MAINTAINING A TRACK RECORD OF SUCCESS

EXPANDING RAIL INFRASTRUCTURE TO ACCOMMODATE GROWTH IN AGRICULTURE AND OTHER SECTORS

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EXECUTIVE SUMMARY

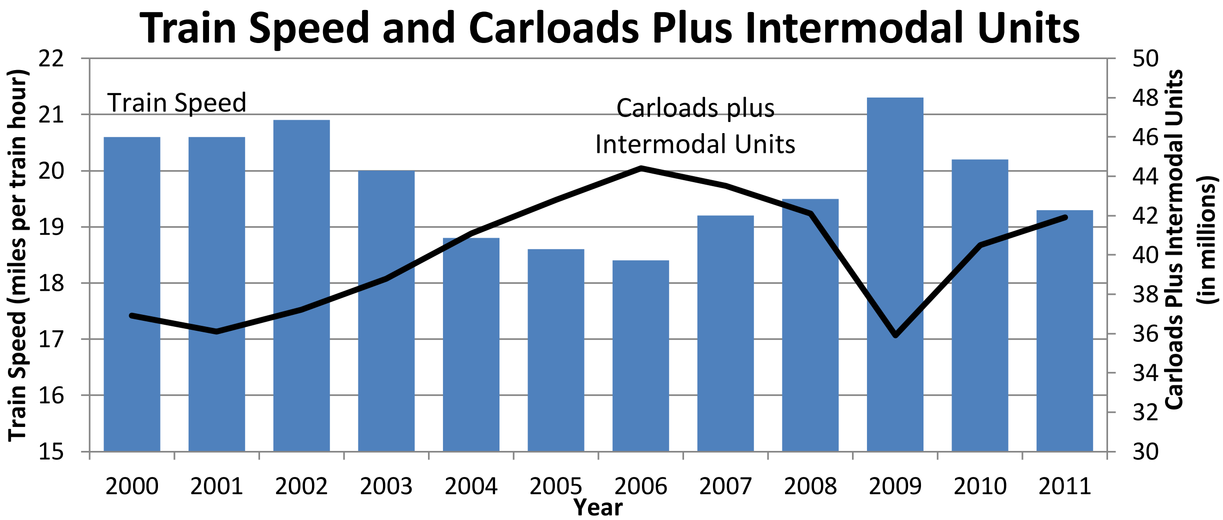
Freight-hauling infrastructure in the U.S. is a critical linkage in sustaining national economic growth and employment. For the soybean sector and U.S. agriculture, transportation linkages provide access to customers in urban areas and around the world. Each of the major modes in the U.S. – rail, truck and waterways – plays a significant role, but there are unique differences in the nature of each mode and the integration into the national economy that must be taken into account in evaluating future capital investment needs. Barges utilizing waterways tend to be very fuel efficient and the most cost-efficient per ton-mile of movement, but waterways by their physical nature are not available everywhere. Railroads also are more fuel efficient and cost effective than trucks where available, but accessibility can be an issue. Trucks are the most universally accessible mode, providing door-to-door service, but trucking is also the most expensive form of bulk transportation, and least fuel-efficient.

This study looks at the current national freight system and assesses its capacity to support economic growth in agriculture and the rest of the economy. As government funding supports highway building and maintenance and waterway infrastructure and dredging of rivers, an assessment is made of the potential impacts of government programs that could expand the rail sector's capacity to alleviate highway congestion and create a more efficient transportation platform for the national economy.

This study identified some important trends in U.S. transportation that are significant in understanding the opportunities for improving the U.S. transportation system:

- Gross Domestic Product (GDP) for the U.S. has grown 66% from 1990 through 2011, and has been paralleled by simultaneous growth in the rail sector of 68%. The relationship between rail and the economy may be shifting with changes in the rail commodity mix.
- Total vehicle miles traveled on highways began to decline in 2006, even prior to the recession of 2007-08. This is likely due to higher fuel costs, but may signal some gradual shifts in consumer social habits. Even with a dampened growth in vehicle miles, the annual cost of highway congestion is estimated at $101 billion annually.
- Rail and truck traffic carry the largest proportion of ton-miles of freight in the U.S., and since 1980 the rate of growth in trucking has exceeded that for rail. But the most recent data from the last decade show that this trend is shifting. Based upon current information, this study estimates that it is reasonable to expect rail traffic to grow faster than truck traffic in the future, possibly by 0.2% annually, leading to a modal share gain for rail, and replacing some truck traffic, provided that investments in rail infrastructure are adequate to support rail growth.

The U.S. rail freight industry has, since 1980, experienced over 20 years of reducing surplus capacity and re-engineering rail freight infrastructure to better serve customers. While rail volumes have been gradually building over time, growth has been relatively slow. But the U.S. economy began to grow more rapidly beginning in 2002 and created a spurt of growth in the rail sector from 2002 to 2006 that was very vigorous and for the first time tested the capacity of the rail sector. The figure below portrays what happened in this period. Carload and intermodal units both grew quickly causing average train speeds to decline, hampering rail efficiency. Simply adding more cars could not solve the rail system service capacity issue, as handling efficiency was being compromised in an effort to expand service quickly with existing infrastructure. A nationwide recession began in 2007-08 and rail traffic volumes bottomed out in 2009 to almost the same level as 2001. The recession "solved" the rail capacity crunch temporarily, but did nothing to correct the fundamental problem of a shortage of rail infrastructure to support vigorous economic growth.



Source: Association of American Railroads

During 2006-2010, a number of freight studies were released by government and the private sector that estimated the "investment gap" in rail and highway infrastructure that needed to be filled by private or public sector funding to avoid economic disruptions, and to serve a growing economy. In 2005, U.S. Department of Transportation (DOT) released numbers indicating that long-term growth (in total tonnage) in the rail sector was projected at 88% by 2035, or 2.3% compounded on an annual basis. In 2010, DOT released a forecast of long-term annual rail tonnage growth of 0.83%. Our study concludes that, based upon more recent data and using ton-miles as a measure of the growth in freight congestion, a more realistic assessment would project rail traffic demand growth at 2.05% going forward. This forecast is based upon:

- GDP projected to grow at 2.5%. If this occurs, rail traffic generally should lag GDP slightly at a 2.2% growth rate, but will also be affected by other major economic sector shifts for coal, oil and intermodal traffic.

- Shifts in the coal sector are expected to reduce domestic use, increase U.S. exports, and result in a 25% reduction in the base rate of growth for U.S. rail. This amounts to a 0.55% annual loss in the rail growth rate. (See following table.)

- Fracking and other developments in the oil industry are anticipated to add 0.15% to the annual growth rate in rail demand.

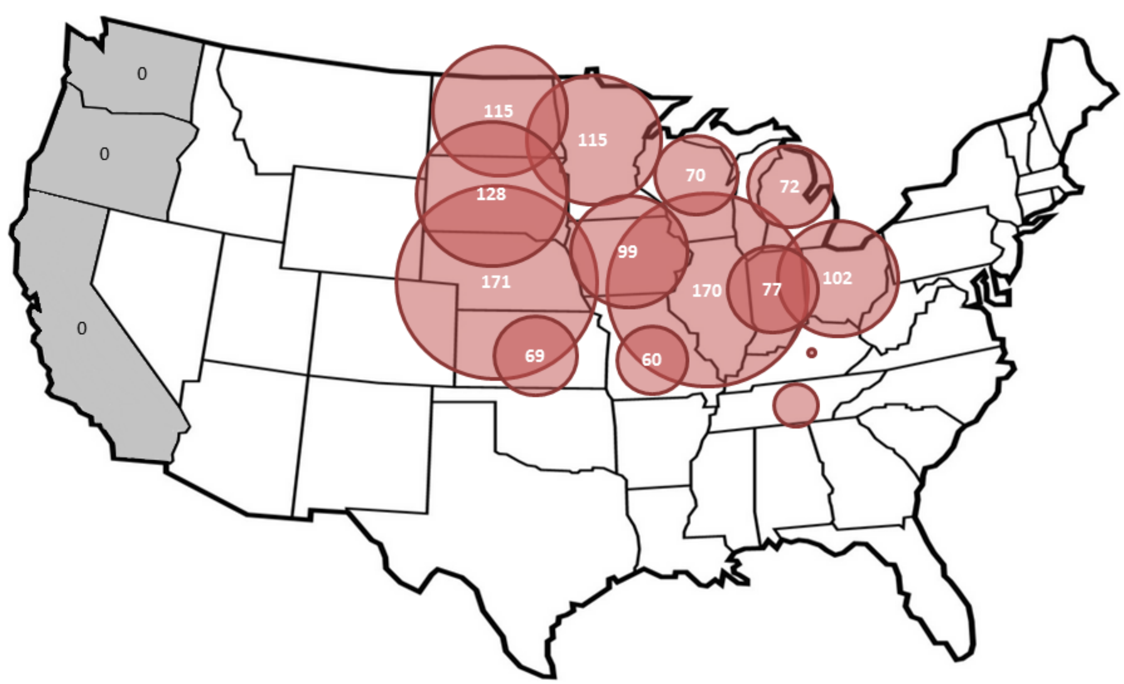
- Intermodal volumes are expected to grow 5% annually, double the rate of the GDP because of expanded trade, and a shift of truck movements to rail. This will add an expected 0.25% to rail freight growth for the future.

- Agricultural markets are expected to grow at a 2.05% rate overall (resulting in "0" net impact on the projected rate of net rail traffic growth—see table below); however, it is expected that rail's market share of ag commodities will increase from 30% to 35%.

Revised Annual Growth Rate for U.S. Freight Transportation to 2035	
Estimated base economic growth rate Based upon 2.5% GDP through 2035	2.2% per year
Reduction in growth rate due to coal industry changes	-0.55% per year
Increase in growth rate due to oil fracking/other increased rail	+0.15% per year
Intermodal growth: improved infrastructure/cost savings from truck	+0.25% per year
Agricultural markets: growth potential from exports/higher market share for rail, but no net effect on overall rail growth (ag growing at same rate as rail)	0.0% per year
Estimated Annual Economic Growth Rate, Total U.S. Rail Freight, to 2035	+2.05 per year

For the soybean sector, rail investments by railroads and shippers/receivers in the last 12-15 years have developed an industry that is moving more quantities by shuttle and unit train shipments at per bushel savings of $0.20 to $0.30. Soybean meal is increasingly moved in 100-car shipments. These trends will continue, although the declining soybean and corn yields of the past two years are of some concern to the commercial industry. New shuttle train facilities require investment costs of $20 million+, so there is considerable investment risk. Infrastructure benefits to soybean producers include more elevator and processor truck receiving capacity to better handle high volume periods and minimize wait time at harvest. More modern shipping capacity will happen, and could be further incentivized by government tax policy. The estimated average of soybean net state exports of the past 5 years for major producing states in the midwest, based upon ProExporter analysis, is pictured below.

17-State Net Exports of Soybeans,
Average of the last 5 years, 2008-2012, mil. bu.



