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Agricultural Transportation Challenges of the 21st Century

Long-Term Trends in Railroad Service and Capacity for U.S. Agriculture

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Because rail is the only cost-effective transportation mode available to many agricultural shippers who are not located near markets or waterway transportation, long-term trends in railroad service and capacity are critically important to U.S. agriculture. These long-term trends are important because they will define the size of the rail network to which agricultural shippers will have access, the minimum shipment requirements that rail shippers and receivers will have to meet, the amount of intramodal competition that will exist in the industry, and, ultimately, the levels of rail service and capacity that will be available to agricultural shippers and receivers in the 21st century.

In this paper, the long-term trends in railroad services and capacity for U.S. agriculture are identified and described, particularly in terms of what these trends portend for agricultural shippers absent any change in the economically deregulated environment within which the U.S. rail industry has operated during the past 20 years. Before the trends are discussed, however, introductory material on how the U.S. railroad system has evolved over that time will be presented. After the long-term trends are presented, the paper concludes with a brief discussion of the likely long-term implications to U.S. agriculture of these long-term trends in railroad services and capacity.

The Evolution of Railroad Services for U.S. Agriculture

Importance of Rail – Rail and barge transportation are the only cost-effective modes for transporting low-value bulky agricultural commodities such as grains and oilseeds long distances. But, for agricultural shippers located long distances from the marketplace or navigable waterways, rail is typically the only cost-effective transportation alternative. Overall, rail is an important transportation mode in the marketing of grains, oilseeds, and lumber and wood products, as well as for the movement of farm inputs such as fertilizers to rural areas.

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Each year, the United States produces large quantities of grains and oilseeds whose associated transportation costs are high relative to the value of the commodity being shipped.[2] While transportation costs vary by mode and origin/destination, the total transportation cost in the delivered price of some grains and oilseeds can exceed 40 percent.[3] Because they are such a large part of the cost of marketing agricultural products, transportation costs for agricultural products are a source of constant concern for agricultural producers and shippers. Typically, the highest freight rates paid by agricultural shippers are for rail shipments from relatively remote production regions, particularly where transportation alternatives are limited.

Grain and oilseed shippers in the Upper and Lower Great Plains, for instance, lack cost-effective transportation alternatives to rail and must move their products long distances to domestic markets for processing and consumption or to coastal ports for export. Shippers in these regions do not have direct access to inland waterway transportation, and the distances involved make truck transportation costly. Many of the agricultural shippers in these regions are wheat shippers, and 9 of the 10 top wheat-producing States are more than 150 miles from barge transportation. In fact, from the Plains States, nearly 80 percent of all interstate wheat shipments and more than 90 percent of all export wheat shipments are by rail (Ferguson, 1994).

On average, about 40 percent of grain and oilseeds moved in the United States between 1990 and 1995 were transported by rail (Eriksen, et. al, 1998) (figure 1). However, preliminary data indicate that railroad modal share of domestic grain and oilseed movements decreased sharply to 31.1 percent by 1998, while truck modal share increased to 51.7 percent (figure 1). This sudden shift in market share may be largely a result of rail service problems experienced during 1997 and early 1998. In 1995, railroad share of domestic grain and oilseed movements, where truck is the major competitor, was slightly above 40 percent. For export movements, where barge is the major competitor, rail share was slightly less than 40 percent in 1995 (figures 2 and 3). From 1990 to 1995, rail moved, on average, about one-third of the corn, about two-thirds of the wheat, and about one-quarter of the soybeans in the United States in any year (Ericksen, et. al, 1998)(figure 4). However, preliminary data indicate that rail share decreased to only 25.4 percent of corn, 54.8 percent of wheat, and 19.5 percent of soybean movements by 1998 (figure 4).

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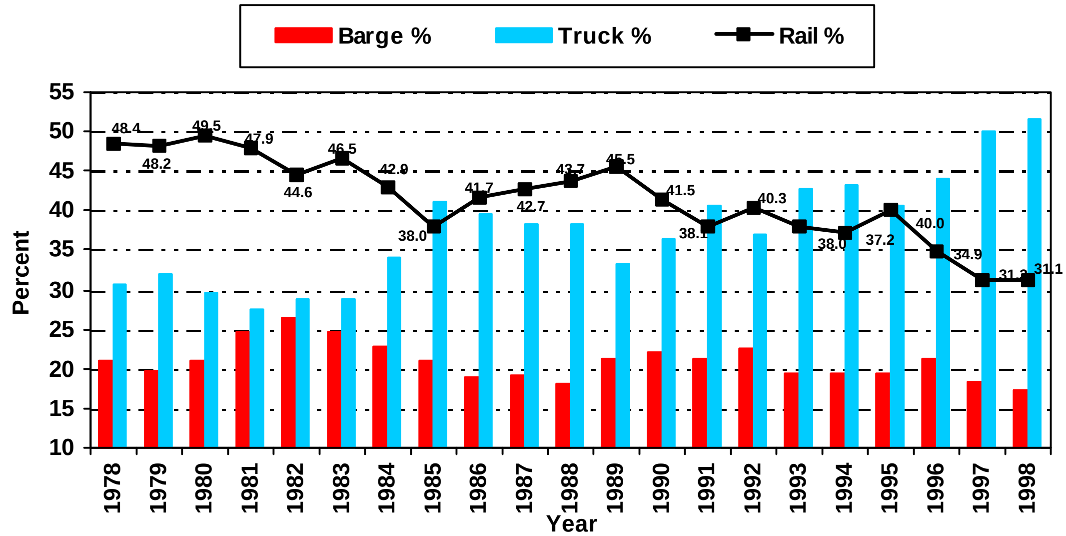
[2] Although production varies by year according to acres planted and weather conditions, the United States generally produces in excess of 300 million metric tons (mmt) of grains and oilseeds each year. In 1999/2000, expectations are that total grain production in the United States will exceed 400 mmt.

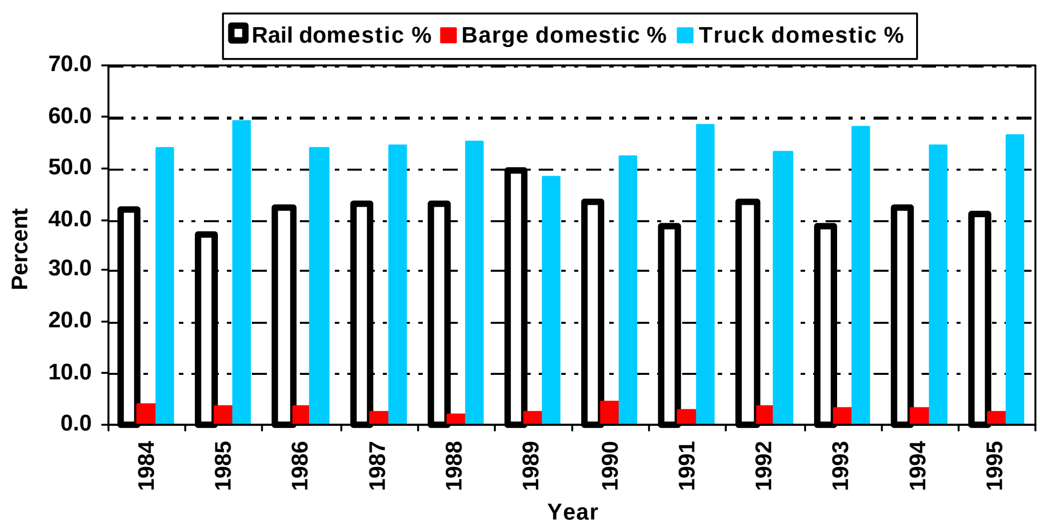
[3] Burlington Northern Santa Fe Railroad (BNSF) charges about $1.20 per bushel to ship Hard Red Spring Wheat from North Dakota to Seattle. At a current local price of $2.27 per bushel, rail transportation costs alone are nearly 53 percent of the crop's on-farm value and more than 31 percent of the delivered price of $3.86 per bushel (Aasmundstad, 2000; USDA Grain Transportation Report, September 12, 2000). From Kansas City, MO, to Portland, OR, BNSF charges $1.27 per bushel of Hard Red Winter Wheat. Thus, rail transportation alone is more than 38 percent of the delivered price of $3.32 per bushel (USDA, Grain Transportation Report, September 12, 2000).

Figure 1. U.S. grain and oilseed modal shares, 1978-98*



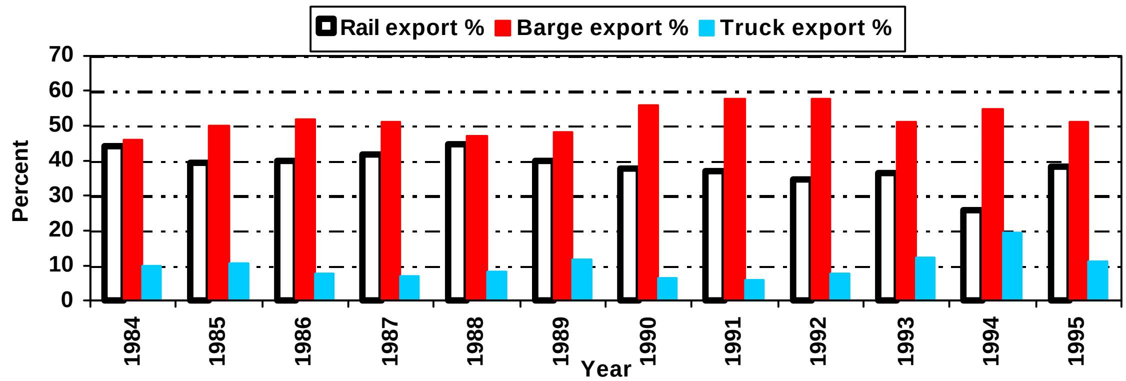
**Source: Eriksen, et al., March 1988. 1996-98 preliminary data added.*

Figure 2. Modal shares of grain and oilseed movements to domestic markets, 1984-95*



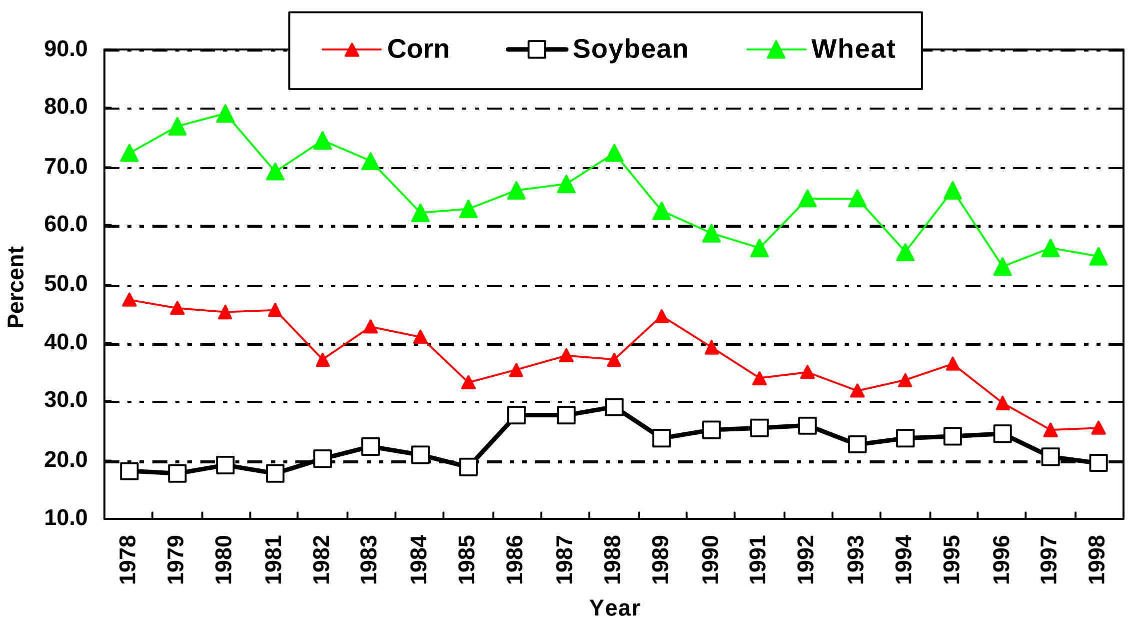
**Source: Eriksen, et al., March 1998.*

Figure 3. Modal shares of grain and oilseed movements to export markets, 1984-95*



Source: Eriksen, et al,. March 1998.

