Preserving Railroad Infrastructure: The Case of Iowa Branch Rail Lines

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In the 1970s, huge grain exports, deteriorating branch rail lines, poor railroad earnings and increased demand for new railroad locomotives and grain cars led railroads to apply for the abandonment of the deteriorating branch lines. The state of Iowa developed a program to subsidize the upgrading of 1,984 miles of branch lines. This paper analyzes the results of these programs and evaluates the potential economics of future branch rail line subsidy programs.

INTRODUCTION

The influx of settlers into Iowa in the late 1850s was the motivation for the construction of the Iowa railroad system. Railroads became the only available form of public transportation. Most people wanted access to a railroad and railroad companies were anxious to oblige. The Iowa railroad system expanded rapidly. By 1911, there were 10,500 miles of track in Iowa, one of the largest rail systems in the United States (Iowa Department of Transportation 1995). Nearly everyone in the state lived within seven miles of a railroad (Iowa Department of Transportation 1995).

Construction of paved roads in Iowa began around 1910. Since then, the development of automobiles and trucks and huge government investments in paved roads and inland waterway locks and dams have diverted large amounts of traffic away from the railroads. Railroads responded to these developments with mergers, bankruptcies, and abandonment applications. By 1970, the Iowa railroad system had declined to just over 8,000 miles of track (Iowa Department of Transportation 1978).

Declining passenger traffic, major competition from trucks and barges, and government regulation of railroad rates and operations resulted in major reductions of railroad earnings. Of the five Class I railroads operating significant mileage in Iowa in the mid-1970s, only the Burlington Northern Railroad earned substantial profits (Iowa Department of Transportation 1978). The Chicago and Northwestern and the Illinois Central Gulf railroads operated just above breakeven (Iowa Department of Transportation 1978). The other two Class I railroads, the Chicago, Rock Island and Pacific Railroad (Rock Island RR) and the Chicago, Milwaukee, St. Paul, and Pacific Railroad (Milwaukee RR), operated with large losses in income (Iowa Department of Transportation 1978). The latter four railroads had little or no money to buy new locomotives and rail cars or to upgrade their rapidly deteriorating railroad track and bridges.

Lightweight rail and rotting ties on many branch rail lines were in such bad condition that derailments were common events. Trains operating on many of these lines were constantly going uphill. The weight of the locomotives and cars forced the lightweight rail to bend down into the rotting ties, causing the train to constantly travel up the rail.

The 1970s began a period of rapid growth in U.S. grain exports (U.S. Department of Agriculture). Corn exports grew from 506 million bushels in 1970 to 2,403 million bushels in 1979. Adding to this growth, the U.S. government signed an agreement to sell and deliver large amounts of wheat and corn to Russia. The purpose of the agreement was to improve the diets of the Russian people, to improve relations between the U.S. and Russia, and, most importantly, to reduce the huge quantities of wheat and corn the U.S. government had purchased and placed in long-term storage to increase the prices paid to U.S. farmers. Most of this wheat and corn was delivered to export elevators in New Orleans, Louisiana, and in Houston, Texas for shipment to Russia. The deliveries to New Orleans were by railroads and barges down the Mississippi River. Deliveries to Houston were all by rail. The Russian wheat and corn sales effectively required the delivery of two U.S. wheat and corn crops in a few months.

During the 1970s, the railroads began shifting from single 60-ton box car shipments to 100-ton covered hopper grain cars and then to unit-trains. The first unit-trains consisted of 50 100-ton capacity covered hopper grain cars loaded at one grain elevator and delivered to one export elevator at New Orleans or Houston. The covered hopper grain cars were more efficient and less costly per ton of grain than the old 40-foot box cars that had been used for decades for grain shipments. Demand escalated for new jumbo covered hopper cars, more powerful locomotives to pull the heavy loaded covered hopper grain cars, and upgraded branch rail lines. But four of the five railways, operating 84% of the rail lines in Iowa, did not have enough cash to buy new cars and locomotives and, at the same time, rebuild the rail lines and bridges to the capacity needed to carry the new heavy rail cars and locomotives.

The cost efficiencies of the unit-trains enabled the railroads to reduce the rates for unit-train shipments below the charges for single car shipments. These lower rates encouraged some grain elevators, mostly those located on main lines and a few selected branch lines, to make the necessary investments to load the unit-trains in the short time period required under the lower unit-train tariffs. The lower rates allowed these elevators to increase their bid prices to encourage more grain farmers to deliver grain from longer distances. Grain farmers responded by buying larger trucks to haul grain longer distances to capture the higher bids offered for their grain.