Given the estimated gap in rail infrastructure to support economic growth and efficiency in the soybean sector, the study analyzes the financial investment incentives of the following government programs:

- Railroad Rehabilitation and Improvement Financing (Federal Railroad Administration)
- Investment Tax Credit of 25% and Accelerated Depreciation
- Accelerated Depreciation and "Bonus" Depreciation of 50%
- General Business Tax Rate Reduction of corporate rates from 35% to 25%

The conclusion is that the investment tax credit of 25% and accelerated depreciation yielded the most incentive for investment, generating a 21% decline in present value of the after-tax investment cost. It was assumed that this incentive would be adequate to close the gap in rail infrastructure funding and increase the rate of investment by the soybean marketing and processing industry to more rapidly capture efficiencies of improved rail cycle time for a greater proportion of the U.S. soybean industry.

The final analysis of the impacts of this policy on the U.S. and the soybean sector are shown in the following table. Annual cost to the government is $981 million in lost tax revenues (from lower depreciation and the investment tax credit). Specific gains to the U.S. soybean sector are estimated at $98 million with $57 million of this being a direct gain to U.S. soybean producers. Railroads gain from the investment subsidy, and also gain by market share shift from trucks. The total economic benefits to the U.S. are estimated at $2.296 billion annually after a five-year adjustment period to the new policy. The analysis does not provide for any multiplier effects of the jobs created in construction of the new infrastructure. U.S. Department of Commerce has estimated that for each $1 billion in new rail investment, an additional 20,000 jobs are created. The additional annual amount of new rail investment believed to be created by the tax incentive program is $1.5 billion (the amount of the estimated rail investment gap). This would be expected to create an additional 30,000 jobs that would exist during the building phase of the infrastructure.

Annual Impacts (After 5-year phase-in) of Investment Tax Credit/Accelerated Depreciation ($ millions)	
Annual Cost to Government in Lost Tax Revenues	$981
Annual Benefits to U.S. Soybean Sector ($57 million of this is producer benefit)	$98
Annual Benefits from General Rail Freight Reduction from Added Capacity	$635
Annual Gain, Market Shift from Truck to Rail (rate savings on marginal shift)	$268
Annual Benefit in Savings in Highway Maintenance and Construction	$700
Annual Gain from Reduced Highway Congestion	$595
TOTAL ANNUAL BENEFITS	$2,296

SECTION I. INTRODUCTION

The U.S. transportation sector – trucks and highways, railroads, and waterways – enable and support the functioning and growth of major sectors of the U.S. economy. U.S. agriculture and the soybean sector are highly dependent on rail transportation to reach many markets. The U.S. transport infrastructure has, for the most part, been an important strength of the American economy dating back to the turn of the century when railroads began hauling long-distance traffic and during the 1950s when the U.S. began building its vast interstate highway system. Transportation has been a vital component of the U.S.'s economic success story and fundamental reason the U.S. economy, representing 1/6 of global economic activity, remains highly competitive and a world leader in economic activity and development.

As U.S. population has expanded and the economy has grown, the U.S. highway system has developed points of congestion. Public funding of highways has struggled to keep pace with transportation demands and in some corridors demands for truck haulage and automobiles are creating long stretches of highway congestion. Congestion is more than an annoyance; it becomes a drain on economic resources by causing inefficiencies and additional expense. The rail sector for many years had excess capacity, although some rail yards were known bottlenecks for switching as necessary traffic exchanges took place. Following a number of structural changes in the rail sector – deregulation; consolidation; more privatization of rail equipment ownership – the growing transport demands of the national economy in 2005-2006 began to challenge the capacity of the U.S. rail system. Despite technologically advanced logistical systems and reliance on longer trains, cycle times of cars and dwell times in switching yards began to increase and peaked in 2006. Rail capacity began showing clear signs of strain to meet demand. The severe economic downturn in late 2007 and 2008 and slow growth of the economy through 2012 have masked any latent rail sector capacity issues, as rail freight volumes have not yet returned to the levels experienced at the peak of 2006. But as the GDP returns to more rapid and hopefully a more normal expansion rate of 2.5% or higher – which will be necessary to support healthy job growth – the rail freight demands will again approach 2006 levels and beyond, very likely causing greater need to grow freight capacity. As this study will show, the expansion of the U.S. oil sector, the recovery of intermodal freight which is already beginning to occur, and the shifting economics of the coal and oil industry will all force additional adjustments in rail investment strategies, in addition to the overall need for expanded rail capacity. So, capital needs for the rail sector are expected to intensify in the next few years.

Several recent studies have investigated the needed investments in both the national highway and U.S. rail infrastructure systems to serve a growing economy. Maintaining and building highways is funded largely through public sector dollars from federal and state governments, although the gas tax and highway tolls do bring in substantial revenues. Railroads are financially responsible for building and sustaining their own track bed and rail infrastructure. Seven Class I railroads (Class I railroads are those carriers exceeding $379 million in annual gross sales) and 500 short line and regional railroads in the U.S. make capital investments that, along with rail car owners and lessors, largely determine the capacity of the U.S. to move rail freight of all kinds.

The economic and societal benefits of rail movement of commodities with heavy tonnage are compelling. Rail uses about one-third of the fuel per ton-mile compared to trucks, and rail volumes can reduce road congestion and the need for highway investments caused by road damage. Economically, rail rates for long distance moves in agricultural commodities cost about 3.2 cents per ton-mile. This compares to 1.5 to 3 cents per ton-mile for barge movements, depending on season and river market conditions, but the commercial waterways are not able to compete geographically for all agricultural markets. And shipments by rail can move from the Midwest to Pacific Rim nations in as little as 18 days compared to 50 days by barge and ocean-going vessel. Comparatively, truck moves of grain currently cost about 15 cents per ton-mile for the first 25 miles, then 6 to 7 cents per ton-mile thereafter. From a cost standpoint, trucks are not favored for long-distance moves, but rail access can be problematic, sometimes pushing freight onto trucks, even though it is more costly. Short-line railroads provide rail access for about 40% of the grain and oilseed volume moved by rail (either at origin or at destination), and increasingly efficient rail loading points like unit train and shuttle shippers provide closer access to long-distance markets for producers trucking soybeans from their farming operation. As the preferred hauler of heavy cargo like grain, soybeans, fertilizer and coal, rail moves almost 50% of the ton-mile freight in the U.S. at a much lower cost than truck movements. Across all types of freight, truck costs average over 16 cents per ton-mile compared to less than 4 cents per ton-mile for rail.

The Staggers Rail Act of 1980 reduced the regulations that were hampering rail industry management flexibility, and gave the rail sector the opportunity to re-engineer itself into healthy, functioning businesses. From 1980 to 2000, the rail industry shed surplus capacity and made investments, such as high-speed infrastructure and intermodal transfer points, to better serve a diverse base of customers. Thus far, the U.S. rail industry has succeeded in a less-regulated environment and had a number of success stories with industrial development in various sectors. The question now is whether private sector investment incentives will be adequate to meet both private company and broad societal goals. If the rail industry cannot justify building and maintaining transport capacity to adequately serve the desired level of growth in the rest of the economy, there will be poor performance in job growth and general economic recovery. The fundamental economics of rail---movement of heavy tonnage at ¼ to ½ the cost available through truck transport—is compelling. Census transport flow data of 2007 show that rail transportation was used in 47% of the rail ton-miles of all commodities shipped in the U.S. The market is using rail because of its lower cost and logistics of long-distance and heavy load moves. If there are ways to expand the amount of additional tonnage moved at lower cost by rail, there are benefits achievable throughout the rest of the economy.

This study takes a fresh look at the potential growing "gap" in transportation infrastructure investment with particular focus on the rail sector. It looks at the possible growth path for the U.S. economy. What kinds of demands on rail transportation are most likely with more robust growth in U.S. gross domestic product (GDP). Will private investment in the rail system be adequate to support the expected GDP growth path? Regarding the soybean industry and related agricultural sectors, will the anticipated growth in agriculture have access to reliable, efficient rail transportation service to reach important domestic and international markets? Will the demands for rail freight from the general U.S. economy cause potential slowdowns in overall rail service that might adversely affect the soybean sector and its ability to access markets in a timely way? With the intense competition between the U.S. and South America as principal oilseed suppliers to global markets, U.S. soybean exports have become increasingly seasonal, with over 75% of total movements shipped in the first six months of the marketing year. Will rail capacity continue to be adequate to service this intense seasonal need for soybeans?

This study more closely examines the private investment decisions made by railroads and shippers/receivers that determine the rate of expansion and future capacity of the rail system. It considers options that may be available to the government and private industry to further incentivize the private sector to invest in rail infrastructure that will support a growing economy that is of great importance to both the private and public sectors. Does it make sense for the government to consider encouraging more investment in rail that could reduce the demands on highways for freight, help manage congestion, and possibly reduce the demands on public sector investment in highways?

The U.S. soybean industry is, as are many other parts of agriculture, highly dependent on a smoothly functioning transportation system to reach markets and maintain international competitiveness through cost-efficient systems. Rail, truck and barge modes all play important roles in bringing agriculture-based products to consumers and into international markets. The significance of trucking within local markets has taken on new importance for agriculture as biofuels have become a major source of demand. The growing strength of the movement of soybeans out the Pacific Northwest rail corridor has underscored the market links that rail provides. Yet, food and agriculture is but one of a large array of industries---coal, petroleum, autos, chemicals, consumer and many others---that share the rail capacity to move products and resources, and some of these sectors are in rapid transition today. The energy sector, in particular, is being altered fundamentally by the oil and gas fracking industry which will change overall rail movement volumes and the direction of transportation flows.

The changes that are occurring in the U.S. economy will create demand for needed directional changes in transportation investment. New infrastructure will need to be built to adjust to those changes. The question this study attempts to address is: What is the best pathway of investment to reach the economic goals of U.S. soybeans, grains-based agriculture and the rest of the economy? There will continue to be roles for both the private sector and the government. What is the optimal mix to achieve our national purposes of enhanced competitiveness, economic expansion and job growth?

SECTION II. CAPACITY AND UTILIZATION OF U.S. FREIGHT TRANSPORTATION AND INFRASTRUCTURE

(Note: This section reviews overall capacity measures of the U.S. freight transportation system and trends in capacity utilization. It looks at basic economic relations among the transportation modes and the links between growth in Gross Domestic Product and growth in freight usage. These relationships are important for future sections of this study as economic growth projections are linked to transportation demand. The major data sources for transportation data---Bureau of Census, Dept. of Transportation, Surface Transportation Board, and USDA, and the differences in methods of measurement---are examined to show how they may affect interpretations about transportation needs of soybeans and other agricultural sectors.)