Figure 4. Railroad share of U.S. corn, soybean, and wheat shipments, 1978-98*



**Source: Eriksen, et al., March 1998. 1996-98 preliminary data added.*

On a ton-mile basis, rail moves about 44 percent of field crops like grains and oilseeds, about 23 percent of lumber and wood products, and about 40 percent of fertilizers and pesticides in the United States (USDA, July 1998).

During 1999, agricultural shippers paid nearly $3.5 billion in freight costs to U.S. Class I railroads to transport agricultural products (AAR, Freight Commodity Statistics, 2000).[4] The freight bill that U.S. agriculture pays–along with the railroad modal shares of grains, oilseeds, lumber, and fertilizer movements–demonstrates the importance of adequate and efficient rail services and capacity for the marketing of U.S. agricultural products and the delivery of needed farm inputs.

The Pre-Staggers Environment – The U.S. railroad industry has been subject to Federal and State regulatory oversight which has varied in scope and intensity over the years. Until the Staggers Rail Act of 1980 substantially loosened regulatory constraints on railroad operations in the United States, the regulatory influence on railroad operations was pervasive and constrained the ability of railroads to compete with the emerging motor carrier and waterway modes.

Pervasive Regulation – Railroads became the first industry to face comprehensive Federal economic regulation because they were perceived as possessing and exercising market power. The Interstate Commerce Act of 1887 (ICC Act) prohibited price discrimination and pooling (the formation of cartels) and required that rail rates be "just and reasonable." To monitor prices and price discrimination and to ensure "fairness" to shippers, railroads were required under the ICC Act to publish and adhere to tariffs and to allow any shipper to ship under the tariff rate who could meet the conditions of the tariff. The ICC Act also created the Interstate Commerce Commission (ICC) and charged it with implementing the ICC Act. Congress broadened and strengthened the scope of Federal regulatory oversight over the industry through subsequent laws such as the *Hepburn Act* and *Transportation Act of 1920*. Federal regulation of all facets of the U.S. rail industry eventually became pervasive.

This Federal regulatory oversight, although well-intentioned, greatly interfered with the ability of railroads to efficiently manage their operations. Railroads were unable to adjust tariff rates in a timely manner to reflect costs and competitive conditions because any changes in rail tariffs required a railroad to seek permission from the ICC in adversarial proceedings. Railroad innovation which could increase productivity, such as multiple-car pricing, was impeded, particularly by minimum rate regulation (Gellman, 1971; Gallamore, 1999). Abandonment of excess and unprofitable rail lines involved an expensive and time-consuming procedure before the ICC, which typically placed more weight on the costs of abandonment to communities and shippers than on the railroad costs of continuing to provide service. Finally, since contracts were prohibited, railroads were unable to tailor service (and price) to fit the needs of the individual customers.

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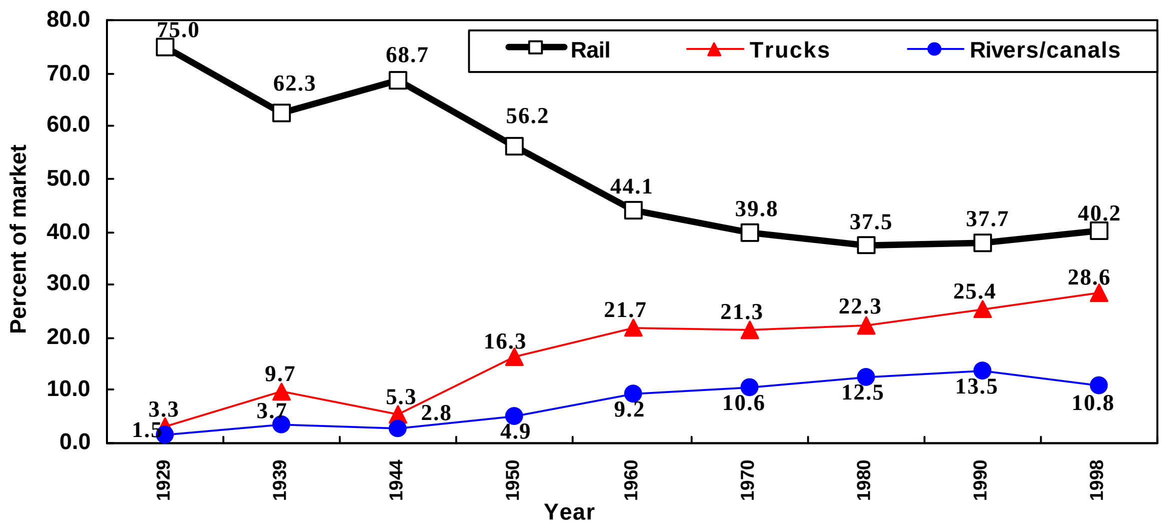
[4] The Surface Transportation Board (STB) classifies railroads by their level of operating revenue, adjusted annually for inflation. For 1998, Class I railroads had operating revenue of $259.4 million or more; Class II railroads had revenues of $20.8 million to $259.4 million; and Class III railroads had revenues less than $20.8 million (AAR, Railroad Facts).

Increasing Competition – The regulatory constraints on U.S. railroads during the first 75 years of the 20th century were particularly onerous because of the increased competition railroads came to face from other transportation modes, which affected both their passenger and freight revenue. The invention of the automobile led to the development of the trucking industry, which was heavily promoted by the Federal Government through construction of an extensive network of roads and highways. This road and highway network has not only allowed the use of large trucks, but also expedited travel between major cities and industrial areas, resulting in large decreases in the costs of truck transportation. In addition, passengers soon came to prefer travel by automobile, bus, or airplane to travel by railroad. The loss of passenger traffic was particularly problematic for U.S. railroads because the U.S. railroad system was designed at a time when half of the railroad movements were passenger movements (Boyer, 1997). Finally, Government construction of lock and dam systems on U.S. waterways allowed waterborne commerce to develop, which further reduced the railroads' share of intercity freight movements.

The result of this increased modal competition and the pervasive regulatory constraints on U.S. railroads was that railroads steadily lost market share of intercity freight ton-miles to trucks and barges (figure 5). But, the revenue loss to railroads over this time was much worse than the ton-

Figure 5. Railroad intercity revenue freight ton-miles by mode, 1929-98*



Sources: Association of American Railroads, Railroad Facts, (Ed.1999). Eno Foundation for Transportation (1998).

mile loss because railroads lost a greater percentage of the more profitable, high-value traffic to the other modes, especially trucks. By 1980, the truck share of intercity freight revenue had reached almost 70 percent, and truck transportation had virtually replaced rail transportation for the more profitable types of traffic, leaving hazardous materials and the less profitable bulk commodities to be hauled by railroads.

The financial impact of this long-term traffic loss on the U.S. rail industry was severe, as railroads became unable to earn enough money to pay for the maintenance of their equipment and infrastructure. During the 1960's and the early 1970's, the rate of return on net investment for railroads averaged close to 2.5 percent (AAR, various years). By 1976, one-third of the railroads in the United States were bankrupt or nearly bankrupt. Since cash flows were inadequate and it was difficult to abandon lines under the rail regulatory system, railroads often opted to defer maintenance on lighter density lines. The condition of the U.S. rail network deteriorated greatly until the mid-1970's.

Railroad deregulation – Regulatory reform began with the *Regional Rail Reorganization Act of 1973* (3-R Act), which was passed primarily to restructure the railroad network in the Northeastern United States and was strengthened with the *Railroad Revitalization and Regulatory Reform Act of 1976* (4-R Act), which relaxed regulation of railroad rates, mergers, and abandonments. The 4-R Act was designed to rescue the rail industry by giving railroads more flexibility and by relying more on market forces to set prices.

However, the 3-R Act and 4-R Act failed to revive the U.S. rail industry. So, in an attempt to significantly reduce regulation of all phases of railroad operations, the *Staggers Rail Act of 1980* (Staggers Act) was passed. The Staggers Act allowed railroads much greater pricing freedom to meet the competitive pressures placed on them by the other freight modes. In addition, the Staggers Act expedited abandonment procedures and accelerated merger timetables, giving railroads much more flexibility in the configuration of their rail networks. The Staggers Act also permitted railroads to enter into confidential contracts with shippers, thereby enabling railroads to make investments in plant and equipment with a greater degree of certainty that these investments would be profitable.

Post-Staggers Developments – Railroads responded to the Staggers Act by using their newly obtained managerial flexibility to aggressively pursue increased profitability and efficiency. Railroads increased profitability through the increased use of differential pricing, reduction of expenses, rationalization of excess rail lines, increased operating and equipment efficiencies, railroad mergers, and the increased use of long-term contracts.

Traffic – Since the Staggers Act, railroads have gradually increased their share of intercity revenue freight ton-miles from 37.5 percent to 40.2 percent (figure 5). Railroads have also increased the number of intercity ton-miles of revenue freight hauled from 932 billion ton-miles in 1980 to 1,442 billion ton-miles in 1998, an increase greater than 54 percent (AAR, Railroad Facts). Between 1980 and 1998, however, the number of tons hauled by railroads increased by only 10 percent, and the number of carloads increased by only 15 percent. In fact, most of the increase in railroad ton-miles since 1980 can be attributed to a 35-percent increase in the average length of haul for railroads over that time. More important, the railroad share of intercity freight revenues continued to decline after deregulation from 20.4 percent in 1980 to only 10 percent in 1998

(Wilson, 1997, 2000). This decline reflects both the continued loss of higher revenue freight to truck competition and lower railroad tariff rates after deregulation.

Differential Pricing – One of the lasting effects of the Staggers Act has been a greatly increased pricing flexibility for railroads to meet the varying levels of modal competition they face in individual markets. Whereas, prior to the Staggers Act, railroad regulation encouraged railroads to price their services according to the cost of the service, railroad deregulation allowed railroads to price according to the competition.[5] In practice, this type of railroad pricing is known as "differential pricing."

The cost structure of railroads clearly requires the use of a more flexible pricing system than the cost-of-service-based pricing under regulation. Railroads have high fixed costs because they must provide their own roadbed, tracks, terminals, and associated facilities; depreciation, property taxes, and maintenance expenses are incurred on these assets regardless of the volume of traffic. The fact that many of these fixed costs are also "common costs" further complicates the pricing decisions that railroads must make. Because common costs in railroad operations like those for roadbed, rails, and crossties are not separable and cannot be attributed to specific outputs, it is very difficult for railroads to scientifically apply cost-of-service pricing. Railroads transport many different commodities so, while certain expenditures may benefit all shippers, the allocation of these costs to specific movements can be very difficult (Sorenson, 1983). Thus, railroads maintain that only by recognizing and pricing in accordance with the varying levels of demand for rail service can a railroad have any opportunity to recover its full costs.

