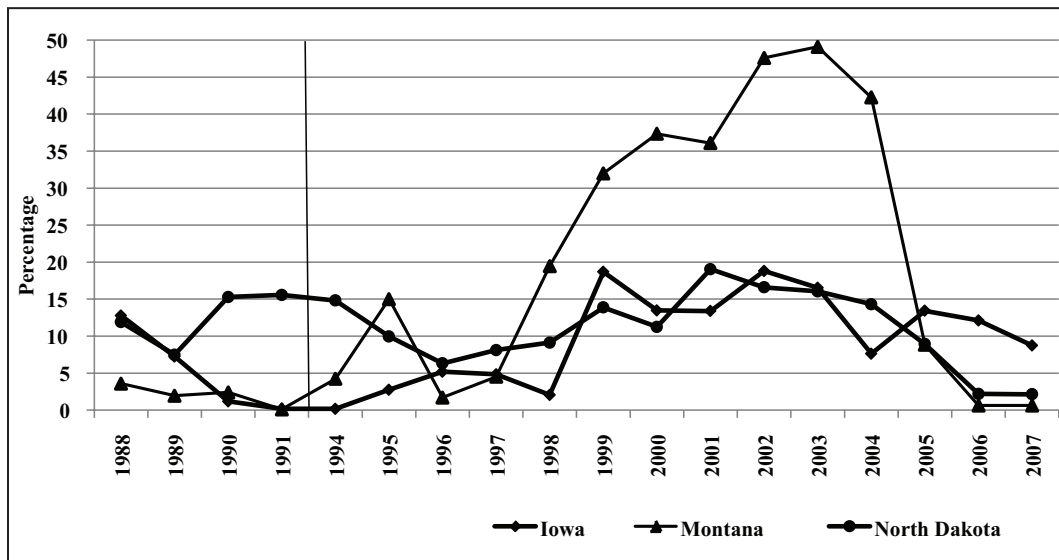
The analysis of rail rates is limited to tariff rates since contract rates are confidential and unregulated. However, several limitations in Waybill Sample data mean that tariff rates should be used with some caution. Volume discounts and rebates for use of non-railroad equipment are not included in tariff rates. Fees for guaranteeing delivery of rail equipment on specific dates, or “certificates of transportation” payments, are not included. Also, in some instances contract rates can differ substantially from tariff rates, while in other instances there can be little if any difference between contract and tariff rates. Thus, the use of Waybill Sample tariff data and costs for the calculation of R/VC ratios can provide a misleading picture for some comparisons. While these anomalies can distort the R/VC calculations for some comparisons, the results presented in the rate analysis for this study are thought to be generally representative of rate trends over the period.

## Agriculture Rates are Higher Than Those of Other Commodities

The GAO found that “although rates have declined since 1985, they have not done so uniformly, and rates for some commodities are significantly higher than rates for others” (GAO 2006) (Figure 5). Specifically, GAO found that “grain rates declined from 1985 through 1987, but then diverged from the other commodity trends and increased, resulting in a net 9% increase by 2004.” In 2005, rates



**Figure 4: Selected States with Higher Percentages of Grain and Oilseeds Moving at R/VC Over 300%**



Source: USDA analysis of STB Waybill Sample

for all commodities increased by 9% over 2004 rates, the largest annual increase in 20 years. Rail rates for grain increased 8.5% over 2004 (GAO 2007).

According to the *AAR Freight Commodity Statistics*, agricultural rates not only are higher than those of other commodities, but also have increased more rapidly (see Figure 6). For instance, rail rates for grain and oilseeds increased to \$2,809 per carload in 2008, up 73% from 2003; rates for all other commodities increased to \$1,556 per carload, up 50%. In addition, grain and oilseed rates during 2008 were 81% higher than those paid by all other commodities, compared with 55% higher in 1998. The average number of grain and oilseed tons per carload increased 2.2%, from 97.6 tons per carload in 1998 to 99.7 tons per carload in 2008.

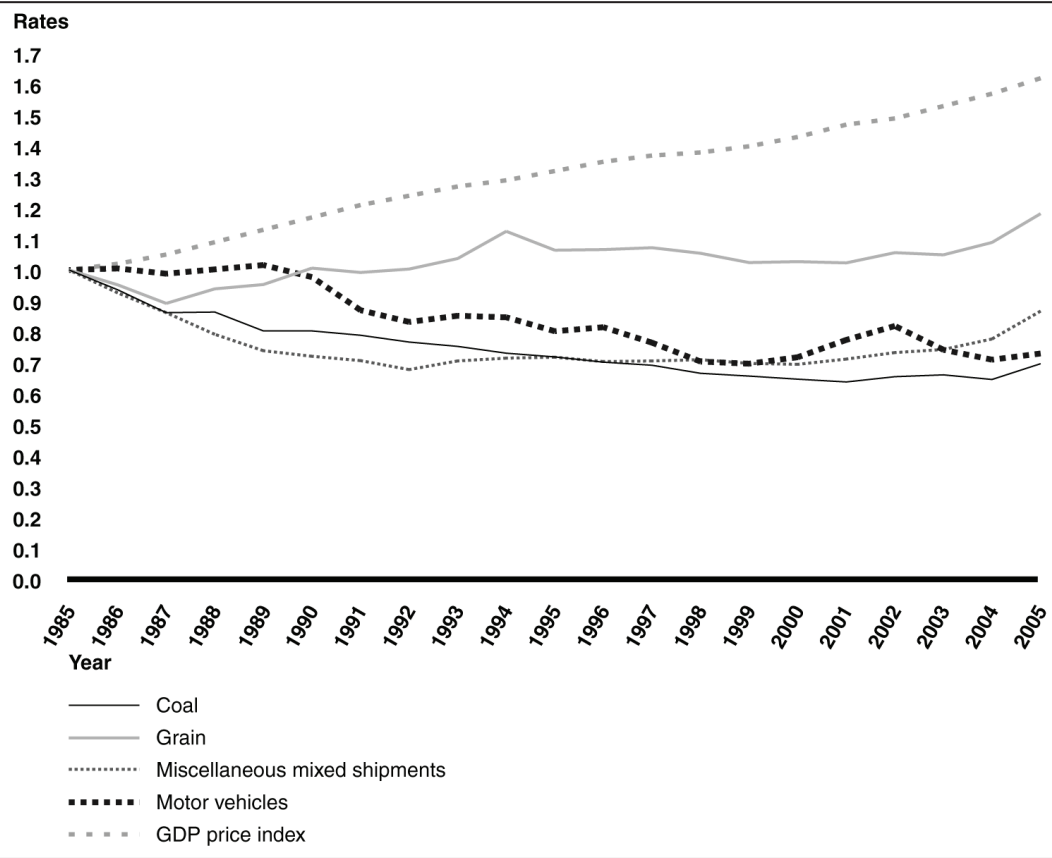
### Comparison of Rates by Shipment Size and Distance Shipped