A. Growth in Transportation Capacity and Relation to the U.S. Economy

As the U.S. economy has expanded and population has grown, the transportation system has expanded to both accommodate and encourage growth. Table I provides a current inventory of railroad, highway and inland waterway infrastructure and recent capacity utilization for the different freight modes. Both Class I and Class II (regional railroads) plus Class III (short line railroads) are broken out in Table 1. Class I rail mileage has been gradually declining and now stands at 95,700 miles compared to 43,000 miles of short-line and regional railroad track. The average Class I haul distance, at a length of 914 miles, is quite different from a typical short line haul of 32 miles. Regional railroads average about 180 miles per movement; and short lines average 25 miles. The total inventory of highway miles is 4.0 million miles with roughly 1 million miles in urban settings and 3 million miles classified as rural. There are 25,320 miles of navigable rivers in the U.S. available to barge traffic. Comparing the most recent data available, total annual rail tonnage hauled (including the short line industry) is 2.4 billion tons; trucks haul about 8.8 billion tons and waterways haul 0.523 billion tons.

Table 1. U.S. Transportation Infrastructure and Tonnage Hauled

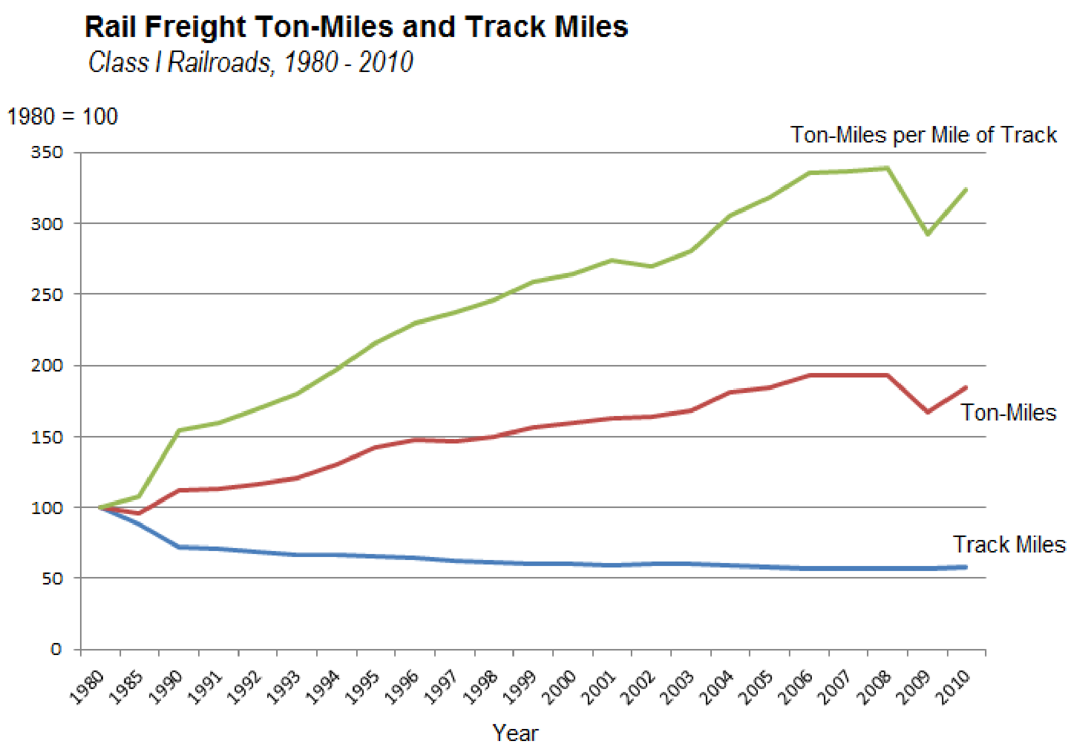
	Class I Railroads		Class II and III Railroads	
Number of Companies	7		558	
Miles of Track	95,700		43,000	
Annual Carloads Hauled (2010)	29.2 mil		7.8 mi	
Tonnage	1,851 mil tons		600 mil tons	
Ton-miles (2010)	1,691 bil		19 bil	
Average Length of Haul	914 mi		32 mi	
Locomotives	23,892		4,000	
Top Commodities Hauled (on the basis of total tonnage)	Coal	43%	Coal	15%
	Chemicals	10%	Food/Ag.	14%
	Farm Pr.	8%	Minerals	12%
	Mineral	8%	Chemicals	7%
	Food	6%	Steel/Metals	3%

Transportation Infrastructure Metric	Value
Highway Miles	4,016,000 mi
Urban Miles	1,029,000 mi
Rural Miles	2,987,000 mi
Truck Tonnage (2007 Census Data)	8,778 mil tons
Navigable Water Channels	25,320 mi
Inland Waterborne Freight Tonnage	532 mil tons

Source: U.S. Bureau of Economic Analysis, U.S. Bureau of Census.

Figure 1 shows the relationship between total miles of Class I rail lines[1], rail ton-miles, and ton-miles per mile of track. Ton-miles per mile of track have increased substantially since 1980, adding to traffic density. Class I rail mileage in the U.S. has declined by 43% since 1980, from 165,000 miles to 95,700 miles today. Much of this reduction in mileage came in the first 10 years since the passage of the Staggers Rail Act of 1980, which deregulated many business activities of rail carriers. While this is a significant reduction in track mileage, the infrastructure was not totally lost because thousands of miles of track were "spun off" to build short lines and regional railroads. Since 1980, when short lines owned 18,000 miles of track, track mileage has grown by 25,000 miles to a total of 43,000 currently.

Figure 1. Rail Freight Ton-Miles and Track Miles



While the Class I rail track infrastructure decline has been sizeable, the amount of goods hauled has increased as general economic growth in the U.S. has pushed volumes higher. The result has been that ton-miles of freight moved per mile of rail track have almost tripled in approximately 30 years. And the growth since the mid-1980s has been steadily upward until the most recent recession began in late 2007. As Figure 1 indicates, the economic recession has had a demonstrable negative effect on rail freight, particularly in 2009. From peak ton-miles of 1.777 trillion achieved in 2008, annual Class I ton-miles fell 13.8% in 2009. Freight began to recover in 2010 with rail ton-miles reaching 1.69 trillion and data for 2011 indicates further improvement.

Table 2 below demonstrates the strong relationship between rail ton-mile volumes and the national economy, in particular gross domestic product. From 1992 through 2000, GDP growth was consistently positive and averaged 3.8% annually. Average ton-miles shipped by rail increased at

[1]There are seven Class I railroads operating in the U.S.: Union Pacific, Burlington Northern Santa Fe, CSX, Norfolk Southern, Kansas City Southern, Canadian National and Canadian Pacific.

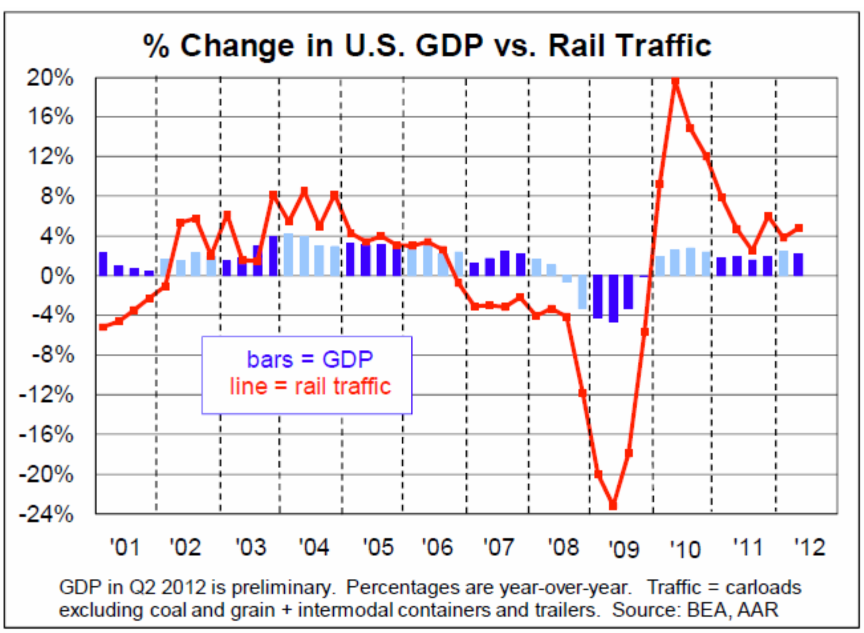
approximately the same rate. Following a slowdown in 2000-2001, the U.S. economy resumed growth through 2007 but at a more modest rate of 2.4% annually. In that period rail ton-miles also increased at a similar rate of 2.8% annually. In the most recent recession, followed by slow growth, 2008 to 2011, real GDP growth has averaged 0.3% above the peak in 2007 while rail ton-miles have averaged 7% below peak. This more dramatic decline in rail volume during this recent soft patch in the national economy is linked in part with the slowdown in coal shipments, but analysis by the AAR (see Figure 2) indicates that the negative consequences of slow or negative economic growth can be magnified in the rail economy. The rail traffic measured in Figure 2 contains all carloads, <u>except for</u> coal and grain. So the decline in rail from a weak economy appears to be broad-based throughout industrials, autos, chemicals and other sectors. However, long-term, rail volumes have been very closely related to GDP, as the bottom line in Table 2 reflects a strong parallel growth between GDP and rail ton-miles over the last 21 years.

Table 2. Rail Ton Miles and GDP – Recent Patterns

	Average Annual Change in GDP	Average Annual Change, Rail Ton-Miles
1992-2000 (strong economic growth)	3.8%	3.9%
2001-2007 (modest economic growth)	2.4%	2.8%
2008-2011 (near zero growth) (Average change in GDP and Rail Ton-Miles for 2009-11 compared to 2008)	0.3%	-7.1%
1990-2011: total 21-year growth	66%	68%

Source: U.S. Bureau of Economic Analysis and U.S. Bureau of Census.

Figure 2. Percent of Change in U.S. GDP vs. Rail Traffic



Source: U.S. Bureau of Economic Analysis, Association of American Railroads.

The growth in the freight rail sector since 1980 is a close parallel with growth in highway traffic shown in Figure 3. As Class I rail mileage declined since 1980, highway lane miles have increased, but very slowly. Over the course of 30 years, lane miles have increased 8.3%. Total vehicle miles traveled increased 94% over that period, while automobiles and pickup traffic grew 88%, and truck traffic expanded 164%. The near doubling of traffic per highway lane mile in the last 30 years has led to substantial increase in congestion, particularly near urban centers. The Texas Transportation Institute estimates that highway congestion added $100.9 billion to the cost of the national economy in 2010 and caused 1.94 billion gallons of fuel to be wasted.[2] There have been a number of recent studies advocating more sizeable investments in highways and roads to better manage and reduce the costs of highway congestion (these studies will be reviewed in a subsequent chapter of this report). As indicated in Figure 3, the economic decline in late 2007-08 appears to have impacted vehicle miles traveled on highways. The increasing cost of fuel may have also had an impact. However, some recent studies[3] have indicated that some of this slowdown in highway vehicle miles may also be related to U.S. demographics (a reduction in the percentage of licensed drivers within each age group) and social trends related to internet communications. In any event, one of the biggest contributors to highway traffic and congestion in the last 30 years has been truck freight traffic. Truck mileage is only 10% of total vehicle miles traveled on highways, but is probably responsible for 25 to 30% of congestion volume, based upon recent analytical work. If truck traffic continues to grow without some accommodation through construction of new highways and interchanges and/or methods to encourage the shifting of truck traffic to other modes, congestion will slow commercial deliveries and increase cost; and reduce the general quality of life as affected by automobile travel in the U.S.