The cash shortages of many railroads, combined with the huge demand for grain to be delivered quickly to New Orleans and Houston, created major shortages of new covered hopper grain cars. These shortages motivated many unit-train loading elevators to lease and/or buy their own grain cars. Thus, the unit-train loading elevators had two major advantages over the grain elevators on deteriorating branch lines: first, they could bid higher prices to grain producers for grain; second, they had access to grain cars for rapid shipments. These two advantages motivated grain farmers to buy larger trucks, including semi-tractor-trailer trucks, and to bypass the local grain elevator located on deteriorating branch rail lines. More grain producers then delivered their grain to the train loading elevators.

The new covered hopper grain cars weighed 263,000 pounds when loaded. This weight restricted their use to rail lines that had been upgraded with at least 90-pound rail–the weight of three feet of rail–that would safely carry these heavy loads. New railroad ties/ballast and some bridge work were also needed for the safe movement of these heavy loaded jumbo covered hopper grain cars and the new, more powerful, locomotives.

The success of the 50-car unit-trains motivated the railroads to increase the trains size to 75 cars and later to 100 cars. Today, the lowest cost rail shipments are in shuttle trains consisting of 110 cars in each train with each car carrying approximately 110 tons of cargo. The cargo weight of each shuttle train is approximately 12,000 tons. Shuttle trains require a commitment for a fixed number of multiple loaded train trips.

Most of the branch lines in Iowa needed to be upgraded with 90-pound rail, new ties, ballast, and some bridge work. Given that the railroads did not have enough cash to upgrade all branch rail lines that could not carry the new heavy loaded grain cars, railroads filed petitions to abandon many miles of low traffic, deteriorated branch lines in Iowa. Most of the deteriorated branch lines served smaller grain elevators located in small towns. Managers of these elevators, as well as many small-town business owners, petitioned state and federal governments to do something to "save my rail line!" The U.S. was facing severe fuel shortages during those years. They also argued that saving these lines by upgrading them would save fuel if grain producers could deliver their grain to the local elevators rather than haul them to the distant unit-train elevators located on the main lines. The state of Iowa and the federal government responded to these pleas with railroad preservation programs. The purpose of this paper is to

- describe the branch rail line preservation program enacted by the state of Iowa
- describe how the two Iowa agencies implemented this program
- compare the results of the two methods of implementation
- suggest the conditions under which similar future programs should not be enacted and conditions under which future programs might produce economic results

LITERATURE REVIEW

There is a rich literature available on the economics of branch rail lines in the United States and particularly in the Midwest. Using a network model, Baumel et al. (1979) evaluated the benefits and costs of upgrading 71 branch rail lines in Iowa. Only seven of the 71 lines that were evaluated generated benefits that exceeded the cost of upgrading.

Casavant and Tolliver (2001) estimated how shippers and short line railroads are affected by heavy cars (loaded weights of 286,000-pounds) on state of Washington branch rail lines with 90-pound or less weight rail or deferred maintenance. They concluded that even with innovative short-run solutions, upgrading the track to carry 286,000-pound cars was the only long-term solution. Approximately 480 miles of track needed to be upgraded to effectively carry 286,000-pound cars at a cost of $110 to $141 million. Failure to upgrade the track would likely result in abandonment, and the economic benefits of the heavier cars would be lost to shippers.

Sage et al. (2015) examined the role of and problems facing 22 short line railroads in the state of Washington. The major problem facing these railroads is the railroad industry shift to heavy axle (286,000-pound capacity) rail cars. Much of the existing short line rail systems in Washington cannot safely carry these cars at economic speeds. The estimated cost of upgrading these short line rail and bridge systems is about $610 million. Sage et al. (2015) present three case studies showing the economic benefits of investments in the Washington short line railroad system.

Fengxiang et al. (2016) examined 45 short line railroads in Texas. They evaluated the impact of short line railroads on safety, congestion, noise, environment, road infrastructure, employment, and the local community. Their conclusion was that “short line railroads provide significant benefits to the state. However, many short line railroads operate railroad infrastructure that is in a deteriorated condition because of deferred maintenance by previous owners. Most short line railroads do not have sufficient revenues or access to large amounts of capital that are necessary to rehabilitate their infrastructure.”