The effect of the regulatory environment before Staggers was to encourage railroads to employ cost-of-service pricing and to price at average cost. Yet, considering the increasing competition railroads were facing from other modes and the different cost structure of these competitors, a railroad pricing strictly at average cost would be uncompetitive on many freight movements. For such a firm, much of that traffic would be diverted to competing transportation modes, and the contribution of that traffic to fixed costs would be lost. Furthermore, if this traffic and its contribution to fixed costs were lost, the railroad would be forced to either raise rates on the remaining traffic or reduce its fixed costs by shedding lines or other means. Each time the railroad was forced to raise rates, additional shippers would shift to competing transportation modes, resulting in even higher prices to remaining shippers and the eventual loss of rail service to all. Railroad traffic loss to other modes under a regulatory system which encouraged average-cost pricing was not at all surprising.

[5] Prior to the Staggers Act, railroads were allowed to differentiate their rates according to commodity and length of haul. Since all new rate proposals were subject to challenge by competitors, shippers, or others, railroads usually requested general rather than specific rate increases. This resulted in fairly stable rate relationships among geographic regions. The Staggers Act allowed railroads to differentiate tariff rates in additional ways: according to the size of shipment and the transportation options available to different regions and/or individual shippers. In addition, the Staggers Act allowed railroads to enter into confidential contracts with shippers, resulting in further differences in pricing, which are often due to differing service terms and volumes shipped.

Thus, the advantage to railroads of differential pricing is that it provides for rates sufficient to maintain the transportation infrastructure, perform the operations, and make the appropriate upgrades. In this way, differential pricing can benefit shippers by ensuring economically viable rail service.

Railroad deregulation in 1980 greatly improved railroad pricing flexibility by encouraging railroads to employ "differential pricing" in order to utilize their capacity efficiently and to recover their fixed costs. Differential pricing is based on the value of service and, in simple terms, is based upon "what the traffic will bear"; that is, with differential pricing, different shippers are charged different rates for rail service based upon the value of rail service to each shipper. Those shippers with competitive alternatives secure lower prices; whereas, those shippers lacking competitive alternatives pay higher prices.

From the perspective of many shippers, the problem with differential pricing is that shippers paying the higher prices recognize and protest this apparent inequity. Differential pricing by railroads is evidence that railroads possess some degree of market power over some customers; that is, for shippers lacking competitive alternatives, railroads have the ability to set prices above competitive levels and earn profits in excess of what would be earned under competition. Differential pricing allows railroads to extract higher prices from those shippers who cannot effectively use other modes of transportation. Thus, differential pricing engenders an adversarial–rather than cooperative–relationship between railroads and those customers that pay higher prices. So, while the presence of high fixed costs forces railroads to use differential pricing, it also increases the pressure on the political system to restrain railroad market power.

Cost Reduction – Another industry development which was stimulated by railroad deregulation in 1980 was an increased emphasis among railroads on controlling and reducing costs. Even prior to 1980, railroads worked diligently to control costs. However, given more managerial freedom by the Staggers Act in 1980, railroads have cut costs much more rapidly. For instance, although Class I railroad revenue freight ton-miles increased 50 percent between 1980 and 1998, Class I railroad operating expenses have increased only 6 percent since 1980 (AAR, Railroad Facts).[6]

In fact, inflation-adjusted freight expenses per revenue ton-mile for Class I railroads have decreased significantly over the past 20 years–from 5.028 cents in 1980 to 1.978 cents in 1997–more than a 60-percent decrease.[7] Due to the 50-percent increase in revenue ton-miles since 1980, inflation-adjusted Class I railroad freight revenues have decreased by only 32 percent and inflation-adjusted operating expenses have decreased by only a little more than 41 percent

[6] Railroad expenses prior to 1983 cannot be accurately compared to present expenses due to changes in accounting for depreciation. Prior to 1983, railroads used retirement, replacement, betterment accounting methods. Railroads began to use ratable depreciation accounting, which is commonly used by other businesses, in 1983.

[7] Calculated from data contained in AAR, Railroad Facts using the Gross Domestic Product Implicit Price Deflator, 1996 = 100.

since 1980.[8] These decreases in operating expenses have been made possible by the abandonment and spinoff of rail lines, reduction of labor, reduction of routes, longer hauls, and more aggressive use of technology to obtain efficiencies.

Railroads have aggressively trimmed labor costs by reducing the number of rail employees by more than 50 percent since 1980. This reduction in the number of employees has led to a U.S. rail industry in which labor costs comprised only 30.2 percent of Class I railroad operating expenses in 1998, compared to 39.2 percent in 1980. Correspondingly, the productivity of Class I rail employees had more than tripled since 1980–each rail employee hour accounted for 2,955 revenue ton-miles in 1998 as compared with only 863 revenue ton-miles per employee hour in 1980 (AAR, Railroad Facts).

Rationalization of the Rail Network – The contraction of the U.S. rail network that occurred after World War II was inevitable for a number of reasons. The initial U.S. rail system was vastly overbuilt and was designed for a time when passenger traffic accounted for half of the trains on the U.S. rail system (Boyer, 1997). The increasing share of intercity ton-miles being gathered by modal competitors also cut into the railroad traffic base, both for passenger and freight traffic. Finally, technological advances in traffic control and railcar design also enabled railroads to manage greater traffic volumes on a smaller network. The result has been a steady contraction of the U.S. rail network since it reached its peak size during World War I.

This contraction of the U.S. railroad network has continued since railroad deregulation. Class I track miles owned have decreased by 37 percent from 270,623 track miles in 1980 to 171,098 track miles in 1998 (AAR, Railroad Facts).[9] However, due to some Class I railroads being declassified to Class II railroad status since 1980 and the sale of track to short line and regional railroads and governmental entities, neither the change in Class I track miles owned nor the change in Class I route miles operated accurately reflects the loss of railroad route miles due to railroad abandonment. Between 1979 and the end of 1999, approximately 39,500 route miles of Class I and Class II railroads have been abandoned–21 percent of the Class I and Class II railroad route miles operated at the end of 1979 (Prater, et al, forthcoming, A).

Abandonments by Class I railroads over the past 20 years generally have been of secondary routes and low-traffic-density lines. However, over this time, the increasing consolidation of the railroad industry has also resulted in Class I railroad abandonments due to the duplication of lines. Also, abandonments of line by short line railroads have increased in recent years as the low traffic densities and poor track conditions make many of these lines uneconomical to upgrade. Since many short line and regional railroads were created through the sale of Class I low-density trackage that otherwise would have abandoned, the increasing abandonments by short line and regional railroads are not surprising.

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[8] Ibid.

[9] Track miles include multiple main tracks, yard tracks, and sidings. Miles of road, or route miles, represents only the aggregate length of roadway, excluding yard track, sidings, and parallel tracks. Jointly used track is counted only once (AAR, Railroad Facts, 1999).

The abandonment of rail lines is intended to enhance the profitability of a railroad by increasing the traffic density on the remaining lines and discontinuing operations on a line where long-term rehabilitation costs exceed projected contributions to net income. However, a system-level cost to railroads which is often missed is that the value of a transportation network also decreases as the number of accessible shipping locations decreases. Thus, the loss in inflation-adjusted freight revenues since 1980 experienced by the U.S. rail industry also reflects revenue losses due to rail abandonment as well as revenue losses due to the railroads' inability to compete with increased modal competition and the declining railroad traffic base. Consequently, rail abandonments affect, not only railroad costs, but also railroad revenues in the long term. As rail capacity becomes more constrained, the ability of railroads to increase profitability through the rationalization of excess capacity, as described above, will become more limited.

Increased Operating Efficiencies - Another important industry development since deregulation has been the achievement of increased operating efficiencies by running more frequent trains, increasing their average length of haul, increasing shipment and railcar size, and investing in track infrastructure, instituting directional running and shared dispatching where feasible. These operating efficiencies, discussed below, all reflect fundamental economic characteristics of the U.S. rail industry.

Because they have such high fixed costs, railroad profitability is heavily influenced by the volume of traffic they can achieve over individual routes and on their networks. In practical terms, railroads can harness such economies of traffic density by running more frequent trains over the same track (Keeler, 1983). Many of the Class I railroad policies toward agricultural shippers since deregulation have reflected this desire to increase the traffic density of their operations relative to that of the pre-Staggers period.

Class I railroads also have encouraged longer hauls since deregulation because their per-mile costs decrease appreciably as the length of haul increases. As long as additional switching is not required, longer hauls tend to result in little additional expense to the railroad. In fact, the average length of a rail haul has increased 35 percent since the Staggers Act from 615.8 miles in 1980 to 835.1 miles in 1998 (AAR, Railroad Facts).

Railroads have also attempted to increase shipment size in the last 20 years under deregulation. This is not surprising because, with railcar switching being labor-intensive and costly, railroads also have significant economies in increasing shipment size and train length. Trains consisting of fewer shipments–each having more railcars–require less switching time than similar-length trains consisting of more shipments–each having just a few railcars. Similarly, because no more labor is required to operate a train of 100 cars than one of 50 cars, railroads tend to assemble full trains before moving. In addition to eliminating excess switching, shuttle trains–repetitive trainload movements from the same origin to the same destination–greatly increase the traffic capacity of rail lines which are heavily used because they minimize the amount of time that lines are blocked while picking up shipments. Rail tariff rates for multiple-car and shuttle-train shipments reflect these labor and efficiency savings.

Increased railcar size is another way to increase railroad operating efficiency which has developed in the post-Staggers era. Due to economies from increased railcar size, grain transportation has shifted from boxcars to 70-ton and 100-ton covered hoppers. In 1978, 23 percent of the grain hauled by railroads was still hauled in boxcars; however, by 1983, only 1.3 percent was hauled in boxcars (AAR, Ten-Year Trends). On average, a 268,000-pound covered hopper railcar hauls 3,400 bushels of grain, whereas a 40-foot boxcar could haul only 2,000 bushels, and the new 286,000-pound railcars can haul 10 percent more grain than 268,000-pound railcars. Railroads also benefit from better fuel economy since the 286,000-pound railcars have a better net load-to-tare ratio.[10] However, as railcar size increases, the cost of maintaining the track also increases; thus, railroads must carefully balance the benefits of larger railcars against the additional costs of wear and tear on tracks due to heavier railcars.

Overall, railroads have tried to maximize equipment utilization after deregulation to minimize the cost of the railcars and locomotives required to handle a given amount of freight. The use of covered hopper railcars for moving grain has greatly increased equipment utilization since the loading and unloading times for those railcars are much less than for boxcars. Railroads also have increased demurrage penalties and decreased loading windows in an effort to improve equipment utilization.[11] Railroads have encouraged the use of shuttle trains since railcar cycle times for shuttle trains are approximately one-third less than those for carload service. As a result, railcar utilization (annual freight car loadings divided by freight cars in service) has increased from 13.2 trips per year in 1980 to 19.5 trips per year in 1998 (Prater, et al, forthcoming, A).

Railroads have also upgraded operating efficiency by investing in track infrastructure, instituting directional running and shared dispatching in some areas. The key capital investments to improve rail capacity include upgrading signal systems, increasing the number of tracks, upgrading the speed of the track, and adding or lengthening passing sidings. Single-track lines have limited capacity since trains must pull onto sidings to allow trains they meet to pass. Railroads have also upgraded switching yards when the yard's capacity or efficiency has been insufficient.