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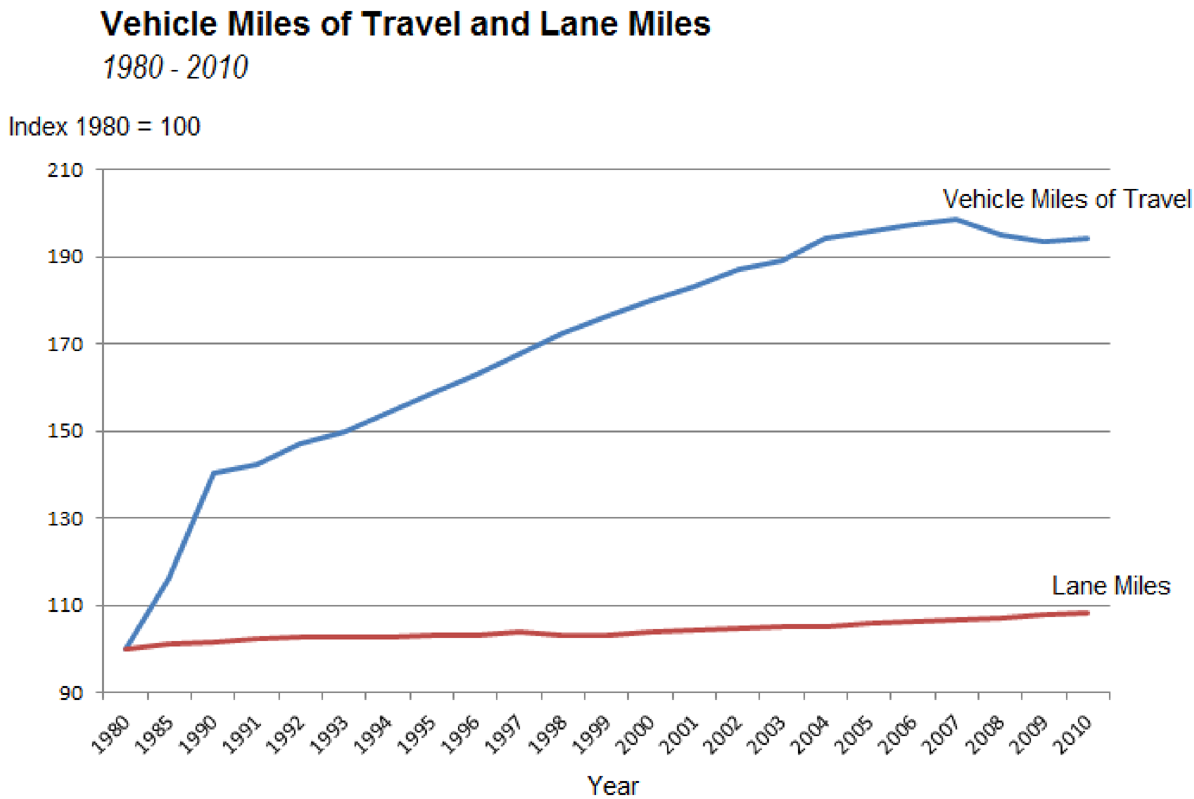
[2] TTI's 2011 Urban Mobility Report, Powered by INRIX Traffic Data. David Schrank, et al. Texas Transportation Institute. Texas A&M University System, September 2011.

[3] *"Seeing the Back of the Car,"* Briefing on the future of Driving, The Economist Magazine, September 22, 2012, pp. 29-32.

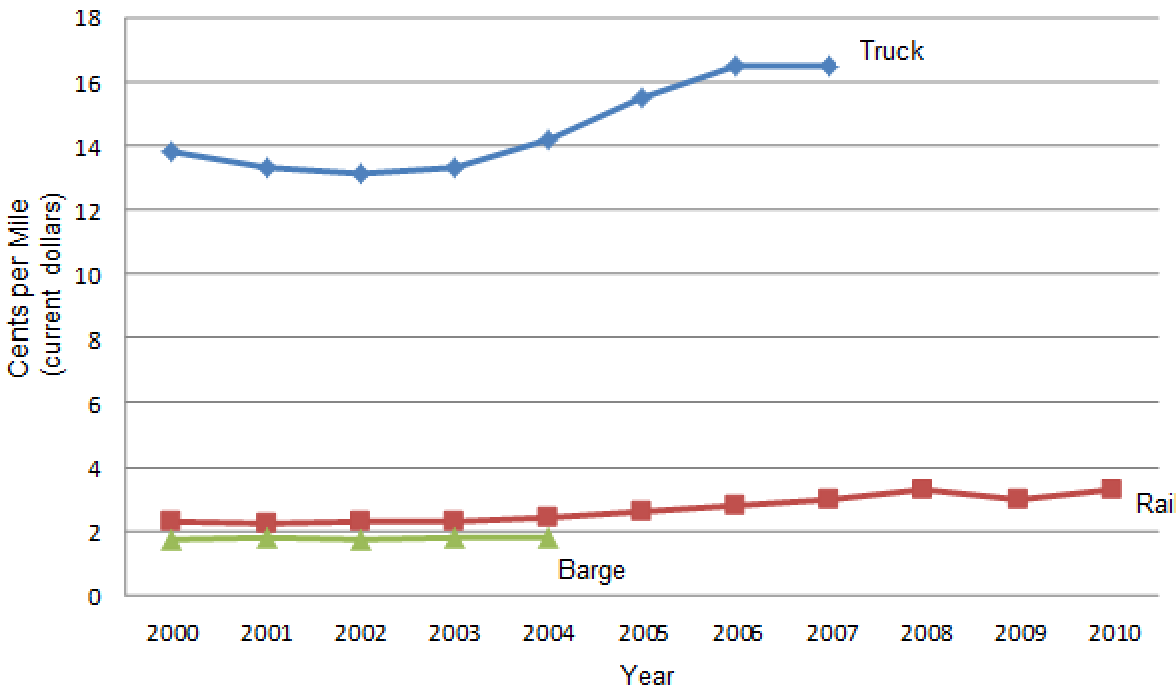
Figure 3. Vehicle Miles of Travel and Lane Miles



Source: Department of Transportation, Bureau of Transportation Statistics, National Transportation Statistics, 2012.

Freight-hauling infrastructure of all types – highways, rail track miles, and waterways – is critical to be able to sustain and promote economic growth. Each of the major modes – rail, truck and waterways – plays a significant role, but there are unique differences in the nature of each mode and the integration into the national economy that must be taken into account in evaluating future capital investments. Barges utilizing waterways tend to be very fuel efficient and the most cost-efficient per ton-mile of movement, but waterways by their nature are not available everywhere, and so accessibility can be limited. Railroads also are more fuel efficient and cost efficient than trucks. On a ton-mile basis, trucks are the most expensive freight mode, but trucks can originate and deliver freight to almost any location. Figure 4 compares the cost of truck, rail and barge on an average ton-mile basis, as reported by the U.S. Department of Transportation. (More recent cost comparison data between the three modes for soybeans and grain transportation is contained in Section VII.) The historic truck and barge rate computations were discontinued by Dept. of Transportation in the mid-2000 decade, but the cost relationships remain about the same. Average rail ton-mile rates are about 25% higher than barge rates (relationship of these rates tend to be seasonal), but rail freight cost is substantially below truck ton-mile rates.

Figure 4. Average Freight Revenue per Ton Mile, 2000-2010



Source: Department of Transportation, Bureau of Transportation Statistics.

Rail and barge have advantages over truck movements, other than simply cost. In a 2009 study, the Texas Transportation Institute compared the various modes for hauling efficiency, fuel efficiency, and greenhouse gas emissions. A summary of those findings are in Table 3. This table demonstrates that to the extent that freight transportation movements can be shifted from truck to either rail or barge, there are economic benefits, highway congestion benefits, fuel efficiency savings and environmental benefits from lower greenhouse gas emissions. Freight train and barge movements can assist in reducing highway traffic, reduce national fuel consumption, and contribute fewer fuel-related emissions in freight transport. Barge and rail movements will never be able to match the convenience of door-to-door trucking, but more efficient freight transfers between modes through intermodal and other transfer facilities that will permit a maximum of tonnage to be hauled by rail and barge can have substantial economic and other societal benefits.

Table 3. **Comparison of Modal Efficiencies and Performance**

	Truck	Rail	Barge
Cost per ton-mile (DOT) (cents/ton-mile, 2004)	14.24	2.35	1.83
Managing Congestion (Equivalent Cargo Capacities across modes)	1,050 Trucks	2 Unit Trains	15 Barge Tow
Fuel Efficiency (ton-miles per gallon)	155	413	576
Greenhouse Gas Emissions (GHG) (tons of GHG per million ton-miles)	72	27	19

Source: A Modal Comparison of Domestic Freight Transportation Effects on the General Public, December 2007, amended 2009, Texas Transportation Institute.

B. Freight: The Mix of Commodities, Goods, and Products Being Hauled by Railroads, Trucks, and Waterborne Carriers

(There are several sources for data used for U.S. freight transportation which will be referenced in this study. Definitions of data series will vary from source to source. The most important data sources are: 1) Bureau of Census Commodity Flow Survey conducted 1997, 2002, 2007, and 2012 (not yet available); 2) Department of Transportation's Freight Analysis Framework (FAF) which uses Census data as a base dataset and extends the data through analysis to provide extrapolated transport data each year, and makes other data adjustments; 3) Surface Transportation Board waybill sample that is collected from the rail carriers on a continuous basis; 4) Association of American Railroads that collects additional railroad financial and performance data; 5) U.S. Department of Transportation that reports highway investments, inventories of highway, waterway, rail and truck transport conveyance data; 6) U.S. Department of Agriculture that reports rail, truck and barge annual transport of major grains and oilseeds; and 7) Army Corps of Engineers (ACE) that reports inland waterway movements of commodities. Data from Census Bureau and DOT FAF are both reported in SCTG (Standard Classification of Transported Goods) format which groups commodities into cereal grains (02 SCTG) and other ag commodities (03 SCTG). The ag commodities (03) combines soybeans, other oilseeds and other products; some USDA, ACE, STB and AAR data report on a specific commodity basis, e.g., soybeans, corn, and wheat.

Table 4 provides a snapshot of the most recent U.S. Census Data collection years of 2002 and 2007. For the total economy, truck movements are a dominant portion of total ton movements, but rail becomes much more significant in measuring transportation in ton-miles. Heavier movements and longer mileage movements tend to gravitate toward rail because of the relative cost compared to truck. Total ton-mile movements reported for truck and rail are evenly split between the two modes for both 2002 and 2007.