The STB waybill sample allows specific analysis of grains and oilseeds, which is presented in detail in this section. This study did not have access to the unmasked confidential waybill data, which report the unmasked rail rates for contract movements as well as for tariff movements. Consequently, only tariff rail rates are analyzed in this section. In addition, samples with fewer than 30 observations are not included in the figures to increase the statistical reliability of the analysis. The vertical lines in figures 7 and 8 denote the lack of waybill data for 1992 and 1993.

The rates for grain and oilseeds reflect a significant advantage for large trainload shipments. As can be seen in Figure 7, rates for all shipment sizes have risen steadily and rapidly since 2003. The rates for the smallest shipment size have increased 21% since 2003, compared with 25 and 23%, respectively, for 6–49 car and 50+ car shipments, keeping the relative relationships between shipment size categories about the same over the last five years analyzed. However, since 1988, the rates for the smallest shipment sizes have increased by only 13%, while the rates for 6–49 car shipments and 50+ car shipments have increased by 40% and 43%, respectively. This shows that the rates for larger sized shipments have increased relatively more than for smaller shipments over the entire period.

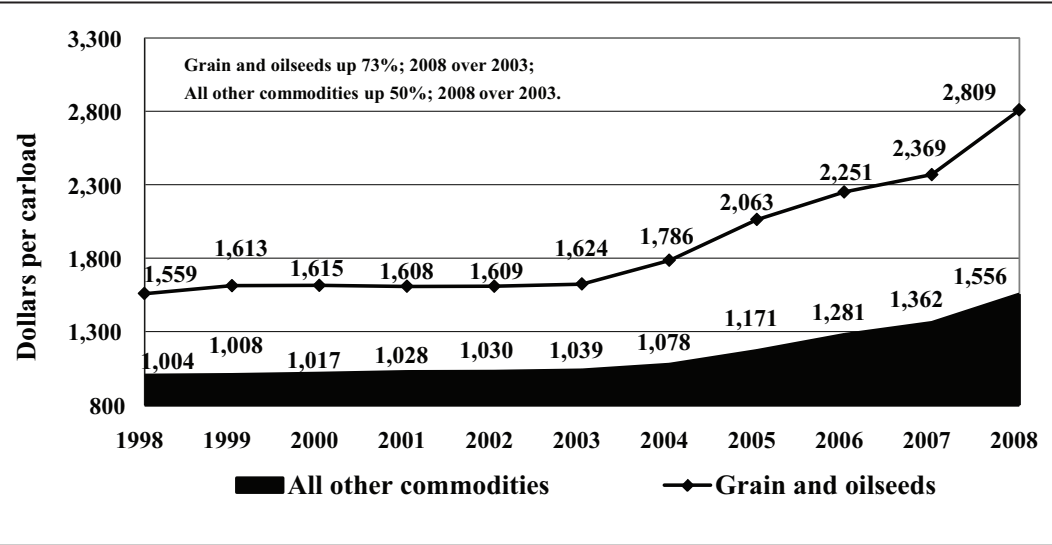
Rates for large shipments are nearly 2.1 cents per ton-mile, contrasted with about 3.0 cents for smaller movements. Rates for large shipments are about one cent or 33% lower than the smallest

Figure 5: Rate Changes for Coal, Grain, Mixed Shipments, and Motor Vehicles, 1985–2005



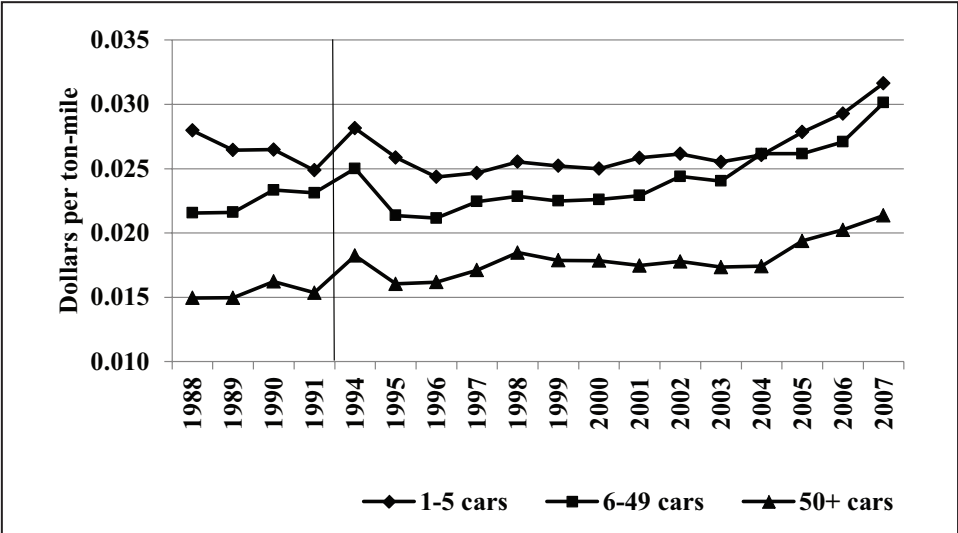
Source: GAO analysis of STB data

Figure 6: Railroad Average Freight, Revenue per Carload



Source: Association of American Railroads, Freight Commodity Statistics

Figure 7: Grain and Oilseeds Tariff Revenue (Current \$) Per Ton-mile by Shipment Size