Yet, in spite of the operating efficiencies they have achieved since 1980, the perspective of many rail shippers is that Class I railroads seem to have lost effectiveness, expecting customers to adjust to their policies, rather than responding to the service needs of customers. Although U.S. railroads have made substantial gains in efficiency since 1980, many of the Class I railroads' efforts to increase efficiency have focused internally on the needs of the railroads to reduce costs rather than externally upon the needs of their shipping customers. Indeed, having eliminated most of the excess capacity and expenses from the system, the railroad industry has only limited opportunities left to increase income through cutting costs. Therefore, instead of improving profitability by reducing costs, the task for railroads now is to improve profitability by increasing traffic volumes. This can only be accomplished by enhancing the service provided to their customers and competing for the traffic lost over the years to other modes.

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[10] Tare weight refers to the empty weight of the railcar.

[11] Demurrage is a penalty charged shippers or consignees for failure to load/unload within the specific time allowed in the tariff.

Increased Use of Contracts – Since the Staggers Act gave rail carriers the freedom to enter into confidential contracts, both railroads and shippers have used contracts extensively to tailor service and price to fit the specialized needs of shippers and to lock in volume commitments for carriers. Contract terms often specify price, quantity commitments, railcar supply arrangements, load-out times, service requirements, and penalties for failure to meet the contract terms. By 1997, contract carriage comprised 70 percent of all rail traffic, the other 30 percent being hauled under tariff rates (GAO, February 1999).

Although the *Interstate Commerce Commission Termination Act of 1995* (ICCTA) eliminated the requirement that railroads file contracts with the Surface Transportation Board (STB), the Act preserved the requirement that railroads provide summaries of contracts for agricultural products. This filing of contract summaries with the ICC (now STB) has been required since 1987. Rates and service terms established by contract are not subject to regulation.

Contracts are an attractive marketing option for railroads since deregulation because they can be used by carriers to obtain long-term traffic commitments from shippers. Yet, some railroads, such as the CSX, have recently indicated that they may increase the number of tariff-based hauls, especially since tariff pricing allows the railroads to react more quickly to changing market conditions.[12]

Mergers and Consolidations – Another post-Staggers development has been aggressive consolidation and merger within the U.S. rail industry. Numerous Class I railroad mergers have occurred since deregulation, resulting in fewer Class I railroads. In 1976, there were 63 Class I railroads operating in the United States; by the end of 1999, only seven Class I railroads remained.[13] In a recent Delphi survey of executives involved in grain transportation, three-fourths of the respondents predicted that only three or four Class I railroads would remain in 2010 (Vachal and Bitzan, 2000).[14]

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[12] Tariff rates can be increased with only 20 days notice, whereas contract rates cannot be renegotiated until the contract expires. Although many rail contracts contain escalator clauses, which allow rate increases based upon various cost indices, escalator clauses do not allow railroad rate increases due to changes in the relative competitiveness of rail services.

[13] Not all of this reduction in Class I railroads was due to merger activity; since the dollar volume threshold for Class I railroads was raised in 1991 from $96.1 million to $250 million, numerous Class I railroads were reclassified as Class II railroads. In addition, prior to 1976, some of these Class I railroads were legally distinct, but operationally integrated.

[14] The U.S. Department of Agriculture sponsored this Delphi survey, which solicited industry predictions from 23 executives regarding future trends in the rail industry and rail services that might be available to U.S. grain shippers. Delphi surveys elicit and refine the opinions of a group of experts by sharing the responses (anonymous)–and bases for those responses–to the prior questionnaire with all participants. Thus, the participants refine their responses with each successive round of the questionnaire. The participants in the survey represented a cross-section of the rail grain industry, including elevators, commercial grain companies, grain merchants, and Class I and II railroads located throughout the United States.

One of the trends likely to affect agricultural shippers is one additional round of mergers and consolidations, probably among U.S. carriers rather than between U.S. and Canadian carriers as has recently been proposed. With the recent merger moratorium imposed by STB, the withdrawal of the proposed merger between the Burlington Northern Santa Fe (BNSF) and Canadian National (CN) systems, and the recent issuance by STB of its proposed rules for major railroad consolidations, future transnational railroad mergers do not seem as likely to occur. Especially when they involve carriers of the scale and scope of the remaining Class I railroads in the United States, transnational mergers present a host of extra issues that merging railroads must address over those of mergers involving carriers within a country. In addition, due to STB's past positions on the reduction of rail competition from two railroads to one, future railroad mergers are more likely to link eastern and western carriers in the United States.

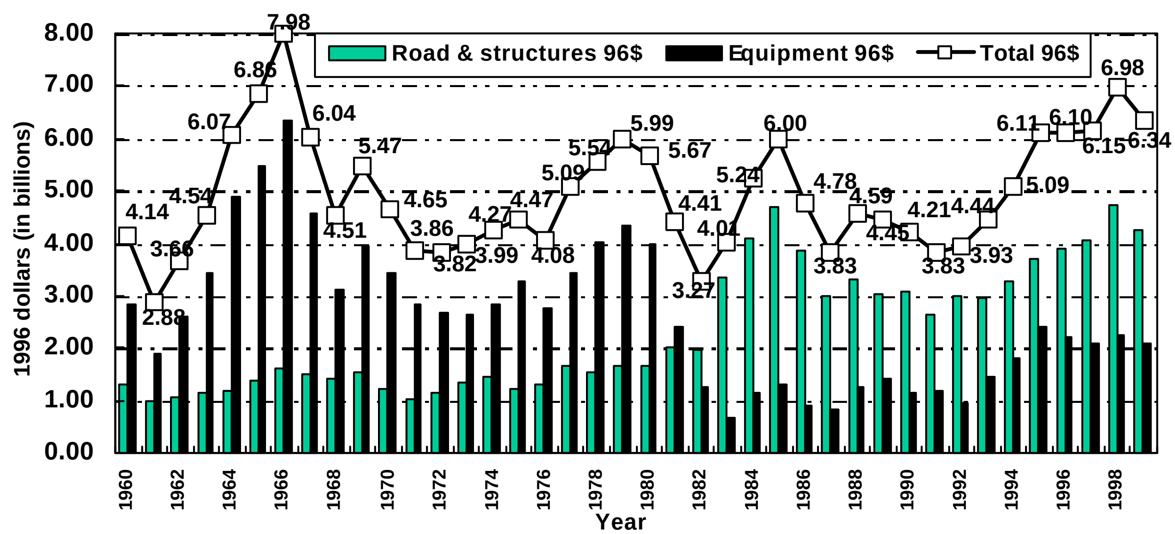
Although the rules governing major rail consolidation are under review, competitive pressures will continue to encourage rail mergers since economies of scope and density are conducive to the creation of railroads that can attract large volumes of traffic and have broad geographic reach. Twenty years ago, long-haul, single-line movements were the exception; most traffic moved in interline service, with moves involving three or more carriers being quite common. The industry was plagued with excess capacity, and few railroads were able to achieve any meaningful economies of density. Thus, the trend toward consolidation in the rail industry has been an effort to achieve cost savings through the creation of more efficient rail networks.

Many earlier railroad mergers had been primarily parallel mergers–mergers between two firms that operate parallel lines. Benefits from a parallel merger include the potential of lower costs through economies of scale and the elimination of redundant facilities and track. These cost reductions are accomplished through elimination of duplicate lines and facilities as well as the reduction of redundant accounting, managerial, and dispatching personnel. In certain markets, mergers can also benefit railroads through the reduction of rail-to-rail competition. Although parallel mergers offer the potential of large cost efficiencies, STB has generally denied or required specific competitive conditions of parallel mergers that would otherwise result in rail-to-rail competition being reduced from two railroads to only one.

More recent mergers–with the notable exception of the Union Pacific/Southern Pacific merger– have been primarily end-to-end mergers. The expected railroad benefits of end-to-end mergers include a much larger and more diverse market, more opportunities for differential pricing, more direct routing, reduced interchange and switching costs, and increased lengths of single-line hauls. Railroads involved in most of the recent end-to-end mergers have promised integrated, seamless, single-line service; direct access to more markets; faster delivery times due to avoidance of interchange yards where railcars can sit for days; and less paperwork. However, a recent railroad cost study indicates that although parallel mergers have resulted in significant reductions of operating costs, recent end-to-end mergers have resulted in increased costs and a loss of efficiency (Bitzan, 2000).

Investment Patterns – The financial health of the railroad industry has improved markedly since deregulation in 1980. Class I railroad return on shareholders' equity, which averaged just 2.4 percent during the 1970's, averaged 7.4 percent per year during the 1980's and more than 10 percent per year between 1996 and 1998 (AAR, Railroad Facts).[15, 16] This greater profitability and improved access to capital markets have permitted Class I railroads to invest more than $78 billion since 1980 in equipment, infrastructure, and information systems (AAR, Ten-Year Trends). Adjusted for inflation, however, the level of Class I railroad total capital investments appears to be much the same since deregulation as during regulation, even though trending upward since 1990 (figure 6). Despite little change since deregulation, Class I railroad inflation-adjusted total

Figure 6. Class I railroad capital expenditures, 1960-99* (in 1996 dollars)



Source: Association of American Railroads, Railroad Facts.
Data calculated by USDA using the Gross Domestic Product Implicit Deflator, 1996 = 100.

capital investments per track mile have risen sharply since 1980 due to abandonment and sale of track (calculated from data contained in AAR, Ten-Year Trends).

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[15] The average railroad industry stockholder returns for 1996-98 would have been higher had it not been for the costly service disruptions which occurred during the Union Pacific/Southern Pacific merger implementation in 1997 and 1998. Not only did these service disruptions greatly reduce the profitability of Union Pacific, they also decreased the profitability of the other firms in the railroad industry.

[16] Despite increased profitability since deregulation, the overall railroad return on equity has been less than the Fortune 500 average each year since 1985 and in the lowest quartile for all but three years (Hamberger, 2000).

Since deregulation, Class I railroads have noticeably shifted their investment from equipment to roadways and structures–shifting the cost of railcar investment to shippers (figure 6). Although Class I railroad inflation-adjusted investment in equipment has increased since 1990, railroads have increased their investments on locomotives and other equipment more so than on railcars.

Long-Term Trends in Railroad Service to U.S. Agriculture

In this section, long-term trends in railroad services and capacity for U.S. agriculture are identified and described with the objective of anticipating future rail service and capacity for U.S. agriculture given these trends.

Increased Class I Railroad Concentration – From the viewpoint of many shippers, railroad mergers have resulted in increased overall levels of concentration and reduced competition in the railroad industry. While the top five Class I railroads originated 57 percent of all Class I railroad grain traffic in 1982, by 1995 this figure had climbed to 90 percent. By 1999, the top five Class I railroads originated 96 percent of the 1.3 million carloads of grain hauled by Class I railroads (AAR, Weekly Railroad Traffic). In addition, 95 percent of all Class I railroad revenue ton-miles in 1997 were hauled by the five largest railroads, compared to only 75 percent of Class I railroad revenue ton-miles in 1990 (GAO, 1999).