The Federal Railroad Administration (2014) reported that there are more than 560 short line railroads operating in the United States. The short line railroad industry has been consolidating under the control of holding companies. There are 27 holding companies that control 270 small railroads. These holding companies reduce the risk that lenders will not be repaid for their loans to short line railroads. A survey indicated that current investment needs in the short line industry is $1.2 billion. Future investment needs total another $5.3 billion. Holding companies indicate that they need a mix of funding sources for these investment needs.

Babcock and Sanderson (2004) used a rate of return on investment analysis to determine if five Kansas short line owners would likely upgrade their rail lines to carry 286,000 gross vehicle weight rail cars or abandon them. None of the five short line railroads could earn an adequate rate of return on upgrading track and bridges to justify the investment. Today all five are still operating.

Laurens and Richardson (2014) assessed the economic role and impact of short line railroads in Louisiana. They found that short line railroads while small in scope play a significant role in supporting the state’s core economic drivers. As a result, short line policies (e.g., grant programs for capital improvements) should be considered by the state of Louisiana to accommodate the flow of goods.

Baumel and Wisner (1974) examined the effect of rail line abandonment on a country elevator's grain and farm supply business. The results indicated that a country elevator located on an abandoned rai line could continue to operate. They would need to continue to perform the necessary function of receiving, drying, and storing grain at harvest time and to provide a local source of feed, fertilizer, and other farm supplies.

O'Riley (2008) described the growth in ethanol production in Iowa and the modes used to transport ethanol out of Iowa.

Yu and Hart (2009) described the impact of the rapidly expanding ethanol industry in Iowa and the significant impact of ethanol in the utilization of Iowa's corn production.

Iowa Railroad Preservation Assistance Programs

In 1974, the Iowa Legislature created the Iowa Rail Assistance Program and appropriated $3 million to begin rehabilitating Iowa's rail network. The program began under control of the Iowa Energy Policy Council (IEPC) but was transferred to the Iowa Department of Transportation (IDOT) in 1975. IEPC developed the following point system to analyze and rank potential branch rail line candidates for financial assistance to upgrade the rail lines (The Council of State Governments 1976):

Rating Category	Maximum Points
Historic Viability (number of cars per mile)	15
Potential Viability (potential cars per mile)	20
Safety (derailments)	10
Track Structure (condition)	20
Shipper Funding Participation	20
Railroad Funding Participation	15
	100

The higher the number of points, the higher the priority that the IEPC assigned to the rail line. IEPC used this system to allocate $3.4 million to upgrade six branch lines. Shippers and railroad companies also allocated $2.8 million to these six branch lines. These six branch lines were upgraded with 90-pound rail and new ties to carry the new loaded covered hopper unit grain trains.

In 1975, the Iowa Rail Assistance Program was transferred to the newly formed IDOT. In 1974, the Iowa Legislature passed Senate File 1141 creating IDOT, which assumed responsibility for transportation operations, planning, building and regulatory activities formerly performed by six separate state agencies (Iowa Department of Transportation 1980). IDOT used a benefit-cost model to determine whether a given branch line would generate enough traffic to become profitable and remain in operation over a long period of time. The model, based on an earlier study to estimate the benefits and costs of upgrading 71 branch rail lines in Iowa (Baumel, Miller and Drinka 1979) was estimated using the following steps:

1. Establish the line alternatives
2. Estimate the project costs
3. Determine what will happen if the line is not upgraded
4. Use a standard planning horizon
5. Establish a discount rate
6. Estimate transportation benefits
7. Estimate secondary benefits
8. Estimate salvage values
9. Calculate the benefit cost ratio

The IDOT benefit-cost model, a more sophisticated economic model than the point system used by IEPC, was used to allocate $27.7 million in state funds and $35.7 million in federal funds to 35 branch line projects from 1975 to 2005 (Iowa Department of Transportation 2005). Shippers added $35.0 million and railroad companies added $52.2 million to these 35 branch lines from 1975 to 2005 (Iowa Department of Transportation 2005). Table 1 compares the results of the IEPC procedures with those of IDOT's.