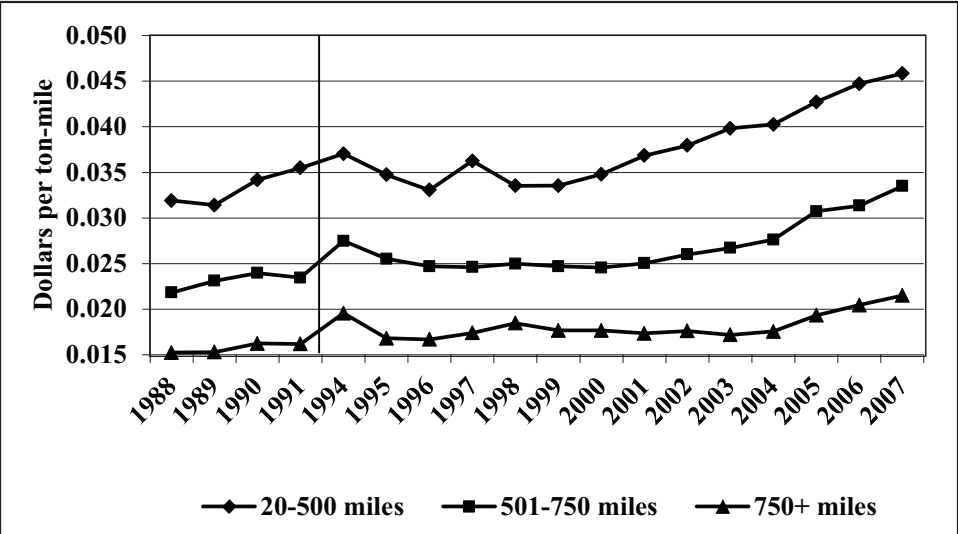


Source: STB Waybill Samples

shipment size. In 1988, though, large shipments were 46% less than small shipments. The discount for medium-size shipments relative to small shipments has decreased substantially—from 23% in 1988 to only 5% in 2007.

A similar situation holds for shorter distance movements, in which rates are consistently about double the rates for movements over 751 miles in length—4.6 cents versus 2.15 cents per ton-mile in 2007. Rates for short hauls started increasing in 2000, but longer hauls didn’t have sharp increases until the last four years (see Figure 8).

Figure 8: Grain and Oilseeds Tariff Revenue (Current \$) Per Ton-mile by Shipment Distance



Source: STB Waybill Samples

This detailed examination of the grain and oilseeds commodity group shows the effect of distance on railroad rates. As railroads seek to increase the usage and revenue generation of their rolling stock, it is often in their best interest to give price/rate incentives to shippers with long hauls. Also, the cost disadvantages in equipment utilization make the short hauls more expensive for the carriers.

It is widely acknowledged that railroads have used trainload or multiple car rates to encourage shippers to consolidate shipments, thereby increasing the efficiency of the capital stock, power, and labor. The analyses above demonstrate that the longer the movement, the lower the rate charged by the railroads. However, the analysis does not consider the costs that have been shifted to the shipper so they could access these rates.

### TRANSFER OF RAILROAD COSTS TO SHIPPERS

Rail rates have decreased since deregulation in the early 1980s. Inflation-adjusted rates have decreased by slightly over 30% since 1985. However, a broad and consistent increase in rail rates over at least the last four years—and for some commodities the last seven years—indicates the railroads have used rates to achieve profit levels previously unseen in the industry.

Moreover, the overall decrease in revenue per ton-mile for railroads does not reflect the actual impact on shippers. The logistical cost to shippers, and to the public, has increased over that time.

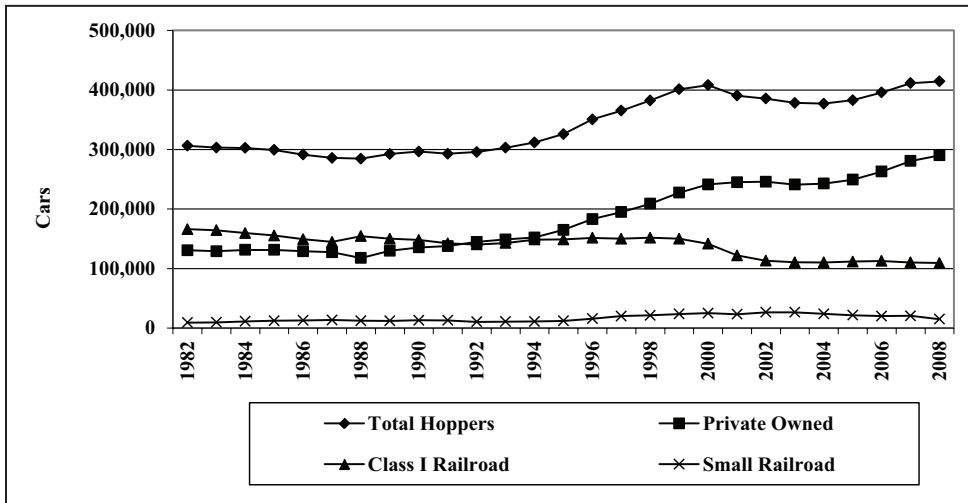
The Christensen study defined cost-shifting as additional costs incurred by shippers as a result of changes in railroad operations. Examples of cost-shifting identified in that study include (Christensen 2008):

- A shift in railcar ownership and its associated expenses, such as maintenance and insurance, from railroads to shippers or other private firms.
- Increased railcar maintenance standards being required by railroads as necessary to maintain service and capacity.
- Increases in and additions to accessorial charges, such as finance charges, charges for faxing versus electronic transmission, higher demurrage charges, private car storage charges, and car cleaning charges.
- Deterioration in railroad service, causing the increased use of shipper labor to monitor railroad performance or to unload railcars.
- The use of trucking to transport goods to distant terminals to access multiple-car rates.
- Increased highway congestion and maintenance because of the increased use of trucking.

The average rate per ton-mile has decreased, in part, because all shippers, and especially grain shippers, are assuming greater responsibility for car supply and other functions that railroads have traditionally provided. Many shippers, in times of short railcar supply, use guaranteed rail-ordering systems, paying fees in addition to tariff rates to guarantee car delivery within a specified time period rather than risking a delay in receiving railcars on a first-come-first-served basis (Prater and Klindworth 2000).

The attractiveness of unit and shuttle trains due to the railroad's rate structure has caused shippers to invest in sidings, inventory, storage capacity, and loading facilities to access these more cost-effective rail services. Shippers note that, after investing in equipment to handle 50–54-rail-car shipments, the railroads have changed some rate structures to emphasize 100–110-car shipments, requiring further investments.