However, the level of competition is not a function of the number of relatively large railroads in the Nation as a whole. Instead, it is a function of the quality and effectiveness of competitive options in particular markets; not only the number of competing railroads to which shippers or receivers have access at their shipping or receiving points, but also the effectiveness of competition from the other transportation modes. Although the number of Class I railroads has been reduced since deregulation, the railroad industry states that rail-to-rail competition is actually more intense because the remaining large railroads are stronger and their market reach is greater. In addition, the railroad industry states that the Nation is better served by having only a few strong railroads with broad network coverage who compete with each other throughout the West or the East than with a patchwork quilt of regional railroads that face limited rail-to-rail competition within their territories.

When changes in railroad concentration are examined for the sub-State regions of crop-reporting districts, a more relevant indicator of changing railroad concentration for grain shippers is obtained. In 1996, for instance, 87 crop-reporting districts in the top 20 grain-producing States were served by fewer than three railroads, compared to only 58 of those crop-reporting districts being served by fewer than three railroads in 1992.[17] Thus, 29 of those 87 crop-reporting districts lost competitive choices between 1992 and 1996 (USDA, 1998). Even these numbers do not indicate the true extent of railroad concentration, however. Some of the railroads counted in these crop-reporting districts are short line railroads that may have contractual obligations preventing the exchange of freight traffic with Class I railroads other than the one from which the line was purchased or leased. This is important since the presence of a competing railroad has a

[17] There are approximately 168 crop-reporting districts in the top 20 grain producing States. Thus, 81 crop-reporting districts in these 20 States, or nearly half, are served by more than three railroads.

noticeable effect on rail rates; rail rates rise well above incremental costs in regions that have only one or two railroads and are far removed from navigable rivers (MacDonald, 1989).

As would be expected, the number of route miles operated by each of the remaining Class I railroads has also increased greatly. Railroad mergers of the 1960's and 1970's combined smaller rail systems which operated in smaller geographic territories. In the 1980's, newly merged systems began to gain dominance within some geographic regions. In 1960, the average Class I railroad in the United States operated 1,956 route miles. However, by 1980 this had increased to 4,226 route miles, and by 1998 it had increased to 13,313 route miles. Thus, the average number of route miles operated by each of the Class I railroads in the United States has more than tripled since 1980, resulting in dominance over some geographic regions by a single Class I railroad.

Today, two large railroads dominate in the Western United States, and two large railroads dominate in the Eastern United States. Some argue, and STB has generally found, that two railroads provide adequate competition. However, recent empirical evidence indicates that competition between two rail companies in Canada has been inadequate in many markets, despite mandatory reciprocal switching at prescribed rates and the requirement to provide competitive line rates (Vercammen, 1996; PRR Consulting, 1999). Thus, it can be debated as to whether two rail companies will provide adequate rail-to-rail competition in the United States under the present regulatory framework.

Shrinking of the Rural Rail Network – Another trend for rural rail shippers that is expected is the continued shrinking of the rural rail network through abandonment.

The bankruptcies of several Class I railroads during the 1970's and Class I railroad abandonment of unprofitable rail lines have resulted in the loss of rail service to many communities. Many of these abandoned lines were purchased or leased by short line and regional railroads, shippers, States, or quasi-governmental entities to preserve rail service. Most of the short line and regional railroads operating on these lines have been successful, but a few have failed.[18]

Since 1965, the number of route miles operated by all railroads in the United States has decreased by nearly 20 percent (AAR, Railroad Facts). However, many of the Great Plains and Midwest States have lost a much more substantial proportion of their railroad networks. In terms of the amount of the Class I rail networks they have lost since 1965, the States that have been affected most by the loss of Class I rail service are Iowa (49 percent), Minnesota (40 percent), and South Dakota (46 percent). Approximately a third of the Class I rail networks in Missouri, Montana, and Nebraska have also disappeared since 1965. In addition, the States of Kansas and Illinois have each lost 30 percent of their Class I rail networks and North Dakota 20 percent of its network (Tolliver, 1998). All of these States produce substantial quantities of grain and other agricultural products.

[18] Short line railroads include line haul railroads as well as switching and terminal railroads. Line haul railroads may be local or regional in size.

Since 1995, abandonments by short line and regional railroads have comprised an increasing proportion of total rail abandonments. Recent short line and regional railroad abandonments have usually occurred on low-traffic-density branch lines that have failed to generate enough income to prevent further deterioration of the track. In these cases, short line and regional railroads have extracted the remaining value from the lines. In other cases, incentives offered by Class I railroads for unit-train loading or 286,000-pound railcars have contributed to the abandonment of track by short line and regional railroads. Since most short line and regional railroads do not have sufficient access to the capital needed to upgrade their lines and generally serve smaller grain elevators unable to load unit trains, these incentives have often resulted in grain traffic normally handled by smaller railroads moving to elevators located on the Class I railroad.

Respondents to a recent Delphi survey expect railroads to abandon about 10 percent of the remaining track they operate by 2010, leaving only 155,000 route miles in the United States (Vachal and Bitzan, 2000). Expectations for continued rail abandonment are based on four primary factors: (1) technology that will increase the capacity of main lines and allow railroads to rationalize their networks, (2) unit-train and shuttle-train loading stations that will expedite abandonment of grain-dominated branch lines, (3) continued rail mergers and consolidations, and (4) increased usage of the larger 286,000- and 315,000-pound railcars (Vachal and Bitzan, 2000).

Growing Importance of Short Line and Regional Railroads – Despite recent failures of some, short line and regional railroads are likely to continue to grow and play an important role in moving agricultural traffic.

Class I railroad bankruptcies in the 1970's and railroad deregulation resulted in the sale or lease of many unprofitable line segments to short line and regional railroads. Between 1980 and the end of 1995, 278 short line and regional railroad firms were formed, which currently operate 29,000 route miles that were previously owned by Class I railroads. These 278 newer short line and regional railroads, operating on lines that otherwise would have been abandoned, haul more than three million carloads of freight annually (Prater, et al, forthcoming, B). In essence, these smaller railroads have preserved rail access to many rural communities that would otherwise be without rail service altogether. The smaller railroads formed since 1980 typically operate as feeder railroads to the Class I railroad systems. Some short line and regional railroads operate over track that State and local governments purchased from Class I railroads.

By the end of 1998, 550 short line and regional railroads operated 49,985 route miles in the United States–more than 29 percent of the rail network–and accounted for nearly 9 percent of all railroad freight revenues (AAR, Railroad Facts). In many agricultural States, the importance of these smaller railroads has become even greater; by the end of 1998, they operated 58 percent of the rail network in Wisconsin, 52 percent in South Dakota, 49 percent in Michigan, 43 percent in Iowa, and 42 percent in Kansas (Prater, et al, forthcoming, B).

Nationwide, short line and regional railroads in the United States now participate in the movement of an estimated 33 percent of the total carloads, 45 percent of the lumber carloads, 34 percent of the farm product carloads, 23 percent of the food product carloads, and 19 percent of the chemical carloads. Short line and regional railroads are also an important part of the grain gathering network, originating nearly 20 percent of all U.S. railcar loadings of grain in 1996 (Prater, et al, forthcoming, B).

Some respondents to a recent Delphi survey expect the number of route miles operated by short line and regional railroads to increase by 17 percent by 2010 and for these smaller railroads to maintain their collective market share in the origination of U.S. farm products (Vachal and Bitzan, 2000). Those expecting a decline in route miles operated based their expectations upon doubt that short lines would be able to handle heavier axle-load railcars, the competitiveness of trucks in providing shorter distance grain gathering services, and the continued development of shuttle-train-loading facilities located on Class I lines. Those predicting an increase in route miles operated by short line railroads based their predictions upon expectations of continued rationalization of the Class I railroad network and continued joint marketing ventures with Class I railroads.

The Push to Trainload Operations – The promotion of trainload-size shipments is certain to be a long-term issue for agricultural shippers. Railroad efforts after deregulation to increase productivity and decrease costs is one of the factors resulting in their promotion of unit and shuttle trains through incentive rates and economic development incentives to encourage shippers to build train loading stations.[19, 20] Since railcars in shuttle-service trains cycle up to 36 times per year, compared to only 15 times per year for railcars in normal service, the use of shuttle trains increases railcar utilization and is extremely attractive to railroads.

Since 1980, railroads have increased the number of railcars handled by 15 percent and the number of ton-miles hauled by 50 percent while decreasing the miles of road operated by nearly 20 percent (AAR, Railroad Facts). One of the ways railroads have been able to handle more cars on a smaller network is with the promotion of unit- and shuttle-train shipping. Gathering individual railcars into larger trains requires substantial switching, which can temporarily block other traffic on a rail line, as well as being time consuming and costly. Unit trains allow railroads to move more freight over the same track since the through lines are not blocked as long by switching activities.

[19] Unit trains are usually 50- to 54-railcar shipments from a single origin to a single destination, but may be as large as 110 railcars. Shuttle-train shipments are defined as <u>multiple</u> 100- to 110-railcar shipments from a single origin to a single destination. Discounts on shuttle trains also vary according to the number of trips contracted–typically 6 to 24 trips in a season. Thus, although all shuttle-train elevators must be able to load 100- to 110-railcar trains, not all elevators capable of loading 100- to 110-railcar trains ship shuttle trains.

[20] Changes in the agricultural industry also have encouraged the trend toward unit and shuttle trains, as well as the associated consolidation of grain handling facilities. These factors include investments in local processing plants, increased size of livestock and poultry feeding operations, increased economies of scale for unit- and shuttle-train loading facilities, larger farms, and increased producer ownership of semitrailer trucks which allow the producer to haul longer distances.

Real savings accrue to shuttle-train shippers when they are able to ship 100- to 110-railcar trains and can qualify for multitrip discounts. Using 286,000-pound railcars and getting all the discounts, effective shuttle-train rates on Nebraska corn moving to the Pacific Northwest are 13 cents per bushel less than the corresponding unit-train (54-railcar) rate (Klindworth, 2000). The rate spread between the single-car and unit-train shipment of wheat from Minot, ND, to Portland, OR, narrowed from 23 cents per bushel in 1984 to 12 cents per bushel in the fall of 1997 (Vachal, et al, 1998). Some of these savings are passed back to farmers through higher bid prices but only to the extent necessary to capture the additional grain needed to meet an elevator's unit- or shuttle-train obligations.

Based upon STB's Waybill data, 7 percent of the corn, 5 percent of the soybeans, and 11 percent of the wheat was moved by shuttle trains in 1998. Of all the shuttle-train agricultural shipments in 1998, 84 percent went to export markets–68 percent of soybean, 72 percent of corn, and 99 percent of wheat (Klindworth, 2000). More recently, however, shuttle-train corn operations have expanded to such a degree that currently all corn delivered by rail for West Coast export is delivered by trainload shipments.

Recently, the BNSF railroad has proposed the Scoots program, which is an effort to better compete against trucks for transportation to processing plants. The Scoots program is a variant of the shuttle program designed for domestic processors that are typically unable to handle 100- to 110-railcar shipments. So far, the Scoots program has been proposed primarily for soybeans and corn. Rather than contracting with grain shippers, BNSF would contract with processors (receivers) for a specific number of trips over a 9- to 12-month period for 58-railcar trains.[21] BNSF has proposed freight rates for the 58-railcar trains at a discount compared to 54-car rates.