Table 4. Total Flows of Commodity and Goods, U.S., 2002 and 2007, U.S. Bureau of Census

	TONS (mil tons)		**TON MILES** (bil ton miles)	
	2002	**2007**	**2002**	**2007**
Total Movements	11,668	12,543	3,138	3,345
Single Mode Movements				
Truck	7,843	8,779	1,256	1,342
Rail	1,874	1,861	1,261	1,344
Waterway (shallow, deep)	681	404	283	157
Multi-Mode Movements				
Truck/Rail	43	226	46	197
Truck/Water	23	145	32	98
Rail/Water	105	55	115	47
All Other/Unknown	1,099	1,073	145	160

Agriculture-Related Shipments – Volumes, All Modes, (mil tons)				
Cereal Grains (02)	561	514	264	203
Ag Products (03) (incl. soybeans)	259	212	109	88
Animal Feeds/Proteins (04)	228	246	51	76
Milled Grain Products (06)	109	120	49	51
Other Foodstuffs/Oils (07)	449	468	162	171
Total Agriculture Related Rail Shipment Volumes	1,606 (14%)	1,560 (12%)	635 (20%)	589 (18%)

Other Non-Ag Products, All Modes, in Order of Volume, 2007	
Coal	(25%)
Chem/plastics/rubber	(10%)
Sand/gravel	(7%)
Metals/machines	(6%)
Petroleum/products	(5%)
Wood products	(3%)
Fertilizer	(2%)

Source: U.S. Bureau of Census and Dept. of Transportation.

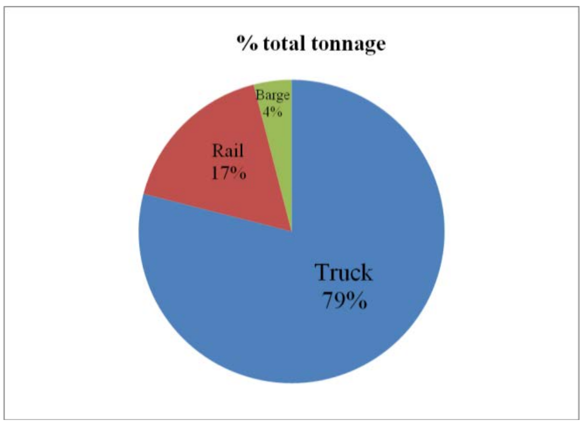
In the middle section of Table 4 are shown the total shipment tons and ton-miles for five census categories that comprise agricultural and food-related products. Soybean movements are contained in the "Ag Products" (03) category, listed separately from "Cereal Grains." Soybeans make-up 40-50% of this category. For major soybean producing states, the percentage of soybeans is much higher. Overall, ag and food related product movements comprise 12-14% of U.S. tonnage moved and 18-20% of transportation ton-miles on a national basis.

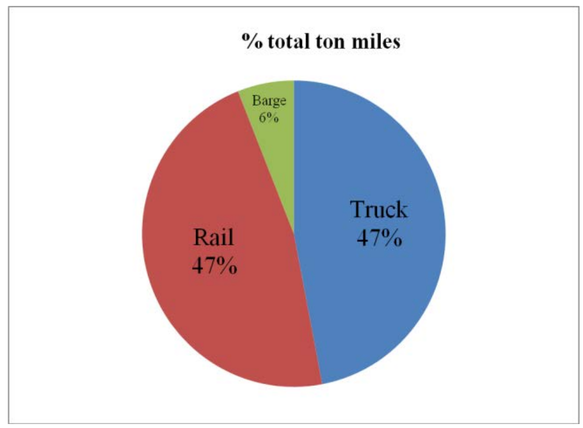
Some important considerations in reviewing the data in Table 4 are: 1) Census data may not be reliable in measuring the multi-mode movements of commodities. Notice that there are huge data swings in reported multi-mode movements between 2002 and 2007; for this reason, in the remainder of this document, we focus on the single-mode measurements from Census and use other data sets to complement the analysis; and 2) Truck movements in Census data do not include truck shipments from farm to elevator or other commercial facility. But, DOT's FAF data does reflect all estimated truck movements of commodities, including movements from field to farm bin and farm to market.

Figures 5 and 6 compare modal share data for both tons and ton-miles for 2007 for U.S. Census Data and for DOT's FAF (Freight Analysis Framework) Data. Figure 5 shows Census and FAF data for all commodities in the U.S. economy. Figure 6 presents similar data, but only for the narrow portion of the agricultural economy, Cereal Grains (02) and Ag Products (03), which includes soybeans as a major component.

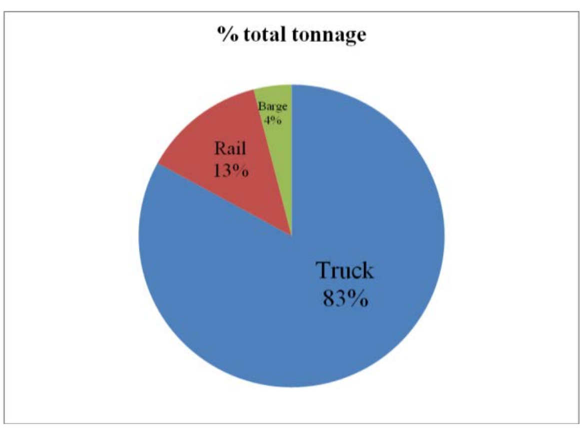
Figure 5. Modal Share Data, All Commodities, 2007, Census and DOT FAF Data

U.S. Census Data





DOT FAF Data



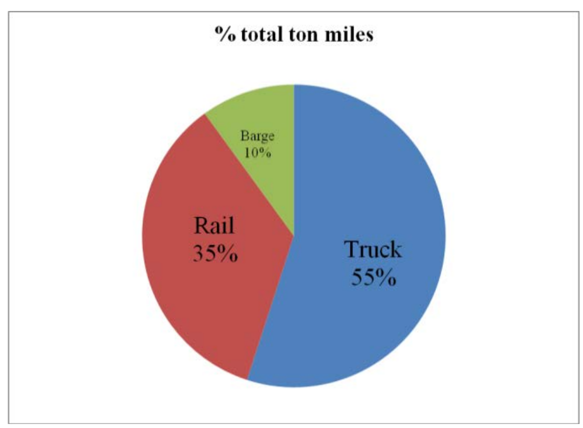
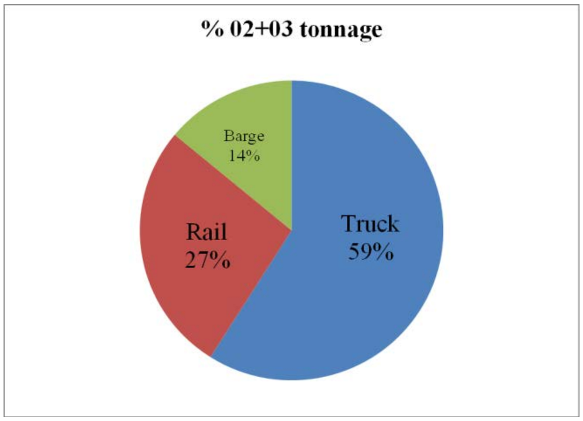


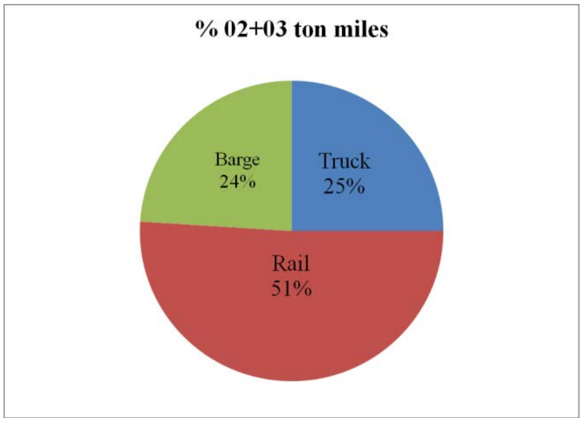
Figure 5 shows how much truck transportation dominates the gross tonnage movements of all commodities in the U.S. Comparing the DOT FAF data to the U.S. Census, truck becomes even more important. The two major differences in these data are that: 1) FAF data uses the Census data as a base, but also includes computations from Waterborne Commerce data (Army Corps of Engineers) and Rail Waybill sample from the Surface Transportation Board; FAF adjusts these reported data series for double-counting of loads; and 2) FAF counts each commodity move during the year, such as grain from farm to grain elevator, which then moves from elevator to terminal, export or processor. And each of these moves is counted as part of the totals. Rail ton-miles represent 47% of reported moves in Census data and 35% of total movements in FAF data.

Figure 6 shows modal share for Cereal Grains and Ag Products. Census data reflect a stronger modal share percentage for both rail and water than does FAF. Census data suggest 51% of total ton-miles are moving by rail and 24% by barge. The DOT FAF data are remarkably different from Census numbers, but do reflect the additional counting of farm truck movements to farm bins (if harvested commodities are first stored on the farm), then the additional truck movements to the first point of sale in the commercial marketing channels.

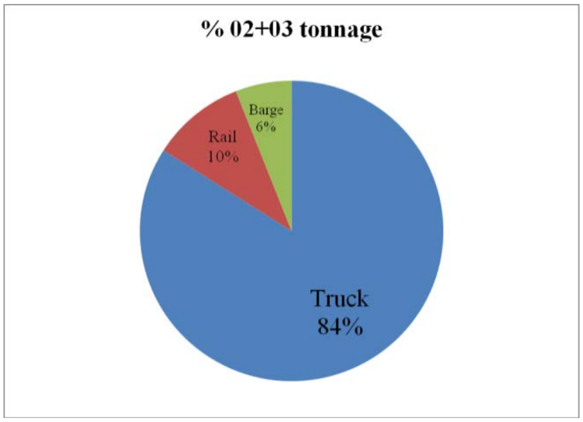
Figure 6. Modal Share Data, Cereal Grains (02) and Ag Products (03), 2007, Census and DOT FAF Data