The costs of railcar ownership have shifted from railroads to shippers, adding further to costs not reflected in tariff rates. As can be seen in Figure 9, private ownership has been the source, in a steady increase, of new covered hopper railcar capacity. In 1981, private ownership accounted for 41% of the total covered hopper cars, with the Class I railroads providing 56% and the smaller railroads contributing 3% of the capacity (AAR, *Railroad Equipment Report* 1982). By 2008, hopper car ownership was 70% private, 26% Class I railroad, and 4% smaller railroads (AAR, *Railroad Equipment Report* 2008). Another way of looking at rail car ownership is to see that from

**Figure 9: U.S. Covered Hopper Fleet Ownership, 1982–2008**

Source: AAR, Railroad Equipment Report

1981 to 2008 privately owned cars increased from 128,394 to 290,176, or 126%, as Class I railroads decreased their ownership by 37% (AAR, *Railroad Equipment Report* 1982-2008). The costs of car ownership have been shifted to the shippers or their agents.

### Fuel Surcharges Versus Fuel Prices

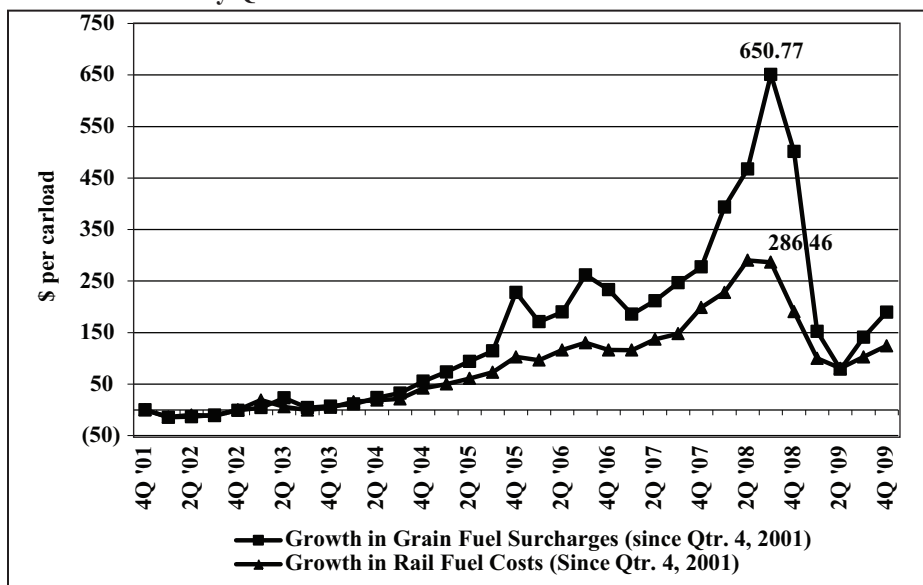
Rates per-ton-mile decreased from the time of deregulation until around 2002. Over the last four years these rates have significantly increased. Recently, railroad fuel charges have added to the shipper's cost burden. These surcharges are designed to allow railroad firms to recover from shippers the impact on costs caused by abnormally high fuel prices. Basic fuel charges have always been included in rail rate determination, but the recent spikes and variation in fuel prices caused railroads to search for ways of recapturing these costs in the near term.

The fuel cost increases were first estimated as a percentage of tariff rates, but shippers felt any errors in estimation were on the side of the railroad carrier. As fuel prices and the attendant fuel surcharges were implemented, shippers felt that carriers were using these surcharges as profit centers, whether the fuel costs were going up or down. They also believed that rate-based fuel surcharges did not fairly apportion the additional cost of the fuel among shippers. Subsequent to a regulatory proceeding on rail fuel surcharges, the STB (STB 2007) on January 25, 2007, ruled that:

- Computing rail fuel surcharges as a percentage of a base rate is an unreasonable business practice because rail rates do not accurately reflect the additional cost of fuel used in individual movements. The STB reasoned that a rate-based fuel surcharge would result in shippers who pay higher rail rates also paying higher fuel surcharges.
- The fact that a railroad may not be able to recover its increased fuel costs from some of its traffic does not provide a reasonable basis for shifting those costs onto other traffic.
- Railroads are prohibited from “double dipping”—charging a fuel surcharge in addition to increasing rates using an index that includes fuel costs as a component.
- Railroads operating in the United States had until April 26, 2007, to change their fuel surcharge programs to comply with the STB ruling.

When examining the performance of fuel surcharges in recovering fuel cost increases, wide differences among fuel surcharge rates cause concern about the accuracy of surcharge formulas. For instance, during September 2008, when surcharges peaked, they varied among railroads from

**Figure 10: Growth in Railroad Grain Fuel Surcharges v. Growth in Railroad Fuel Costs by Quarter<sup>1</sup>**



<sup>1</sup> For the 7 Class I railroads operating in the United States. Weighted average fuel surcharges per carload were estimated by multiplying the average length of haul for grain by the quarterly weighted average fuel surcharge per carload mile. Weighted average fuel surcharge per carload mile prior to 2Q '06 was estimated using mileage-based fuel surcharge formulas for individual railroads.

Source: Class I Railroad quarterly filings to the Security and Exchange Commission.  
AAR, The Rail Transportation of Grain (2009).

46.58 cents to 87 cents per car mile, a difference of nearly 87%. The weighted average surcharge was 59 cents per car mile or \$590 per car moving 1,000 miles.

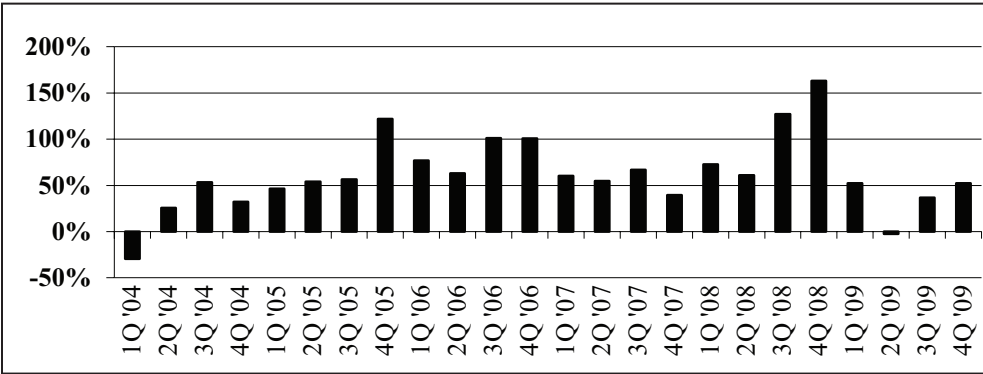
Shippers contend that fuel surcharges should reimburse railroads for only the incremental increase in fuel costs and not the base, since the base fuel costs are already in the rate. The average growth in fuel surcharge per grain carload during the 3<sup>rd</sup> quarter of 2008 was \$650.77, contrasted to the growth in railroad fuel costs from 2001 until the 3<sup>rd</sup> quarter of 2008 of \$286.46, a difference of 127% over the incremental increase in the cost of fuel (see Figure 10).