The most controversial aspect of the Scoots program is that only elevators handling 100- to 110-railcar shuttle trains will be allowed to participate, excluding unit-train loading stations from participation.[22] In addition, as currently proposed, elevators will not be allowed to upgrade their facilities to meet all of BNSF's requirements concerning 58-railcar shipment sizes, loading times, and other terms. Grain elevators that had upgraded their facilities to 52- and 54-railcar loading stations at BNSF's behest believe this to be unfair. Although 52- to 54-railcar loading stations may be allowed to participate in some instances, as the program is currently designed, this will occur only if that elevator is not within the draw territory of a shuttle-train loader. Many of those elevator operators excluded from the Scoots program believe that it allows the railroad to force grain to a given location, thereby giving the railroad the ability to decide which firms survive in the grain business. Thus, in its present form, adversely affected shippers believe Scoots to be anticompetitive.

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[21] Since the Scoots program is still in the formulation stage, the size of shipment has not been decided upon.

[22] Since the Scoots program is still in the formulation stage, it may be redesigned to reflect the concerns of all shippers.

Another issue related to unit trains is Class I railroad cancellation of coloading privileges when shuttle-train programs are implemented in an area.[23] Although BNSF experimented with forming 108-railcar trains by coloading two sets of 54 cars, it believes coloading resulted in an uncompetitive cost structure due to a lack of operating efficiency. Railroads argue that coloading hampers their operations because it requires additional switches and reinspection of air lines to brakes. Sometimes, the switching process required in coloading delays other trains which require use of the same track.

Class I railroads also tend not to allow coloading in any instance where it would undermine a customer's investment in unit-train loading facilities. Thus, in addition to denying coloading privileges on their own lines, Class I railroads generally deny coloading privileges to those shippers served by short line and regional railroads.

Decreasing Importance of the Common Carrier Obligation – Another trend expected to continue is the decreasing importance of the historical common carrier obligation by railroads to provide a minimum level of service to all shippers, large and small, at least as it has historically been applied.

The origin of the common carrier obligation lies in the importance of transportation in connecting producers to markets. Not only is the ability to transport goods important to individual citizens, it affects the collective interests of all by affecting interregional commerce. To satisfy these needs, the common carrier obligation–which requires a carrier to render transportation services without discrimination based upon set rates for specific commodities– evolved under English common law (Coyle, et al, 1994). The common carrier obligation was also a major part of later statutes regulating transportation in the United States.

Even though the common carrier obligation was preserved in the Staggers Act and ICCTA, it is now being applied somewhat differently reflecting the intent of both acts to allow the market system to allocate resources. Carriers now have the ability to price services differentially according to the cost of providing service. For instance, carriers are able to offer incentives for larger shipments and use carlot guarantee systems to allocate railcars. While railroads point to the gains in operating efficiency and return on investment that market-based decision making provides, many shippers express concern over the role that railroads can now play in their competitive access to markets. These shippers note particularly that railroads now have the opportunity to design incentives not universally and uniformly available to all shippers similarly situated. In effect, railroads can now determine which shippers remain competitive.

Continued Transfer of Logistical Costs to Shippers – A further trend affecting agricultural shippers has been the continued transfer of logistical costs to shippers, which previously had been assumed by their rail carrier.

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[23] Coloading allows two or more elevators to combine their shipments into a single unit train and receive the unit-train price for the shipment.

Railroads constantly point to decreases in the average rate per revenue freight ton-mile that have occurred since passage of the Staggers Act as evidence of better, lower cost rail service. Although the average rate per revenue freight ton-mile has decreased due to larger shipments, changes in commodity mix, and transport over longer distances, another reason the average rate per revenue freight ton-mile has decreased is that all shippers, grain shippers in particular, are shouldering greater responsibility for car supply and other functions that railroads formerly provided. For instance, while the total number of covered hopper railcars in service increased by 82,330 between 1980 and 1998, the number owned by Class I railroads decreased by 19,706 while the number owned by other railroads, shippers, and railcar leasing companies increased by 102,036 (AAR, Railroad Facts).[24] In fact, the percentage of total covered hopper railcars owned by Class I railroads decreased from 57 percent in 1980 to less than 40 percent in 1998.

Due to the failure of tariff railcar ordering systems to allocate railcar supply efficiently during periods of peak demand, railroads instituted guaranteed railcar ordering systems which rely on market price to allocate railcar supply. Thus, many shippers choose to pay additional fees above rail tariff rates to guarantee railcar delivery within a specified time period rather than receiving railcars on a first-come-first-served basis as with tariff railcar programs.[25] By 1997, approximately 75 percent of the U.S. rail grain tonnage moved via railcar guarantee programs, and only 25 percent moved via tariff railcar programs. Most observers expect a further significant decline in the use of tariff railcar ordering options in the future. Those expecting decreased use of tariff railcar programs believe that the use of unit trains, the need for predictable service, and benefit/cost ratio of railcar guarantee programs will increase the demand for railcar guarantee orders (Vachal and Bitzan, 2000).

Also, with railroads emphasizing unit and shuttle trains, shippers have made significant capital investments in sidings, inventory, storage capacity, and loading facilities to obtain more cost-effective rail service.[26] It can cost as much as $3.5 million to upgrade existing elevator facilities and an average of $4.6 million to build a new elevator in order to load 100- to 110-railcar trains (Vachal, et al, 1998). Many elevators have complained that despite having made significant investments to upgrade their facilities to handle 50- to 54-railcar shipments in order to obtain the lowest rail tariff rates, Class I railroads have raised the bar again to 100- to 110-railcar shipments even before the previous investments have been depreciated fully.

A long-term issue is whether elevator capacity is being overbuilt due to the construction of shuttle train operations in areas which already have a substantial number of unit-train loading stations.

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[24] The covered hopper railcar fleet available for transporting grain is just a fraction of the total covered hopper railcar fleet.

[25] Although this is an additional expense borne by shippers, these guaranteed railcar program charges are included in railroad freight revenue, which is used to calculate average rate per revenue freight ton-mile.

[26] Through industrial development incentives, railroads have typically participated in the costs of upgrading the first unit- or shuttle-train loading station serving a particular region.

For shuttle-train facilities, which cannot achieve an adequate throughput because grain production is simply not adequate within their draw area, the risk of failure is not with the railroads whose assets are mobile but with the local interests and communities who built the extra rail siding and the additional storage capacity to get the shuttle-train shipping benefits.

Shift to Larger Capacity Railroad Cars – Another trend certain to affect agricultural shippers in the future is the shift to larger capacity railcars. At present, approximately 10 percent of the railcars in the U.S. covered hopper railcar fleet are 286,000 pounds and greater (315,000-pound railcars). Many predict a much greater importance of the larger railcars in the rail grain fleet in the future. In fact, 64 percent of the respondents to the USDA Delphi survey believe that 286,000-pound and greater railcars could constitute more than 50 percent of the U.S. covered hopper railcar fleet within the decade (Vachal and Bitzan, 2000).

Even though heavier railcars increase maintenance-of-way costs, the economic advantages to railroads associated with the heavier axle-load railcars are estimated to be a net cost savings of 10 to 12 percent over the 263,000-pound railcar (Derocher, 1999). The fact that tariff rates on corn shipped from Nebraska to the Pacific Northwest are currently $.12 per bushel less when shipped in 286,000-pound railcars than in 268,000-pound railcars indicates that some of these cost savings are being passed to shippers.

Because some rural branch lines cannot handle the heavier, larger capacity railcars and many of these branch lines are being operated by short line or regional railroads, the emergence of these larger cars as the bulk of the rail grain fleet causes many rural rail shippers great concern. The reason for this concern is that this new rail capacity will be unavailable to many rural rail shippers unless substantial track upgrades are made.

Declining Significance of Agricultural Traffic – Since the Staggers Act, Class I railroads in the United States have concentrated their resources on hauling those commodities and shipments that best fit the operating characteristics and assets of the railroad. In addition, during periods when the demand for rail capacity exceeds supply in a particular traffic lane, railroads allocate the available transportation to those commodities which contribute the most to profitability and to that traffic which is most likely to be lost to competing modes by transportation delays.

Due to the high fixed cost structure of the industry, railroads prefer the types of traffic where the demand for transportation is steady and where each shipment size is large. Thus, agricultural traffic may not be as attractive to railroads as that of other commodities–not only is it seasonal in nature, it is also cyclical due to the volatility of U.S. grain export markets and variability in regional production levels. In addition, agricultural commodities like grain and oilseeds that do not require rapid transportation are typically lower in value relative to their weight, and, thus, the demand for transporting these products is more sensitive to small changes in transportation and market prices than that for transporting higher value products. Finally, agricultural traffic may be less desirable to railroads because the relatively low density of agricultural production in many regions results in a relatively low density of shipments. Numerous small shipments from wide geographic areas are not as attractive to railroads as large shipments of commodities (like coal) that originate from small geographic areas.

Data illustrate the increasing significance of other commodities (like coal, automobiles, and chemical traffic) and decreasing significance of agricultural commodities. Intermodal traffic originated by Class I railroads nearly tripled from 3.06 million containers and trailers in 1980 to 8.77 million containers and trailers in 1998. Between 1980 and 1998, coal originated by Class I railroads increased more than 40 percent to 749 million tons, and coal revenues increased 62 percent. Coal traffic accounted for 45 percent of total Class I rail tonnage and 23 percent of total Class I railroad revenue in 1998, as compared to 35 percent of tonnage and less than 18 percent of revenue in 1980. Chemical traffic on Class I railroads increased 30 percent to 141 million tons, and automotive traffic increased 36 percent to 32 million tons over the 1980-1998 period (AAR, Railroad Facts; AAR, Ten-year Trends).

Yet, although the overall tonnage originated by Class I railroads increased more than 10 percent between 1980 and 1998, the tonnage of farm products originated by Class I railroads decreased 17 percent to 129 million tons in 1998. In 1980, farm product tonnage accounted for 10.4 percent of total Class I railroad tons originated and nearly 9 percent of Class I railroad revenues. However, by 1998, farm product tonnage was less than 8 percent of the total tonnage, and farm product revenue was only 7.25 percent of total Class I revenues (AAR, Railroad Facts; AAR, Ten-Year Trends).

Long-term Implications for U.S. Agriculture

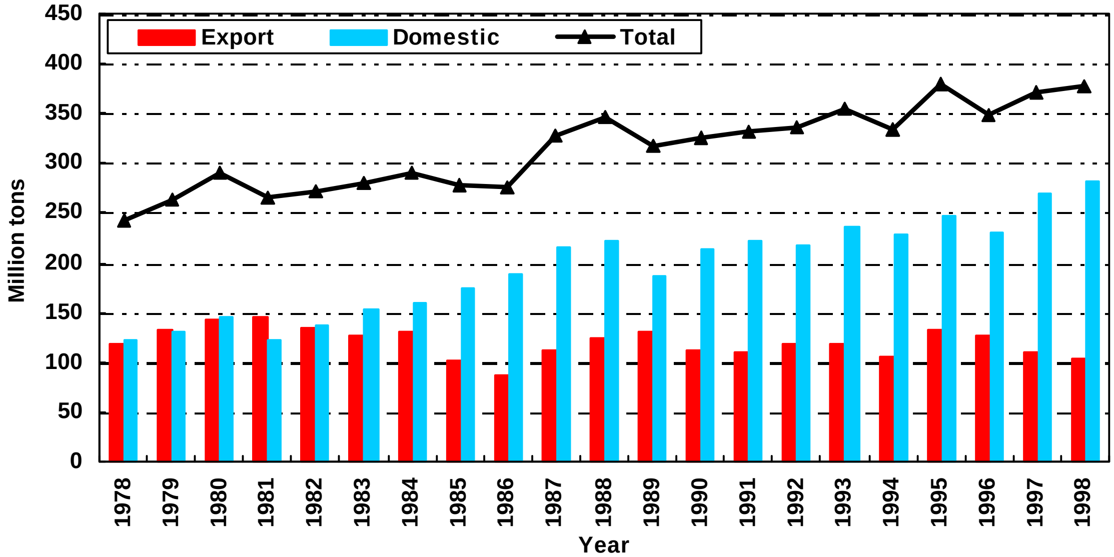
This section relates the long-term trends for railroad service to their effects upon agricultural producers. In addition, we speculate on the type of rail service and capacity that might be available to U.S. agriculture in the future, given these trends and a continuation of current regulatory and transportation infrastructure funding policies.