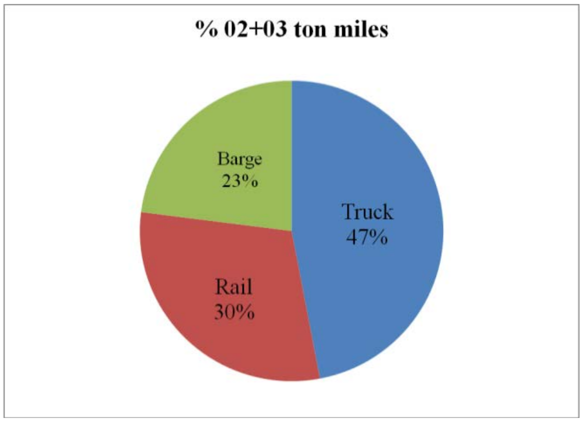
U.S. Census Data





DOT FAF Data





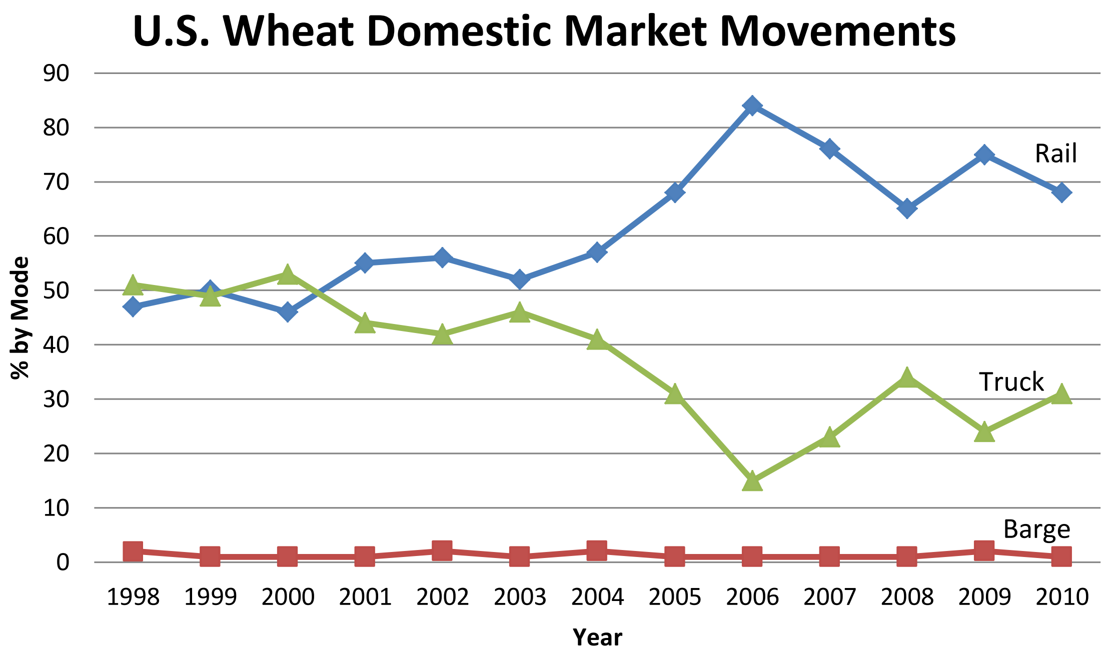
<u>USDA</u> data on soybean and grain movements is different from both Census and DOT-FAF data and is derived from waterborne commerce data gathered by the Army Corps of Engineers, export inspection data provided by AMS-USDA, and STB Waybill samples for rail movements. Truck shipments in USDA data are derived as a residual of other modes. And, importantly, USDA data (in contrast to DOT FAF data) generally <u>do not</u> count commercial “truck-to-rail or truck-to-barge” movements as “truck” movements. The truck movements reported in USDA data are mostly elevator truck shipments to processors/export locations or farmer deliveries direct to processing/feeding/other end users. While

the truck data in USDA statistics is a residual, and therefore has limitations as to how it can be interpreted, the consistency in the reporting format for USDA data and its long history of reporting make it very valuable for tracking trends in the U.S. agricultural sector, and tracing how structural market changes (such as the boom in biofuels) are affecting the transport marketplace.

Figure 7 shows U.S. wheat domestic market and export market modal shares. The wheat export market has traditionally been dominated by rail as Midwestern wheat is railed to Texas ports and northern tier states rail much of export wheat out of the Pacific Northwest ports. But even domestic wheat movements by rail are growing in proportion to other modes as wheat is being shipped longer distances to domestic milling locations that tend to be higher volume flour millers. Figure 8 shows modal shares for corn, and domestic movements of trucked corn have expanded from roughly 65% to 80% in 12 years. Virtually all this growth is due to the rapid expansion of ethanol capacity in locations where trucking corn is the least-cost option. The rail portion of corn exports have also grown from about 27% to 40% during the same period.

Corn transport movements shown in Figure 8 are trending toward heavier use of rail in the export market, but much heavier use of trucks in the domestic market. It is difficult to conceive the enormous impact that the growth in the ethanol use of corn has had on this market. The ethanol industry has expanded by about 7-fold in the last 8 years and now consumes roughly 5 billion bushels of corn, virtually of all of which is delivered directly to ethanol plants by truck (the exceptions are a few ethanol plants in Arizona, California and West Texas). So, more than 1/3 of the U.S. corn crop--- about 25% of U.S. grains and oilseeds volume--- moves by truck to ethanol manufacturers. With this change in corn utilization patterns, railroads have picked up additional shipment volume in ethanol, as the majority of ethanol movements are railed; and DDG movements, of which railroads ship 20-30%. This new development in industrial agriculture seems to be leveling off, but not likely to decrease much in size, unless dramatic policy shifts were to occur or energy economics change substantially. But this episode in agriculture does demonstrate one important fact---how rapidly transportation infrastructure changes can take place. Hundreds of new facilities were built in just a few years, including new infrastructure, upgraded infrastructure for rail bridges and heavier track, to accommodate the new ethanol-related growth----to handle a shift of 25% of the total output of grain/oilseeds-base agriculture. From the USDA data, the modal share for trucked corn seems to be the major beneficiary of this structural change, but the associated changes in product and by-product markets have created other transportation challenges of great significance to U.S. agriculture and the rail and barge industries.

Figure 7. **U.S. Wheat Market: Modal Shares of Domestic and Export Movements**



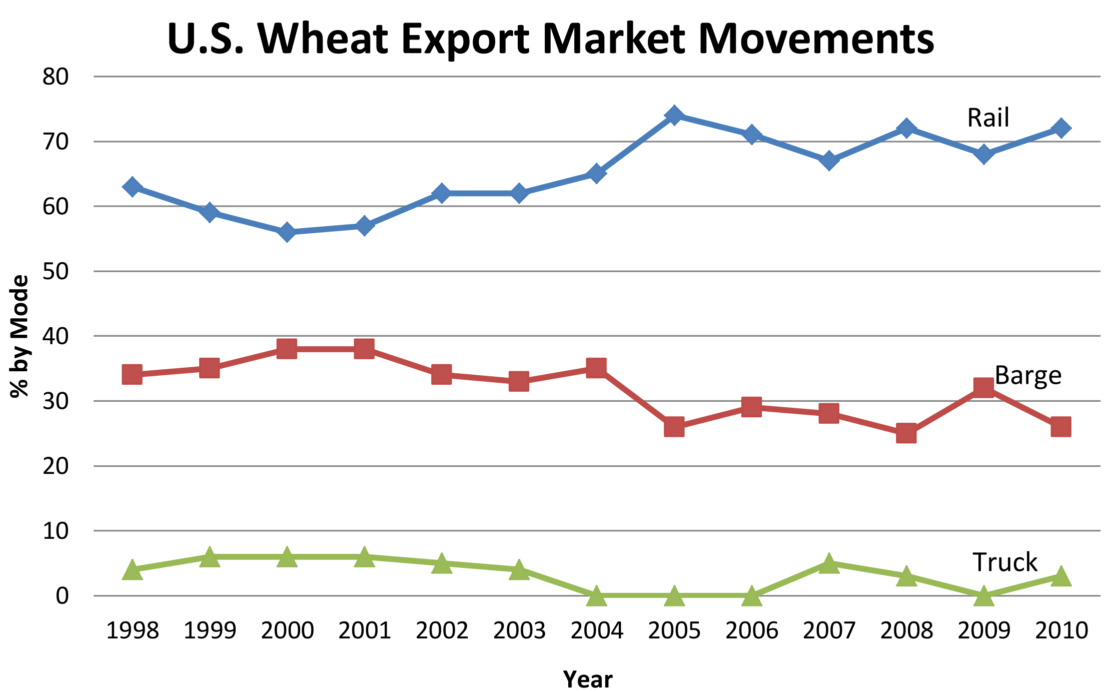
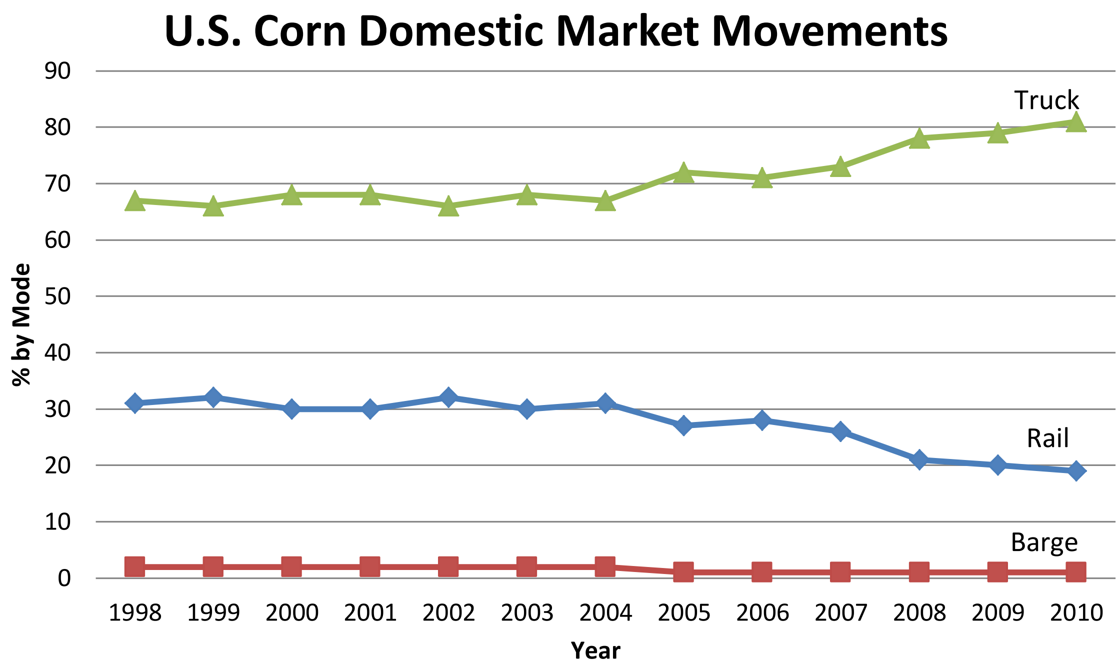