Figure 11 shows that the percentage by which the growth in grain fuel surcharges exceed the growth in railroad fuel costs since 2004 ranges from -30% to 163%. Note that the percentage growth in grain fuel surcharges exceeds the growth in railroad fuel costs in all but two quarters. Furthermore, as fuel costs increase, the difference between the quarterly growth in grain fuel surcharges and the growth in railroad fuel costs tends to increase. This correlation is not perfect mainly because fuel surcharges lag fuel cost increases by two months.

## **RAILROAD REVENUE ADEQUACY**

An evaluation of railroad rate reasonableness requires consideration of both the relative profitability and costs of railroads. Such an evaluation must also consider merger premiums<sup>4</sup> and how they relate to STB revenue adequacy measures<sup>5</sup>, as well as the revenue adequacy and profitability of Class I railroads over time.

**Figure 11: Percentage Growth in Grain Fuel Surcharges Exceed Growth in Railroad Fuel Costs**



Source: Class I Railroad quarterly filings to the Security and Exchange Commission.  
AAR, The Rail Transportation of Grain (2009).

**Merger Premiums and STB Revenue Adequacy**

The STB annually measures the revenue earned from the rate structure against the adequacy of that revenue stream to infuse capital into the industry. To determine the annual revenue adequacy, the carrier’s return on net investment (ROI) is compared with the rail industry’s after-tax cost of capital for that year. If ROI is greater than the cost of capital, revenue is determined to be adequate.

ROI is normally determined by dividing net income from railroad operations by the depreciated original cost, or book value, of the railroads’ assets. This ROI is then compared with the railroad industry cost of capital. The STB seeks to ensure that a railroad has the capability to invest in its infrastructure and provide a reasonable return to its investors.

The costs to be included in determining the critical ROI have been examined in various proceedings and shipper testimonies. If the depreciated book value, or original cost, is increased, then calculated ROI decreases and revenue adequacy is negatively affected, allowing railroads to charge higher rates. In addition, the STB’s Uniform Rail Costing System uses these higher cost values in the calculation of variable costs, thereby driving down the R/VC calculations for the railroad’s movements.

Shippers and shipper representatives have become concerned about the premiums being paid to newly formed railroads when a merger is granted. The ICC/STB has been consistent in allowing such premiums, usually above the current stock or book price prior to the merger, to be included in the depreciated cost figure. Shippers have argued that railroads should not be allowed to pay acquisition premiums if these costs are then used to decrease the railroad firm ROI, which is used for revenue adequacy determination. This can result in the railroads being allowed to charge higher rates than would have been possible if the premiums had not been paid, resulting in economic impact and harm to the shippers.

The extent of these premiums is difficult to determine, but some information is available. Recent mergers have involved significant premiums paid by the merging railroads. These estimated premiums range from \$1.4 billion for the Union Pacific (UP) purchase of Chicago Northwestern in 1996 to \$2.7 billion for the Atchison, Topeka, & Santa Fe merger with Burlington Northern in 1995, and \$3.7 billion for UP’s purchase of Southern Pacific in 1996. Consultants estimate that the premium paid for Conrail by Norfolk Southern and CSX Transportation was about \$6.9 billion. Other estimates also have been generated, but the relevant point is that these premiums, if added to the book value of the merger, affect the ROI value used for revenue adequacy purposes.



The railroad industry and the STB are the only industry and regulator that use book value for determining ROI and add merger premiums into the rate base. For example, the Federal Energy Regulatory Commission will not allow regulated entities to pass through to the customer acquisition or merger premiums unless the effect of the transaction has a net benefit (typically, a rate reduction) to the customers of the acquired entity. The net result is that this approach discourages the payment of large premiums because they are not likely to be permitted to be passed through to customers.

The net effect of merger premiums, which increase both variable and fixed costs of the railroads, is that some rates that would have been above 180% of variable costs might no longer meet that criterion and would no longer be subject to STB regulation.

A contrasting opinion on the ROI calculation is offered by the railroad industry and the AAR. The railroads, through the AAR, have argued that the ROI calculation should be based not on depreciated value but on the replacement cost of the rail assets used to provide transportation. Merger premiums also could reflect the net present value of the merger in expected cost savings to the combined firm.

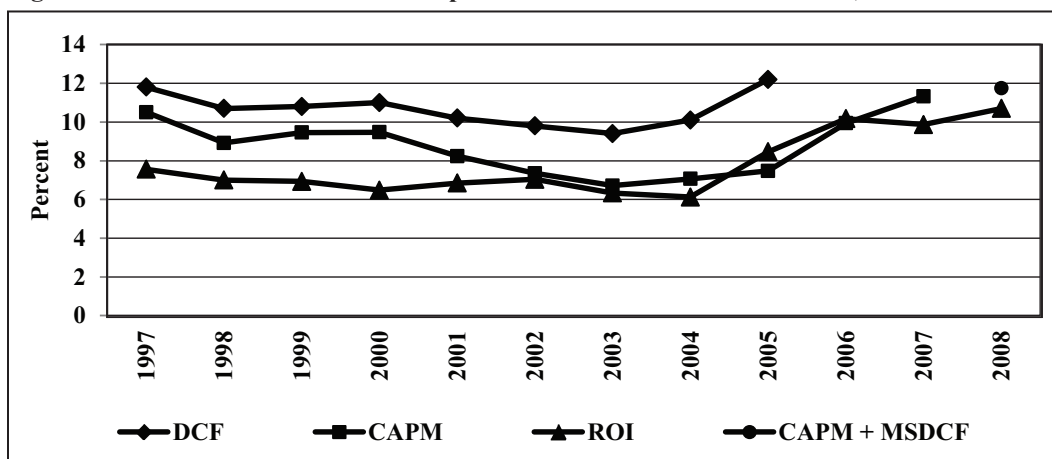
### STB Measures of Rail Revenue Adequacy

Class I railroad revenue adequacy is determined by comparing the ROI with the cost of capital. The STB determines the cost of capital for each year and determines which Class I railroads are revenue adequate. The STB used a simple discounted cash flow (DCF) method to determine the industry's weighted average cost of capital through 2005. After shippers requested public hearings to examine the methodology, the STB then changed to a capital asset pricing model (CAPM) for the years 2006 and 2007. After another public hearing, STB decided to use a simple average of CAPM and a multi-stage discounted cash flow model (MSDCF) in 2008 and beyond.