Decreasing Railroad Market Share – A shrinking rural rail network and the decreasing significance of rail to agricultural traffic point to decreasing railroad share of grain movements in the future. Moreover, given that agricultural shipping needs are also trending toward the use of smaller size shipments to protect the identity of specialty grains and of genetically altered commodities and toward shipments to domestic destinations for further processing, U.S. railroads are likely to lose a substantial part of their agricultural traffic to truck. Some of this traffic, such as the shorter distance movements to processing destinations, may be more naturally suited to the cost structure of truck transportation. But rail, in many markets, also offers ways to segregate and economically transport any product for which identity preservation may be required.

Prior to 1985, rail consistently was the dominant transportation mode for grain and oilseeds. In 1980, for instance, rail moved nearly 50 percent of all grain and oilseeds transported. By the early 1990's, however, trucks had become the predominant transportation mode for grain and oilseeds, attaining a market share of nearly 52 percent in 1998. Meanwhile, the rail market share dropped to a low of 31 percent in 1998 (figure 1), in part due to the Western rail service crisis of 1997 and 1998.

Two factors account for this increasing reliance on trucks and the decreasing importance of rail in grain movements: higher levels of domestic processing and off-farm feeding. While U.S. exports of basic grains are roughly the same as they were in volume terms 20 years ago, domestic usage of grains has more than doubled over that period (figure 7). More and more bushels are being consumed domestically, and the transportation needs of the grain sector are much more domestically oriented than in the past. In fact, the United States used about 1 bushel of grain domestically for every bushel it exported in 1978; now more than 2 of every 3 bushels of grain and oilseeds produced in this country go to the domestic market.

Figure 7. Total U.S. grain and oilseed movements to domestic and export markets, 1978-98*



Source: Eriksen, et al., March 1998. 1996-98 preliminary data added.

Specifically, the industrial use of corn has tripled over the past 20 years as U.S. consumers enjoyed the benefits of ethanol, high-fructose corn syrup, and many other value-added products derived from corn. Production of soybeans has also risen in recent years, and since domestic processing of soybeans is usually located near areas of soybean production, the demand for short distance gathering movements into these processing plants has increased, which favors truck over rail or barge. Structural shifts in the livestock industry have also contributed to the increased reliance upon trucking. Shifts in the location of livestock feeding have been particularly important for corn and have resulted in a much smaller percentage of corn being consumed on the farm where it is produced. This decrease in on-farm corn consumption has been accompanied by a growth in large commercial feedlots, and corn, which used to remain on the farm, is now hauled into commercial marketing channels to be distributed to these and other uses.[27] Rather than exporting grain, more grain is now fed to livestock that is subsequently processed and exported.

[27] When feedlots are located close to grain production regions, truck transportation is favored. However, when feedlots are more distant from grain production regions, rail transportation is favored.

Most of these factors indicate a declining rail share of domestic grain movements and an increasing truck share of those movements.

Higher Railroad Rates for Agricultural Shippers – Railroad prices are limited in the short term by the prices of competing transportation modes and in the long term by the ability of producers and shippers to eliminate their dependence upon rail transportation. Transportation rates for truck and barge firms approximate those expected under competitive market conditions due to relative ease of entry and exit of firms into those transportation modes. In contrast, rail prices for those shippers without cost-competitive transportation alternatives more closely resemble those expected in an oligopoly market structure. Thus, railroads use differential pricing because their cost structure encourages its use to cover all expenses and due to the presence of market power over some shippers. As discussed earlier, differential pricing means that rail rates are based on the value of the rail service rather than upon its cost, the value of service being close to that charged by competing rail firms or transportation modes.

Therefore, the trend toward greater market concentration in Class I rail service has resulted in a greater ability of railroads to raise rates where they face minimal rail-to-rail competition and intermodal competition is not cost effective. In the past, railroad pricing was kept in check by the ability of agricultural producers to haul grain and oilseeds to elevators located on competing railroads. Recent railroad mergers have removed this option for many producers due to the increased distance to elevators located on competing railroads. Thus, Class I railroads having market dominance over geographic regions are able to charge rail tariff rates that are higher than otherwise could be charged. In addition, increasing railroad tariff rate spreads are expected between those agricultural shippers located in production regions distant from navigable rivers and markets and those agricultural shippers having more effective transportation competition.

In the past, STB has concluded that two railroads provide adequate competition–especially in the presence of effective intermodal competition–and have a better probability of operating profitably than when there are three competing railroads. Thus, STB has not placed competitive conditions on those rail mergers in which the number of competing railroads in a region decreases from three to two. However, STB routinely places competitive conditions upon those rail mergers in which the number of competing railroads in a region decreases from two to one. Nevertheless, some shippers–mainly those in regions not having cost-effective transportation alternatives–have complained that competitive conditions are also needed on mergers involving three-to-two loss of rail competition. Other shippers have complained that the competitive conditions placed on mergers involving two-to-one loss of rail competition have not been effective.

These shipper complaints are supported by past USDA research that concluded the price rail firms can charge declines as the number of rail competitors increases (McDonald, 1989). Moving from a rail monopoly to a duopoly in a corn market 75 miles from water reduces rates by 17.4 percent, and increasing competition, further, to a three-firm oligopoly reduces rates another 15.2 percent. Similar results were observed for wheat. Moreover, the farther one moves away from navigable water, the greater the effect on rates as additional railroads enter the market (McDonald, 1989).

Although many believe that the competitive effects of end-to-end mergers are trivial, such need not be the case. For instance, many economists believe that end-to-end railroad mergers are relatively free of competitive impacts because the number of captive shippers does not increase in purely end-to-end railroad mergers and other forms of competition–such as intermodal, geographic, and product–are assumed to be sufficient to constrain prices.[28] Other economists, however, believe that end-to-end mergers allow competitive impacts through the creation of "bottlenecks" and the vertical foreclosure of markets.[29] The argument is that vertical foreclosure of markets can be accomplished by the denial of permission for competing railroads to use their track or facilities; the elimination or cancellation of joint-line rates, through routes, and reciprocal switching agreements; and the closing of gateways (Tye, 1991).[30] The latter view seems to be supported by recent shipper complaints that past railroad consolidations have resulted in Class I railroads canceling reciprocal switching rights shortly before a planned merger is announced, closing gateways, and refusing to quote rates on newly created bottleneck segments.

Increased Costs to Access Rail Service – Trends in the rationalization of rail infrastructure in the United States since 1980 and the likelihood of further rationalization in the future will likely result in agricultural producers having to truck their products longer distances and incur greater costs to access rail service. Shippers are also likely to face changes in service terms which impose greater responsibility and costs on them simply to ship by rail.

The increased market power derived from railroad consolidations allows Class I railroads to change service terms involving demurrage, railcar supply, and shipment size, which affects agricultural shippers, producers, and rural communities. Examples are increased demurrage penalties and shorter loading windows in recent years. The most recent demurrage rate increases by Union Pacific and BNSF railroads have met stiff opposition from members of the National Grain and Feed Association (NGFA) due to the current soft market for railcars. Since railcars are currently in plentiful supply, NGFA believes that the most current demurrage charge increases are a way of disguising tariff rate increases. NGFA states that "unless railroads enhance their own accountability for timely notice and delivery of equipment, as well as movement of loaded railcars, higher demurrage rates would not be effective in raising performance levels in car and equipment utilization (NGFA Newletter, October 19, 2000)." Although some of the Class I railroads have made efforts to improve communications with grain shippers, such as through the establishment of

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[28] As part of its rulemaking on merger guidelines involving major railroad mergers, STB is currently reassessing its assumptions that end-to-end mergers are free of anticompetitive impacts.

[29] When two railroads compete for a haul from a single origin to a single destination but the second railroad has rely on the other railroad for a portion of the haul, a "bottleneck" exists. The railroad able to complete the entire haul on its own line is able to charge the competing railroad an abnormally high price for the portion of the haul that it controls, thereby forcing the entire haul to its own line.

[30] **Joint-line rate**: tariff rate over a route involving two or more rail carriers. **Through route**: a route from origin to destination involving more than one rail carrier. **Reciprocal switching agreement**: a railroad gives shippers access to a second rail carrier in return for the second rail carrier giving the first railroad access to some of its shippers. **Gateway**: a major rail interchange point.

"grain desks," many agricultural shippers still complain that Class I railroad changes in service terms often impose additional "discipline" and costs on shippers without a commensurate increase in responsibilities by the carrier.

The trend toward train loading stations has resulted in increased costs of accessing rail service for most producers due to increased truck transportation costs. Although many producers have a net benefit from train loading stations since the higher prices received for their commodities offset their additional costs for truck transportation, those producers located farthest from train loading stations may have a net loss.

Due to the cost efficiencies of unit- and shuttle-train hauls, Class I railroads offer tariff rate incentives to grain elevators located on their mainlines for upgrading their facilities to train loading stations. However, some grain elevators have considered the risk of building train loading stations substantial in relation to the benefits of these tariff rate incentives. Although shuttle trains result in substantially lower rail tariffs for those elevators capable of loading those trains, the substantial investment required to increase storage and load-out capacity and the higher prices paid to producers to induce them to truck their crops longer distances can offset a large portion of these cost savings.

Class I railroads have shared the cost of constructing some train loading stations through industrial development incentives. Since these industrial development incentives are not universally and uniformly available to all shippers, some shippers have criticized them as being unfairly discriminatory–allowing the railroad to discriminate against some shippers in favor of a few. BNSF's response to these criticisms is that "BNSF does make industrial development incentives available to customers in an effort to bring new business to our railroad. These incentives generally support facility investments required to shift business from other railroads or other transportation modes, or investments required to develop new non-traditional markets." (Bobb, September 25, 2000).

Since train loading stations must draw grain from a large area to support the volume required to fill unit and shuttle trains, only a limited number of train loading stations can be supported in a region. Due to variability of crop yield in some regions and the fact that additional truck transportation costs can exceed the gain from higher commodity prices, some train loading stations have been unable to consistently draw enough volume. This is a particular problem to those train loading stations located in the major western wheat growing States, where the yield per acre is closer to 40 bushels than 140 bushels.

Those railroads having dominance over a geographic region, may have an increased ability to induce grain elevators to upgrade to train loading stations due to the lack of competition from nearby grain elevators which are located on competing railroads. In addition, the gathering services of some short line railroads become less critical to the success of Class I railroads having dominance over a geographic region. This could result in the loss of branch-line rail service.

Finally, agricultural producers and local taxpayers bear the increased costs of additional truck transportation and transshipment costs due to loss of local rail service and longer truck hauls to train-load shipping stations. Producers more distant from unit-train loading facilities not only must incur the cost of transporting their crops longer distances by truck, but also must consider the cost of longer trip times during harvest, which reduces the availability of each truck to haul more loads. Taxpayers are impacted by the costs of additional semitrailer truck damage to rural roads.