Figure 8. U.S. Corn Market: Modal Shares of Domestic and Export Movements



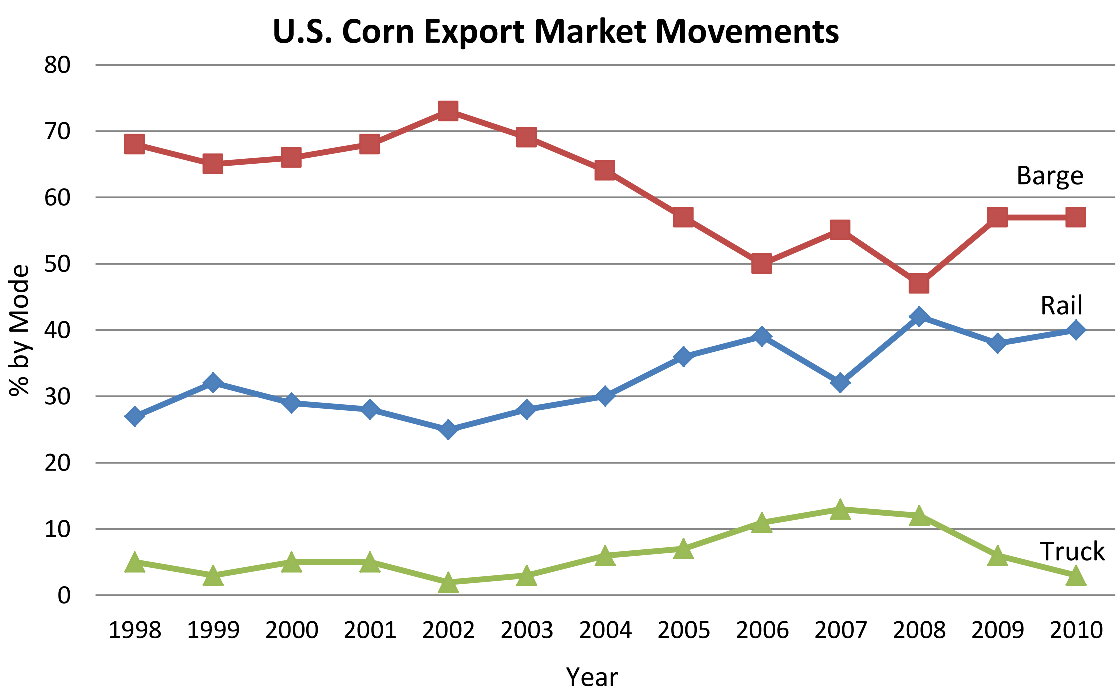
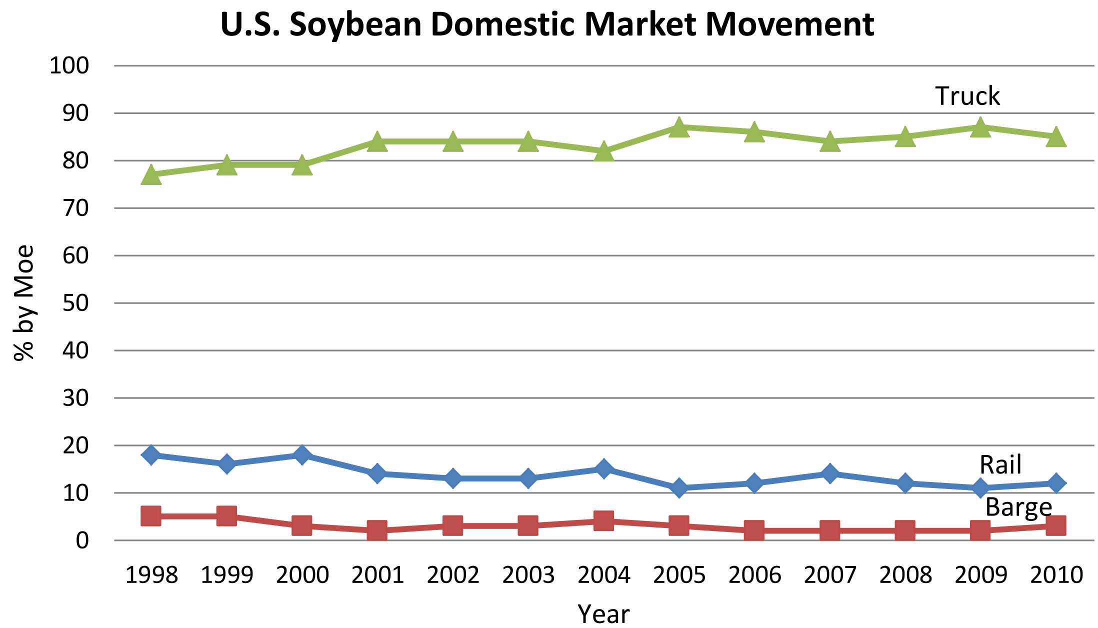


Figure 9. U.S. Soybean Market: Modal Shares of Domestic and Export Movements



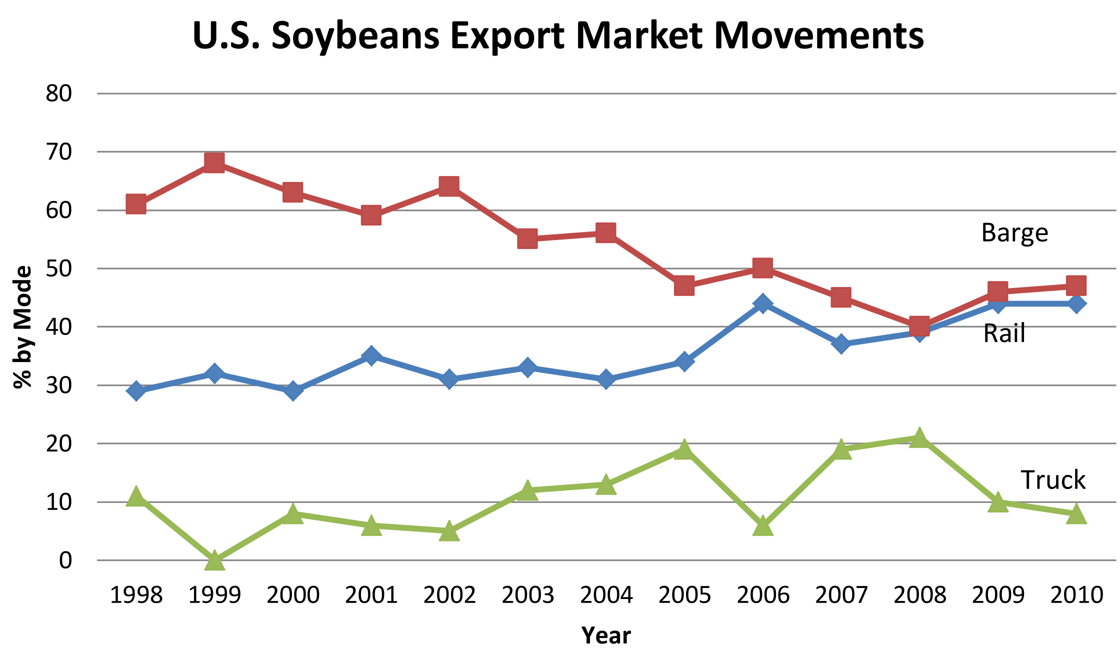
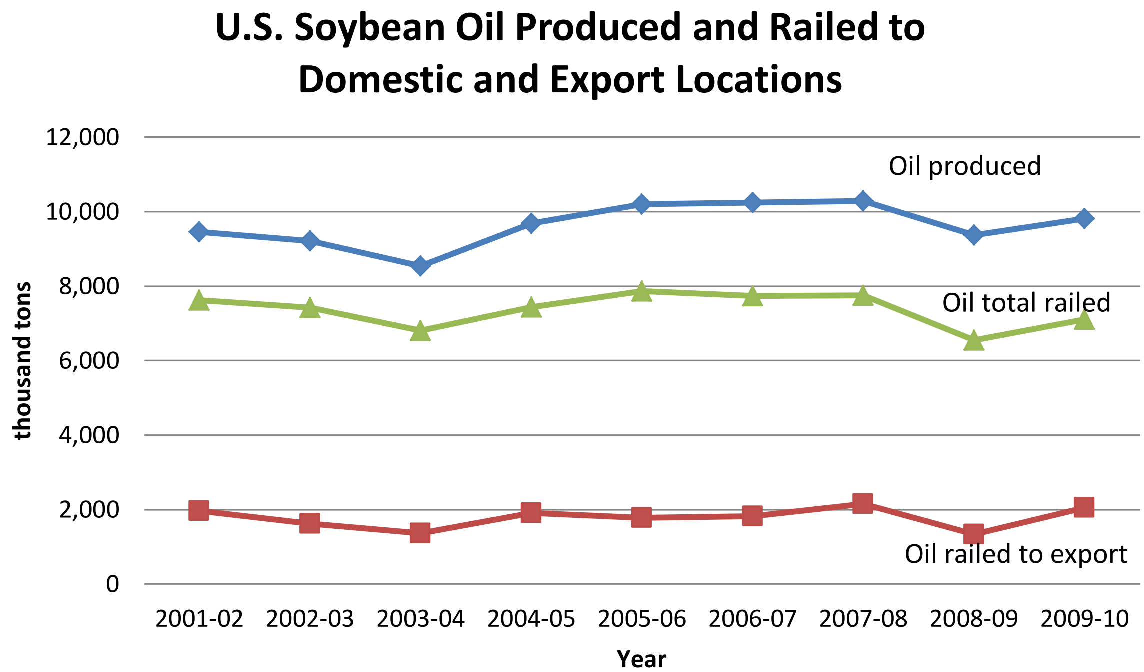
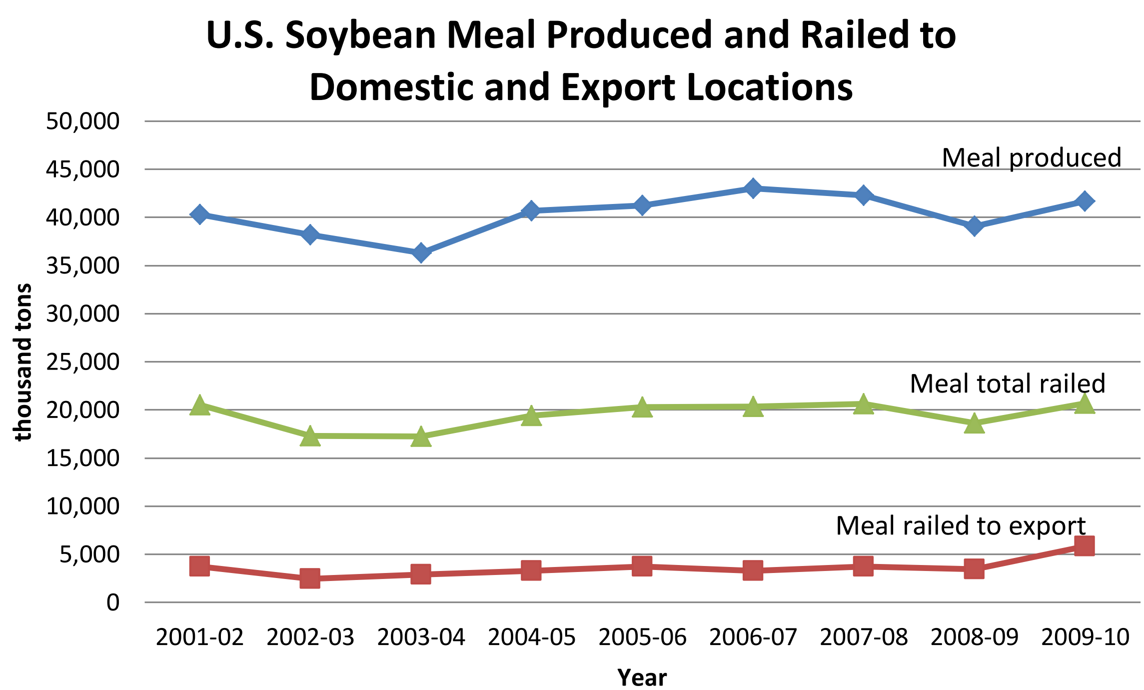


Figure 10. U.S. Soybean Meal Produced and Railed to Domestic and Export Locations