Since the Staggers Act, the ROI for the railroad industry has increased from an average of 2.5% during the 1970s to an average of 10.25% from 2006 through 2008 (AAR, Railroad Facts).

Based upon the CAPM methodology, Figure 12 shows that the Class I railroads have been revenue adequate during 2005 and 2006 and nearly revenue adequate for the other years since 2002. In contrast, the Christensen (2008) study, which used return on equity, found that the Class I railroads could be considered revenue adequate since 2001.

**Figure 12: Class I Railroad Cost of Capital and Return on Net Investment, 1997–2008**



Sources: AAR Railroad Facts; Surface Transportation Board

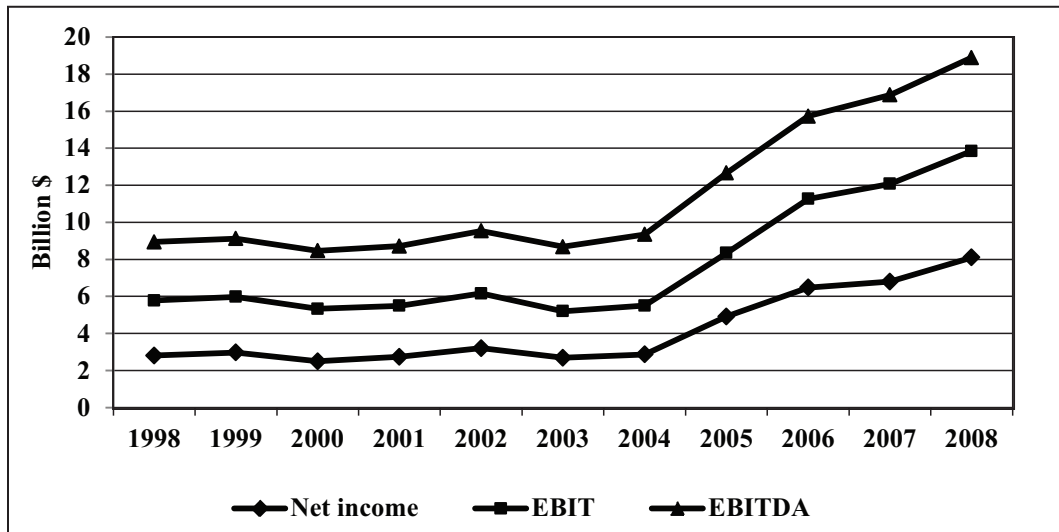
## Financial Measures of Railroad Profitability

Whether measured by commonly used financial measures or by STB-determined revenue adequacy standards, the profitability of the railroad industry has improved considerably since deregulation. The Christensen (2008) study used various measures of profitability to compare the railroad industry with other industries and with the Standard & Poor's 500. Since 2004, railroad profitability was found to be comparable to that of most other industries (Christensen 2008).

The rapid increase in rail rates since 2004 contributed to the surge in railroad profitability at that time. The increase in rail rates is the result of aggressive pricing as rail capacity constraints appeared and the over-recovery of fuel costs. The higher rail rates also reflect higher rail costs since 2004 (Figure 13).

Railroad financial measures of profitability increased at a moderate rate through 2004, and then surged from 2005 through 2007. Net income, earnings before interest and taxes (EBIT), and earnings before interest, taxes, depreciation, and amortization (EBITDA) are commonly used financial measures of profitability. Net income, EBIT, and EBITDA changed 2%, -5%, and 5%, respectively, over the six-year period from 1998 to 2004. Over the four-year period from 2004 to 2008, net profit, EBIT, and EBITDA increased 183%, 152%, and 102%, respectively.

**Figure 13: Class I Railroad Profitability**



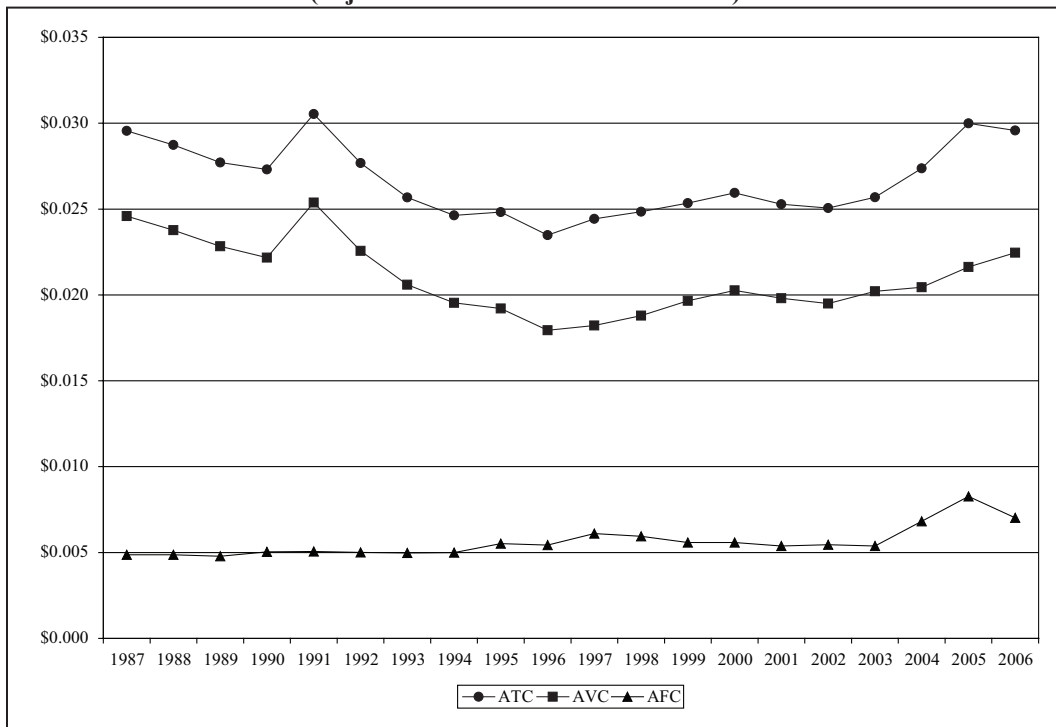
Sources: AAR, Analysis of Class I Railroads

## Factors Affecting Railroad Industry Costs

Several factors affecting railroad costs are often overlooked when analyzing those costs. Railroad management decisions affect some of these factors, which include merger premiums, size of operation, traffic density, the amount invested in capacity, and successful integration of operations during mergers. Other factors, such as unusually high fuel costs and extreme weather events, are factors that railroad management are unable to control.