The abandonment of rail lines and the increased use of shuttle trains are resulting in increased road maintenance costs in rural areas because of increased heavy truck traffic. Although the user fees (fuel taxes, registration and license fees, etc.) assessed on heavy trucks appear at first glance to be adequate, the damage to roads increases exponentially, rather than linearly, with increased weight. For example, the 1997 Federal Highway Cost Allocation Study concluded that user fees collected from 5-axle tractor-semitrailer trucks registered at 80,000 pounds pay for only 90 percent of the costs they impose upon the Federal Highway System, and heavier trucks pay only 60 percent of the costs they impose (U.S. Department of Transportation, 1998). However, since Federal-aid highways comprise only about 25 percent of the total road infrastructure, they do not include most of the rural road system used by these heavier trucks. Because heavy truck traffic does much more damage to rural roads–which were not designed for such traffic–it is likely that those user fees pay for only 60 to 67 percent of the costs tractor-semitrailer trucks impose upon the entire highway and road system.[31]

The increased road damage caused by the loss of rail service and shuttle-train shipments also affects rural counties much more than urban counties since they have fewer residents to pay for the increased road damages. When Ottawa County, KS, which has a population of only 6,000, lost rail service, the county's annual road maintenance bill increased from just more than $1 million to nearly $7 million (Baccus, 2000). Similarly, it will cost Harper County, KS, which has a population of 6,400, $27 million to rebuild the county's roads and bridges to a standard that will withstand the increased truck traffic caused by the loss of rail service in 1997 (Griekspoor, 2000). Due to the high costs of maintaining light-duty asphalt roads, rural counties facing such large-scale diversions of rail grain to trucks will likely be forced to allow many roads to revert to gravel.

In fairness to the Class I railroads, it appears that unequal public promotion of transportation modes is contributing to the divergence between what is good for the individual and the overall public good. Although rail firms are privately owned and financed, the competing transportation modes of truck and barge operate on publicly financed infrastructure and do not pay the full costs of their use. Thus, the cost of transporting freight on those modes is artificially low compared to rail, giving shippers an incentive to use the subsidized modes of transportation.

Fewer Shipper Options – Deregulation, combined with increased railroad market power, has also resulted in fewer shipping options for agricultural producers. This is due to Class I railroad restrictions on shipment routing and access to the rail network as well as differential service given to captive shippers. In addition, consolidation taking place in the grain-handling network–

[31] The damage a loaded semitrailer truck does to a major rural collector highway is 13.5 times the amount of damage the same truck does to a rural interstate highway and, on minor collector highways, the same truck does 21 times the amount of damage (Tolliver, 1998).

influenced, among other things, by Class I railroad incentives to ship in unit- and shuttle-train lots–has also led to fewer shipper options.

Recent railroad mergers have had a mixed effect upon the number of shipping options available to agricultural producers. Although recent mergers have given shippers access to markets that could not be economically accessed before and have preserved rail service that otherwise may have been lost, these mergers have also given railroads greater market power and the ability to influence shipper decisions.

Prior to the Staggers Act, shippers were allowed to specify the routing for their shipments and were guaranteed nondiscriminatory rail service. The enactment of the Staggers Act gave railroads much more freedom to close gateways, route traffic as they chose, abandon excess rail lines, apportion rail services among competing users, and price rail services at market levels. Railroads used these newly gained operating freedoms to reduce costs and increase the efficiency of the rail network. Because railroads were no longer required to quote tariffs between any two stations, tariffs for many of the less efficient shorter hauls were eliminated as quickly as competitive conditions allowed. Railroads also had more freedom to price longer distance movements more competitively than shorter movements, thus encouraging longer hauls which capitalize on rail's long-distance cost advantage over trucks as well as increasing the efficiency of the rail network. In addition, to attain greater efficiency, railroads offered tariff incentives that encouraged consolidation of shipping to fewer shippers, each shipper handling a greater volume.

Class I railroads also began to use various methods to encourage traffic to move on their own lines–rather than on those of competing railroads–and to those destinations on their own lines. Examples of this include noncompetitive bottleneck rates, elimination of coloading privileges for unit trains, and quoting less competitive tariff rates to off-line destinations. Also, Class I railroads began to limit access to the rail network itself by canceling reciprocal switching agreements (especially prior to planned but unannounced rail mergers), closing gateways to competing railroads, and canceling joint-line rates with connecting railroads. All of these tactical competitive decisions seem to place the benefits of the individual railroad above that of the network itself and that of the shippers.

The consolidation of grain-loading stations has also limited shipping options for agricultural producers. As the number of grain-loading stations decrease, agricultural producers have fewer options as to where to sell their commodities. Thus, this consolidation also results in less competition for the purchase of commodities produced by the growers.

When the demand for rail service exceeds supply–as is often the case with seasonally transported commodities–Class I railroads have shown a tendency to serve first those shippers having viable transportation alternatives to avoid losing that business. Typically, once those shippers having other transportation alternatives are served, railroads then serve captive shippers. This is a difficult situation to resolve since the loss of that competitive traffic also would result in the loss of the contribution that traffic makes toward total rail system costs. Thus, although paying the highest rates, captive shippers also tend to receive the worst service (Christianson, 1998). In effect, captive shippers are put at a competitive disadvantage in accessing markets. This is particularly harmful to producers in those regions since the demand for rail service is highest during those periods when grain and oilseed prices are rising.

Thus, the net results for many agricultural shippers have been fewer shipping options, fewer marketing choices, and increased transportation costs. When agricultural producers are restricted in their access to markets, they are unable to obtain the best prices for their products and often are unable to sell when prices are highest.

An Uncertain Future for Small Railroads – Many of the trends previously cited suggest an uncertain future for the many small railroads that have provided rail service to rural areas in lieu of abandonment of service by a Class I railroad.

Yet, due to a customer focus and lower costs, America's small railroads have built a remarkable record of success in recent years (Saylor, 1999). Since 1980, these short line and regional railroads have preserved access to rail service on more than 29,000 route miles of rail line that otherwise would have been abandoned (Prater, et al, forthcoming, B). These small railroads link rural communities with the core railroad system, allowing those rural communities to retain their employment bases and compete for new industry.

As discussed earlier, short line and regional railroads provide an important gathering function for producers of grain and oilseed crops. Should these short line railroads be lost, agricultural producers would lose vital rail connections to markets and would have to ship by more expensive transportation modes. Since grain transportation costs ultimately come out of farmers' pockets, the loss of short line railroads would result in decreased community income and smaller municipal budgets. In addition, the diversion of rail traffic to truck–one railcar can haul up to four truck loads–dramatically affects road maintenance costs. Certainly, no one would argue that all smaller railroads should be saved. In some cases, the costs of preserving these railroads would exceed the costs experienced due to their loss. However, agricultural producers and communities should thoroughly weigh the costs that the loss of smaller railroads will place upon them.

Numerous studies have shown that the viability of railroads is critically dependent upon freight traffic density (Dooley 1991; Due, 1987; Sidhu, et. al., 1977; Prater, 1997; and Wolfe, 1989). Thus, any factor that threatens the traffic base of short line railroads also threatens their viability. Although short line railroads face numerous threats to their survival, their survival is particularly jeopardized by two recent trends: the shift to 286,000-pound railcars and restrictions against coloading of unit trains.

Much of the rural rail network was built when typical carload weights were only 100,000 pounds; today these lines are handling 263,000-pound railcars at greatly reduced speeds. In addition, much of the track operated by short line railroads was in poor condition when these lines were purchased from Class I railroads and typically was constructed using much lighter rail weights. Although much of the track operated by short line railroads has been improved since its purchase, short line railroads have been unable to make major improvements in the condition of many lines because of low freight traffic densities and profitability. Thus, much of the short line and regional railroad network is unable to handle the larger 286,000-pound railcars. Many of the bridges on these lines will also need to be upgraded to handle the additional weight.

Since the upgrading of track and bridges is expensive, the trend toward heavier axle-load railcars has the potential to affect the lower traffic-density short line railroads much more than it does the Class I railroads, particularly those lines serving rural agricultural regions. The estimated cost to the short line railroad industry of upgrading track and bridges to handle 286,000-pound railcars is nearly $7 billion (Zeta-Tech, 2000). The revenue small railroads receive from handling heavier railcars is not sufficient to pay for the upgrade in most cases. With only $3 billion in revenue for nearly 50,000 route miles, the short line and regional railroads average only about $60,000 per track mile in annual revenue, compared with an average of $269,000 per mile for Class I railroads in the United States (Zeta-Tech, 2000). Nevertheless, they must maintain a physical plant capable of handling the heaviest freight cars allowed in interchange on North American railroads.

The heavier axle-load railcars force a choice between rebuilding rail lines or further network shrinkage since a dual-weight standard for rail lines cannot survive. Thus, if not upgraded to handle heavier axle-load railcars, lighter duty rural feeder lines will disappear, and the communities they serve will lose the economic benefits of continued rail service on those lines.

Thus, short line railroads serving rural areas must quickly find massive amounts of funding with which to upgrade track and bridges to handle heavier axle-load freight cars that shippers and large railroads are bringing on line (Saylor, 1999). Internally generated funds and conventional lending sources are insufficient for small railroads to meet this challenge. Due to the huge investment required, both State and Federal Governments, as well as short line railroads, may need to cooperate to develop funding for these track improvement projects. An important public policy issue is whether Federal assistance should be provided to stabilize the remaining rural rail infrastructure, given that truck competitors operate over publicly financed highways and the loss of rail service to rural communities will result in greatly increased highway maintenance costs.

The viability of short line railroads is also threatened by the refusal of Class I railroads to allow short lines to coload unit trains and provide multiple switching services. The denial of coloading to elevators on short line railroads does not appear to be cost based since there is no cost difference between accepting a unit train from an elevator on its own line or from a short line railroad as long as time limitations and other conditions are met.

Conclusion

This paper has identified trends in railroad service and capacity for U.S. agriculture over the past 20 years and described what these trends portend for future rail service and capacity for U.S. agriculture absent any changes in the regulatory environment within which railroads currently operate. This paper has made scant reference to the successful aspects of the railroad deregulation that occurred with the Staggers Rail of 1980; the U.S. rail industry is now, for the most part, on sound financial footing, and the industry has responded to the incentives of deregulation and greatly reduced costs.

For agricultural shippers, however, the future availability of railroad services and capacity is not nearly so promising. The shrinking rural rail network, the trend toward trainload shipping, and the decreasing significance of agricultural traffic to railroads all point to a decreasing railroad share of grain traffic in the future. Moreover, the trend toward greater market concentration in Class I rail service suggests that railroads in the future may attempt to recoup merger expenses and acquisition costs by raising rates where they face minimal intermodal and intramodal competition. Agricultural shippers are also being faced with an increasing burden of responsibilities and charges to ship by rail, and the railroad shipping options for many shippers are decreasing. Finally, long-term trends suggest that the new and vibrant part of the U.S. rail industry, the short line and regional railroads, faces an uncertain future.

Perhaps most important, this paper suggests that it is in the mutual interest of both the U.S. rail industry and U.S. agriculture that railroads remain an important and vital shipping option for agricultural shippers. In particular, Class I carriers would be better off trying to meet the long-term needs of their agricultural customers as they change rather than cede all of this agricultural traffic to trucks. It certainly is in the long-term interest of U.S. agriculture that this traffic is kept on the rails.

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