Table 1: Iowa Energy Policy Council and Iowa Department of Transportation Branch Rail Line Preservation Programs, 1974-2005

	Iowa Energy Policy Council	Iowa Department of Transportation
Miles of line upgraded	271	1,713
Total actual cost	$6,198,523	$150,676,157
Average cost per mile	$22,873	$87,960
Total cost paid by		
Shippers	$1,341,000 (22%)	$35,008,506 (23%)
Railroads	$1,497,917 (24%)	$52,221,459 (35%)
State of Iowa	$3,359,606 (54%)	$27,705,241 (18%)
Federal government	$0 (0%)	$35,740,951 (24%)
Miles abandoned	159	243
Percent abandoned	59	14
Cost per mile preserved by		
Shippers	$11,973	$23,815
Railroads	$13,374	$35,525
State of Iowa	$29,996	$18,847
Federal government	$0	$24,313
Total	$55,344	$102,501

Source: Iowa Department of Transportation (2005)

Table 1 shows that from 1974 to 2005, a total of 1,984 miles of deteriorated Iowa branch rail lines were upgraded under IEPC and IDOT programs. Fourteen percent of the lines were upgraded under IEPC and 86% under IDOT. IEPC paid 54% of the cost of the 271 miles of upgraded track under their control while IDOT paid only 18% of the total cost. Railroad companies paid one-fourth to one-third of the costs and shippers paid almost one-fourth of the costs under both programs. However, the shipper contributions were loans to the railroads and the shippers were reimbursed per car shipped on each line. The federal government paid none of the costs under the IEPC program and about one-fourth of the costs under the IDOT program. The IEPC contributions were grants to the railroads for upgrading the selected lines.

A major difference between the two programs was that 59% of the lines that were upgraded under the IEPC program were eventually abandoned, whereas only 14% were abandoned under the IDOT program. A likely reason for the high level of abandonments under the IEPC program was the method used to allocate funds among applications. The IEPC method relied largely on the historic level of traffic and derailments on each line. There was no measurement of the net benefits expected from upgrading the lines under the IEPC program and the length of time the upgraded lines would remain in operation. Sixty percent (95 miles) of the abandoned lines under the IEPC program miles were from one line on the Milwaukee RR (Iowa Department of Transportation 2005). Eighty-two of the 95 miles of upgraded Milwaukee RR line were abandoned just five years after they were upgraded (Iowa Department of Transportation 2005). The remaining 13 miles were abandoned 15 years after the upgrading. This suggests that there was little effort made to estimate the years that the line would remain in operation. If there were estimates of the useful life of the investment, the estimates were incorrect.

The high level of abandonment under the IEPC program resulted in a higher state of Iowa cost per mile of upgraded lines that remain in operation. The total Iowa cost per mile of upgraded lines that remain in operation was almost 1.6 times ($29,996 divided by $18,847 from Table 1) greater under the IEPC program than under the IDOT program. This was the case even though the average cost per mile over all upgraded lines was greater under the IDOT program than under the IEPC program. In addition to the high level of abandonments of lines upgraded under the IEPC program, a second reason for the lower state of Iowa cost per mile of remaining upgraded lines was that the state contributed only 18% of the total upgrading cost while the IEPC program contributed 54% of the total cost.

A third difference between the two programs was the level of funding provided by the state of Iowa. More than half (54%) of the total funding under the IEPC program was from State of Iowa funds. These funds were grants to the railroad company and were not repaid. Under the IDOT program, only 18% of the funding came from State of Iowa funds. Initially the IDOT funds were provided as a grant to the railroads. In July 1984, the Iowa Transportation Commission changed the grant program to a no-interest loan program (Iowa Department of Transportation 1985).

Table 2 shows the amount of upgrading on branch lines operated by Class I, II, and III railroads under the IDOT program. The class groupings are based on the level of annual gross operating income. In 2015, Class I railroads included those with annual operating income of $457.9 million or more (Surface Transportation Board 2017). Class II railroads had less than $457.9 million but more than $36.6 million while Class III railroads had less than $36.6 million of gross operating income (Surface Transportation Board 2017). The importance of Class II and III railroads (often referred to as short lines) to Iowa was evident from the dramatic increase in their operations from 1980 to 1985 resulting from the abandonment of Class I branch lines and the Rock Island RR and Milwaukee RR bankruptcies. Many communities and small businesses depend on rail service to move their goods and provide a base for their local economy, which the short lines could provide at an operating cost lower than Class I railroads (Iowa Department of Transportation 1985). Other Midwest states that have established rail financing programs to enhance the service and capacity of short line railroads include Kansas, Michigan, Minnesota, Ohio, Wisconsin, and Oklahoma (American Association of State Highway and Transportation Officials 2017).