As discussed in an earlier section, merger premiums can add substantially to the average fixed and variable costs<sup>6</sup> of the new railroad firm. The effects of these mergers, including increased costs due to merger implementation difficulties, are visible in Figure 14, showing average railroad industry costs. Variable costs for the railroad industry increased from 1997 through 2000 and fixed costs increased from 1995 through 1997.

**Figure 14: Railroad Industry Average Cost, Variable Cost, and Fixed Cost in Dollars Per Ton-mile (adjusted for inflation in 2000 dollars)**



Source: Laurits Christensen Associates (2008)

Variable and total costs for the merged railroads increased after each of these major rail mergers or acquisitions:

- The merger of the Atchison, Topeka, & Santa Fe with the Burlington Northern (September 1995)
- The Union Pacific with the Southern Pacific (implemented December 1996)
- The split of Conrail between CSXT and Norfolk Southern (June 1999)

In each of these mergers, the railroads had difficulties merging operating systems and lines, resulting in congestion that drove up average total and variable costs for the merging railroads.

A recent study of railroad cost curves concluded that the four largest Class I railroads, BNSF, CSXT, NS, and UP, may have surpassed the optimal size of operation and may be experiencing diseconomies of scale (Bereskin 2008). This means that the average costs for those railroads are higher than they would be if the firms were smaller. Based upon 2005 data, the optimal size of a railroad was estimated to be slightly less than 21,000 route miles. BNSF and UP operate more than 32,000 route miles, while CSXT and NS operate more than 21,000 route miles. The three smaller Class I railroads, Kansas City Southern, Canadian National, and Canadian Pacific, all appear to be operating with constant or increasing returns to scale.

Excess traffic density on the railroad also affects railroad average costs by slowing train speeds and increasing terminal dwell times. The slower train speeds and reduced terminal efficiency further reduce the effective capacity of the railroad, compounding the problem. When a railroad has excess capacity, fixed costs are higher than necessary. As railroads near capacity and capacity constraints appear, variable costs increase. The effects of railroad capacity constraints, beginning in 2005, are also visible in the above figure, which shows average railroad industry costs.

Another factor affecting average railroad fixed and variable costs is the amount the railroad industry invests in rail capacity. From 2004 through 2006, the railroad industry invested heavily

in capacity, which is shown in the average cost data in Figure 14 as increased fixed costs for the industry after 2004. As capacity bottlenecks are removed, however, variable costs should be reduced by these investments.

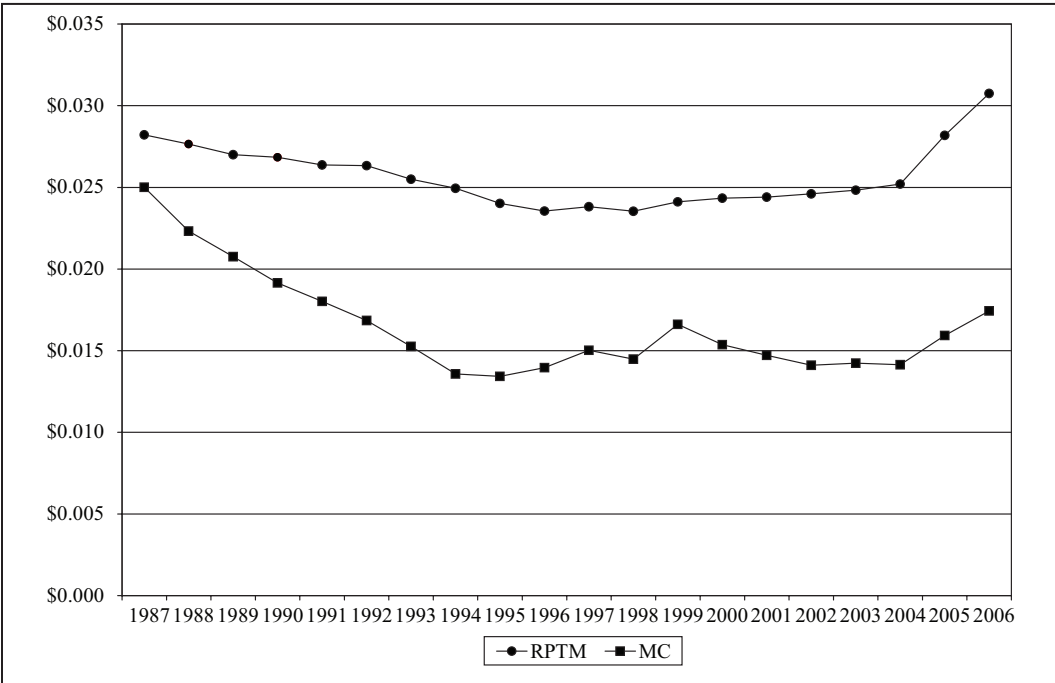
Unusually high fuel costs occurred from 2004, peaking in September of 2008. Fuel is a major component of railroad costs, so high fuel costs result in increased operating costs. This can be seen in the figure above, where high fuel costs and capacity constraints resulted in increasing variable costs in 2005 and 2006.

Extreme weather events can also increase railroad industry costs by adding the costs of repair and rerouting traffic. For instance, Hurricanes Katrina and Rita resulted in substantial damage to the rail network in Louisiana and Mississippi. Damages to the CSX coastal line, which had the most damage, required nearly \$250 million to repair (CSX Transportation 2006). Likewise, a massive mudslide on the UP line between Klamath Falls and Eugene, OR, swept track, ties, and ballast halfway down the mountain and buried over 3,000 feet of mainline track in 20 feet of mud, snow, and downed trees (Union Pacific Railroad 2008).

**Railroad Industry Revenue Compared to Marginal Costs**

Railroad industry revenue per ton-mile decreased slowly through 1996, rose slowly through 2004, and then increased rapidly in 2005 and 2006. Marginal costs (i.e., the addition to total cost attributable to the addition of one ton-mile) increased in 2005 and 2006, probably due to rail congestion as capacity constraints in the rail network and higher fuel costs drove marginal costs up (see Figure 15). Average revenue increased more rapidly than marginal costs in 2005 and 2006, indicating aggressive pricing due to capacity constraints and over recovery of fuel costs.

**Figure 15: Railroad Industry Average Revenue Per Ton-mile and Marginal Costs**



Source: Laurits Christensen Associates (2008)

## SUMMARY

In both the short and long run, farmers cannot individually raise the prices of their commodities to reflect rising costs, so any increase in costs reduces their individual profit. Agricultural producers are unique in that they bear the transportation costs when grain is transported; in the short run the price the producer receives from the elevator is net of transportation costs. Consequently, increases in transportation costs result in decreased producer profit.

Rail rates need to be sufficient to provide railroads with sufficient profit to maintain their equipment and lines, provide reliable service, invest in needed capacity, and provide a reasonable return on investment. However, unnecessarily high rail rates can damage the economic health of the farming sector and rural communities, and also make it more difficult for America to compete in export markets.

The costs of rail transportation to market are important to agricultural producers because they represent a significant percentage of the average on-farm price; grain and oilseeds are bulk commodities with a low value in proportion to their weight. Average rail tariff rates as a percent of the farm price of wheat have varied from 11.3% in 2007, when wheat prices were high, to 23.1% in 1999, when wheat prices were low.

Agricultural producers have become more concerned with rail rates as rail mergers and line abandonments after implementation of the Staggers Act, with its limited regulation of rates, have led to less intramodal competition.

This study reported an increase in the percentage of tons moving at R/VC greater than 300% that began in 1999, peaked in 2002, and decreased until 2007. In Iowa, Montana, and North Dakota, however, a much greater percentage of grain and oilseed tonnage moved at R/VC ratios greater than 300%. The high percentage of rail rates exceeding an R/VC of 300% for Montana shippers from 1998 through 2004 could be due to its distance from intermodal competition and the fact that one railroad handles 95% of the rail movements of grain.

Not only are rail rates for agricultural products higher than those for other commodities, but the rates have increased more rapidly from 2004 to 2008. Rail rates for grain and oilseeds increased to \$2,809 per carload in 2008, up 73% from 2003; rates for all other commodities increased to \$1,556 per carload, up 50%.

Railroad rate structures favor large movements due to cost and operational efficiencies. There is a significant rate advantage for the largest trainload shipments of grain and oilseeds. Rates are 30% lower for shipments of more than 50 cars; rates for large shipments are about 2.1 cents per ton-mile, contrasted to about 3.0 cents for smaller movements. The rates for larger sized shipments have increased relatively more than for smaller shipments over the entire period, thus, factors other than cost efficiencies may be driving the rate changes.

Rates for long hauls have a similar structure; movements less than 500 miles are about twice the rates for movements over 751 miles, 4.6 cents versus 2.15 cents per ton-mile in 2007. As railroads seek to increase the usage and revenue generation of their rolling stock, it is often in their best interest to give price/rate incentives to shippers with long hauls. Also, the cost disadvantages in equipment utilization make the short hauls more expensive for the carriers.

Shippers bear increasing responsibility for car supply and other functions historically provided by the railroads. The costs of railcar ownership have shifted from railroads to shippers, adding further to costs not reflected in tariff rates. Private ownership has been the source of new covered hopper railcar capacity; by 2008, hopper car ownership was 70% private, 26% Class I railroad, and 4% smaller railroads. From 1981 to 2008, privately owned cars increased from 128,394 to 290,176, or 126%, as Class I railroads decreased their ownership by 37%.

Fuel surcharges should reimburse railroads for only the incremental increase in fuel costs, not the base fuel costs that are already included in the rate. The average growth in fuel surcharge per grain carload during the 3<sup>rd</sup> quarter of 2008 was \$650.77, contrasted to the growth in railroad fuel costs of \$286.46, a difference of 127% over the incremental increase in the cost of fuel. Furthermore,

as fuel costs increase, the difference between the quarterly growth in grain fuel surcharges and the growth in railroad fuel costs tends to increase.

This study also reports that billions of dollars in premiums paid as part of mergers are included in the determination of railroad revenue adequacy, which is likely to result in higher rail rates for shippers than otherwise would be the case.

Rail rates have increased rapidly since 2004, resulting in a surge of railroad profitability. The increase in rail rates is the result of aggressive pricing as rail capacity constraints appeared, and the over-recovery of fuel costs. The higher rail rates also reflect higher rail costs since 2004.

Railroad financial measures of profitability increased at a moderate rate through 2004, and then surged from 2005 through 2007. Net income, earnings before interest and taxes (EBIT), and earnings before interest, taxes, depreciation, and amortization (EBITDA) are commonly used financial measures of profitability. Over the four-year period from 2004 to 2008, net profit, EBIT, and EBITDA increased 183%, 152%, and 102%, respectively.

## Endnotes

1. Running directionally occurs when two railroads with parallel rail lines share rail lines, allowing shared use of one line in each direction. This practice eliminates trains waiting on sidings for trains moving in the opposite direction to pass.
2. Tariff shipments comprise approximately 75% by weight of the grain and oilseed movements while contract shipments comprise approximately 25%.
3. Some movements have enough competition to limit rail rates and are exempt from regulation. Exemption of particular movements or exempt commodities can be appealed before the STB, and the STB may remove the exemption if competition no longer adequately constrains rates.
4. A merger premium is the amount paid for a firm that exceeds its net book value according to historical accounting methods. Net book value is the historical cost less accumulated depreciation.
5. As railroad tariff rates are partially deregulated and the financial condition of the railroad industry in 1980 was poor, the Staggers Act requires the regulatory agency (STB) to evaluate the revenue adequacy of the major U.S. railroads and the railroad industry. The STB calculates the cost of capital (weighted average of the cost of debt and cost of capital) for the railroad industry annually. If the railroad's return on net investment exceeds the cost of capital, the carrier is judged revenue adequate, which means that the railroad is able to attract sufficient capital.
6. Merger premiums add to variable costs when the premiums are paid on assets included in the calculation of variable costs.

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