A large percent of the upgraded miles under the IDOT program were on Class I railroads. That was because Class I railroads owned a large percent of the rail lines in Iowa, particularly in 1975 when the Iowa Rail Assistance program began. Seventy percent of the upgraded miles and 76% of the expenditures were on Class I lines. Class I railroads contributed 35% of the upgrading expenditures on their lines while Class II railroads contributed 43% on their lines and Class III railroads contributed 28% of their expenditures. Shippers on Class I railroads contributed 28% of the expenditures while shippers on Class II and III railroads contributed much less, only 8% and 5% of the expenditures on those lines, respectively. Moreover, the railroads repaid the shippers for their contribution per car shipped on the line based on a flat per-car rebate or a graduated revenue per-car rebate as negotiated by the shippers and railroad (The Council of State Governments 1976).

A total of 243 miles of upgraded lines under the IDOT program were abandoned with Class I railroads accounting for 232 miles and Class II 11 miles. Of the total of 243 miles of upgraded and then abandoned lines, 172 were abandoned on the Rock Island Railroad, 38 miles were on the Chicago and Northwestern Railroad, 22 miles were on the Burlington Northern Railroad, and 11 miles were on the Iowa Interstate Railroad (Iowa Department of Transportation 2005). There were no abandonments on the Class III railroads.

Table 2: Class I, II and III Railroad Upgrading Costs for the Iowa Department of Transportation Branch Rail Line Preservation Program, 1975-2005

	Class I*	Class II**	Class III***
Miles of line upgraded	1,207	250	256
Total cost	$115,123,102	$18,408,229	$17,144,826
Average cost per mile	$95,380	$73,633	$66,972
Percent of total cost paid by			
Shippers	28	8	5
Railroads	35	43	28
State of Iowa	16	18	33
Federal government	21	31	34
Miles abandoned	232	11	0
Percent abandoned	19	4	0
Cost per mile preserved by			
Shippers	$33,510	$6,291	$3,254
Railroads	$40,667	$32,714	$18,565
State of Iowa	$19,202	$14,041	$21,979
Federal government	$24,696	$23,976	$23,174
Total	$118,075	$77,022	$66,672

Source: Iowa Department of Transportation (2005)
*63 miles were upgraded by the Rock Island RR (a Class I railroad) and later sold to the Iowa Interstate Railroad (a Class II railroad).
**170 miles were upgraded by the Chicago Central & Pacific Railroad (a Class II Railroad) which is now a subsidiary of the Canadian National Railway (a Class I Railroad).
***83 miles were upgraded by the Cedar River Railroad (a Class III Railroad) which is now a subsidiary of the Canadian National Railway (a Class I Railroad).

Shippers and railroads contributed 63% of the total cost of Class I lines. The state of Iowa contributed only 16% of the Class I upgrading. The state of Iowa paid 18% of the costs of the Class II upgrading and 33% of the Class III upgrading. Many states have provided support to their Class II and III railroads. Such investments ensure that these railroads can continue to serve their shippers in helping to retain shipper employment and prevent the diversion of traffic to truck and the consequent maintenance impacts to the road system (Iowa Department of Transportation 2017). Freight moving by rail lowers congestion on the road system, lowers fuel consumption, reduces greenhouse gas emissions, and provides for safer roadways (Sage, Casavant, and Eustace 2015 and Fengxiang Qiao et al. 2016).

In summary, the IDOT program was more efficiently operated than the IEPC program. First, the IDOT program decisions were based on a more rigorous economic model than the IEPC program. Second, the state of Iowa contributions under the IEPC program were gifts to the railroads, whereas the IDOT prior to July 1984 were grants to the railroads. After July 1984, the IDOT funds became a no-interest loan to the railroads. Third, over half of the upgraded lines in the IEPC program were abandoned while only 14% of the lines in the IDOT program were abandoned. Since the purpose of the programs were to preserve the selected rail lines, the IEPC program preserved only 41% of the subsidized lines while the IDOT program preserved 86% of the selected lines.

FUTURE USE OF SUBSIDY PROGRAMS TO PRESERVE RAIL LINES

The fundamental assumption behind the initial state of Iowa effort to preserve certain Iowa branch rail lines was that Iowa corn and soybean exports would continue to grow over the years and that railroads would remain as the major carrier of Iowa's agricultural output. Therefore, branch rail lines would be needed to transport grain to the main lines for shipment to export ports. The programs also assumed that rail line preservation was necessary to maintain and grow rural Iowa communities.

The first assumption turned out to be false. U.S. corn exports peaked in 1979 (U.S. Department of Agriculture). Except for a temporary spike in 2007, caused by major droughts in competing countries, U.S. corn exports have trended downward since 1979. Iowa corn exports trended downward even faster than U.S. corn exports. There were two reasons why Iowa corn exports declined so rapidly. The first and most important reason was the rapid growth in the use of corn as the feedstock for ethanol production. Iowa produces more ethanol than any other state in the U.S (Iowa Corn Growers Association 2017). The second reason for the decline in Iowa corn exports was that the growth in livestock production in Iowa was made possible with the use of corn and soybeans in animal feed production. Most of the increased animal production was in the growth of confinement swine production. There was also a large increase in the production of eggs in Iowa.

Will the rapid growth in the use of corn in ethanol production and corn and soybeans used in swine and egg production continue to use a high percent of the corn and soybeans produced in Iowa? Technology continues to increase the per-acre yields of corn and soybeans. Technology also continues to make automobiles more fuel efficient and therefore use less ethanol as a transportation fuel. There is also an effort underway to increase the blend of ethanol in gasoline from 10% to 15%. This would likely mean an increase in the use of ethanol. On the issue of feed consumption, there is a belief that it is more efficient and less costly to increase the production of livestock in the U.S. and export meat rather than export corn and soybeans. The net result of these conflicting forces is that corn and soybean exports are likely to increase, but the rate of increase is uncertain and could range from low to modest growth.

If grain exports do increase, will it create a need to continue upgrading Iowa branch rail lines to transport the grain? If there is a large local demand for corn, Iowa elevators will have a local truck market and the need for branch lines will continue to decline. If, however, the local market for grain decreases and the export demand increases, the need for branch lines may increase. The reasons that major changes are occurring in the Iowa grain distribution system are the following:

1. The size of Iowa farms has been increasing with many farmers operating 3,000 acres or more. These large-size operations require large combines to harvest the crops in time to do the post-harvest work before the ground freezes. Many of these farmers have purchased used semi tractor-trailer trucks to increase their capacity to move their corn and soybeans to on-farm storage and to commercial storage sites. Some farmers own up to five semi-trucks. Effectively, these farms have become small trucking firms. Depending on price differentials, these trucks, hauling up to 1,000 bushels per load, can economically haul grain 100 miles or more. This enables these farmers to bypass local grain elevators located on branch rail lines and haul their grain directly to ethanol plants, feed mills, and grain elevators on main lines that buy enough grain to contract for low-cost shuttle trains that make multiple consecutive trips.
2. Iowa grain cooperatives have under gone a period of mega mergers. As of April 2016, there were only 55 grain cooperatives in Iowa, down from about 300 cooperatives in 1980 (Jacobs 2016). This means that each cooperative owns and operates multiple grain handling locations. Landus Cooperative, located in Ames, Iowa, operates 65 grain elevators. Landus is served by all seven railroads operating in Iowa. Its 7,000 members can choose to deliver grain at any of the 65 elevators. Grain bids vary among the 65 elevators depending on the markets available to each elevator. Some of the 65 elevators do not have rail service, yet

some of these non-railroad elevators have expanded their receiving and storage facilities to enable them to serve local ethanol, amd other processing plants and feeder markets. Figure 1 shows a grain elevator at Luther, Iowa. It was originally located on the Chicago, Milwaukee, St. Paul, and Pacific Railroad, which was abandoned in 1976. The elevator remained in business without rail service. In 2016, the new storage capacity shown in Figure 1 was added to the elevator even with no rail service.

Figure 1: New Addition to Elevator Located on an Abandoned Rail Line at Luther, Iowa, 2016

The new elevator addition offers storage capacity to farmers located around the elevator and provide corn and soybeans to local truck markets, including ethanol plants, feed mills, and corn and soybean processors. Other elevators without rail service are located throughout Iowa serving other truck markets. In today's markets, grain elevators function profitably without rail service, and there is little or no need for governmental programs to preserve rail service to grain shippers in Iowa. Most of these changes in the structure of the Iowa grain distribution system are also occurring in other corn belt states (Zelenka 2017).

Another argument for upgrading branch rail lines is that the railroads are in the process of shifting to larger capacity cars that carry 110 tons or more of product. These loaded heavy cars can only move safely over 90-pound rail at slow speeds. These slow speeds increase the cost of transporting over most branch lines. However, declining corn exports, farmers shifting to semi-trucks, and the railroad shift to shuttle trains means that the amount of corn moving over branch lines has been declining. This reduces the net benefits of upgrading branch lines, including Class II and III railroad lines. However, increasing shipments of ethanol and DGS (dried grains from the production of ethanol) by rail has partially offset the decline in corn shipped by rail. Ethanol and DGS will also increasingly be shipped in 286,000-pound cars, which would add to the potential benefits of upgrading branch lines with the rail weighing 112 pounds per 36 inches of rail.

The financial condition of Iowa railroads is much different today than in the 1970s when two Class I railroads were bankrupt and two others had little or no money to upgrade their infrastructure. The current rail network is in much better physical condition, as the railroads have made considerable progress in the last two decades in upgrading their track and equipment. Table 3 shows the miles of rail lines in Iowa that are not able to handle 286,000-pound cars.

Table 3: Iowa Mileage of Class I, II and III Railroads in Need of Potential Future Upgrading to Handle 286,000-Pound Rail Cars, 2017

	Total Miles Operated in Iowa	Miles Unable to Handle 286,000- Pound Rail Cars	
		Total Miles	Miles Located on Ethanol Routes
Class I Railroads	3,225	343	250
Class II Railroads	298	5	0
Class III Railroads	328	136	40
Total	3,851	484	290

Source: Iowa Department of Transportation (2017)

A total of 484 miles (12.5% of the total Iowa miles) are not able to handle the 286,000-pound cars and may need to be upgraded if the movements on these lines require the larger cars. Of the total 484 miles, 343 miles are located on Class I railroads while the remaining 141 miles are located on Class II and III railroads. In the case of ethanol movements, Table 3 shows that 290 miles (7.5% of the total Iowa miles) located on ethanol routes are not able to handle 286,000-pound cars. Class I railroads account for 250 miles (86%) while Class III railroads account for the remaining 40 miles (Iowa Department of Transportation 2017).

Class I railroads are generally considered capable of funding their own capital projects. However, self-funding is more challenging for Class II and III railroads. There are seven ethanol plants in Iowa located on lines that are currently not capable of carrying 286,000-pound cars at normal speeds. Five of these lines are located on Class I railroads. These Class I railroads should be financially strong enough to upgrade these lines themselves. The other two ethanol plants are located on Class III railroads. If these two railroads are not financially strong enough to finance the upgrading of the lines to carry 286,000-pound cars from the efficiencies of heavier cars, one alternative method of financing the upgrading is for the shippers to loan the needed amounts to the railroads to upgrade the track and for the railroad to use the efficiencies of the upgraded track to repay the shippers for the loaned funds. While the 2017 Iowa State Rail Plan describes possible future railroad improvements and investments, the plan identified just a few projects that addressed the potential need to upgrade Iowa's branch lines (Iowa Department of Transportation 2017).

CONCLUSIONS

Most Iowa grain is now being delivered in farmer owned semi-trucks. The dominant markets for corn are now local ethanol plants, feed mills, corn processing plants, and swine and poultry feeders. U.S. grain exports have trended downward since 1979. Most existing Class I railroad companies are in strong financial condition. Therefore, it is unlikely that government programs are or will be needed to preserve branch rail lines in Iowa and other Corn Belt states. However, if exports become the major market for corn, and if Class II and III railroads are unable to finance the upgrading of their lines to carry 286,000-pound loaded cars, alternative sources of capital include:

- Shippers located on those lines could loan the needed funds to the railroads. The Class II and III railroads could then use the efficiency gains from the upgrading to repay the shippers per car shipped on the lines.
- The short lines could try to become part of a holding company.
- The short lines could be repurchased by Class I railroads.
- If none of these alternatives are possible, individual short lines should be evaluated to see if upgrading is economically sound. If so, state and or federal funds could be sought. Improved economic models should be developed so that no lines upgraded with government funds would likely be abandoned.
- If upgrading is uneconomic, the line should be considered for abandonment.

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