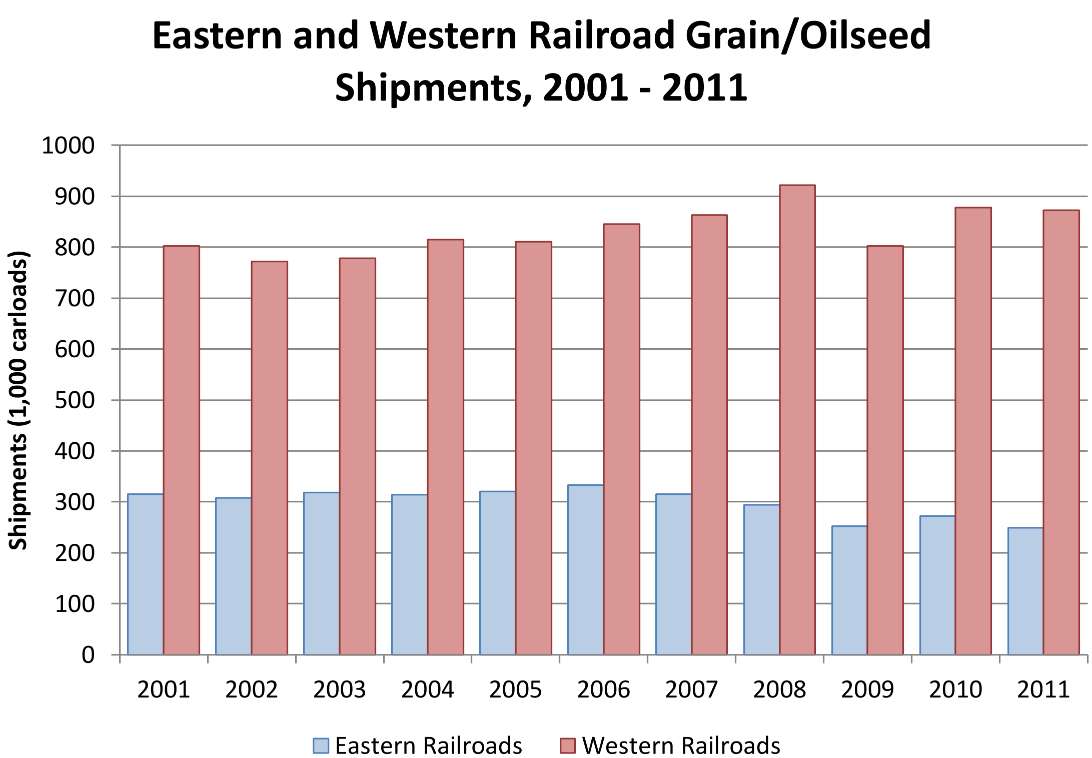


Source: Farm to Market---A Soybean's Journey from Field to Consumer, Informa Economics report July 2012 to USB, USSEC, and STC.

Figure 9 for soybeans shows a slight decline in railed domestic market soybeans, a trend that has led to a gradual upward trend in trucked soybeans. During this period of time, some short line movements of soybeans to plants have been replaced by truck shipments, particularly in the eastern U.S. Export soybeans have seen the rail share of total shipments increase from about 30% to 44%. This reflects a growing use of PNW ports to export soybeans to China and Pac-Rim countries. While the rail mode is of growing importance to whole soybeans, it is even more dominant in the movement of soybean products. As reflected in Figure 10, Rail moves about 50% of all soybean meal shipments within the U.S. market and into export channels. And, between 70% and 80% of all soybean oil movements are made on rail.

Of some interest also for rail transportation are trends in regional movements, east and west. Figure 10 looks at the last eleven years, after the last large merger in which CN acquired the Illinois Central, leaving two large Class Is in the East and three in the West. These data exclude the Canadian-based Canadian Pacific and Canadian National. While many factors have influenced the slight downward trend in the east and an upward trend in the west, much of the impact has come from corn and soybean acreage expansion in the west, strength in market demand growth from Mexico and Pacific Rim countries, and trucks going into ethanol markets taking away some of the shipping volume that would otherwise go to rail.

Figure 11. Eastern and Western Railroad Grain/Oilseed Shipments, 2001 - 2011



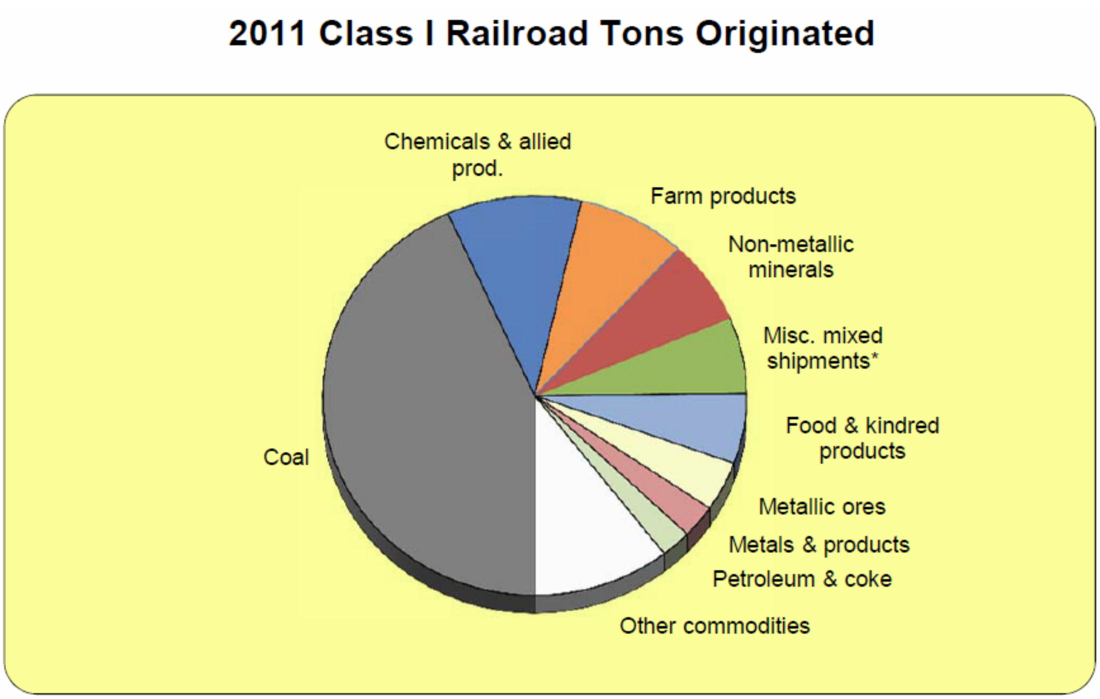
Section III. Capacity Limits Being Reached in Rail & The Investment Gap

(Note: This section identifies the pattern in rail rates and traffic density on railroads measured by traffic speed plus projections from DOT as clear signs of capacity problems in the rail and highway sectors of the national economy. A thorough literature search is conducted to look at past research projecting investment gaps for rail and highway, and importantly, the results of these studies are reported in a format to make them directly comparable. The studies reflect a huge shift, from 2006 to 2010, in the thinking of the Department of Transportation for future freight demand. Some important conclusions are that there is a high likelihood that railroads are in a good position to pick up freight market share from trucking in the future (a reversal of past trends) and that in measuring future freight capacity needs, the U.S. should focus more on ton-miles than gross tonnage, because it is a better measure of capacity and potential for worsening congestion.)

A. Signs of Railroad Capacity Being Reached

As important as rail transportation is to agriculture and the food business, rail has a very diverse customer base throughout U.S. industries. The current mix of rail freight customers is shown in Figure 12. While coal remains a significant portion of the customer base (about 40% on a ton-volume basis), the rail industry is diversified among a wide variety of physical commodities.

Figure 12. Class I Railroad Tons Originated

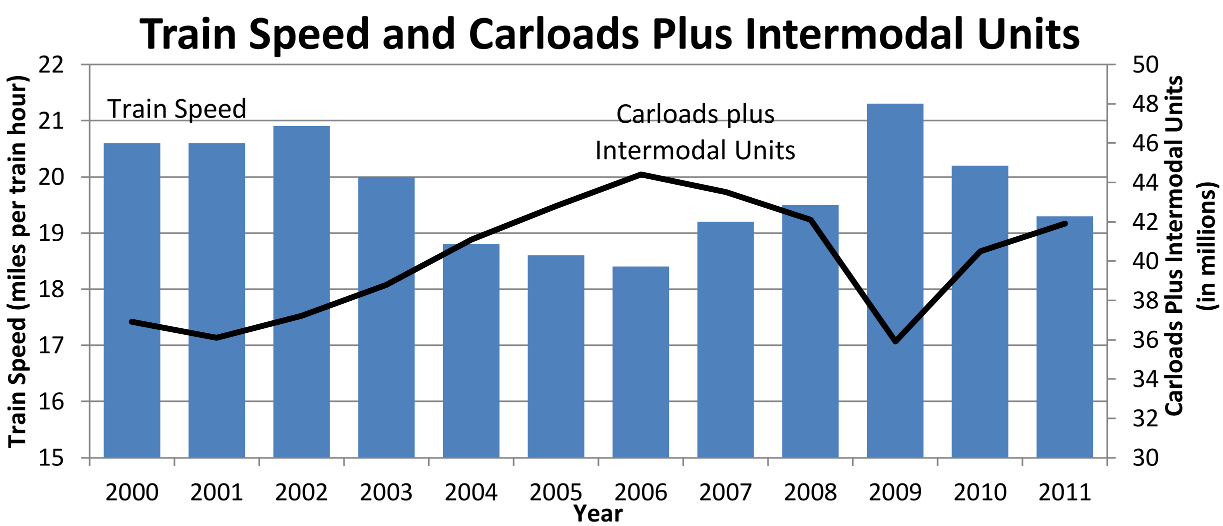


Source: Association of American Railroads

Because of this business diversification for the rail industry among industry customers that are sensitive to consumer buying and business cycles, rail industry volumes tend to closely track the ups and downs of the general business cycle in the U.S. When GDP of the U.S. rises, so does rail volume, and as the U.S. experienced a 15-year period of uninterrupted real GDP growth from 1992 through 2006, the rail industry reached a zenith of volume in its modern history. When that happened, there were some clear signs of strain on U.S. rail capacity.

In 2005-2007, at the peak of the business cycle for rail, there was a noticeable slowdown in train speed, as reflected in Figure 13. Total carloads plus intermodal units peaked at 44.4 million in 2006, a 20 percent rise in rail traffic volume in 6 years. Train speed picked up again by 2009 as traffic volumes fell back to 35.9 million units.

Figure 13. Train Speed and Carloads Plus Intermodal Units



Source: Association of American Railroads

There were other signs of capacity constraint in the rail rate structure. Figure 14 shows that after a long-term continuous decline in real rail rates, rates began to firm up, beginning in 2005. The long-term decline in rail rates was the result of the rail industry becoming more cost-efficient, reducing excess capacity and focusing more on longer train movements to improve efficiency and cycle times.

Figure 14. Average Rail Rates Across All Commodities, Deflated

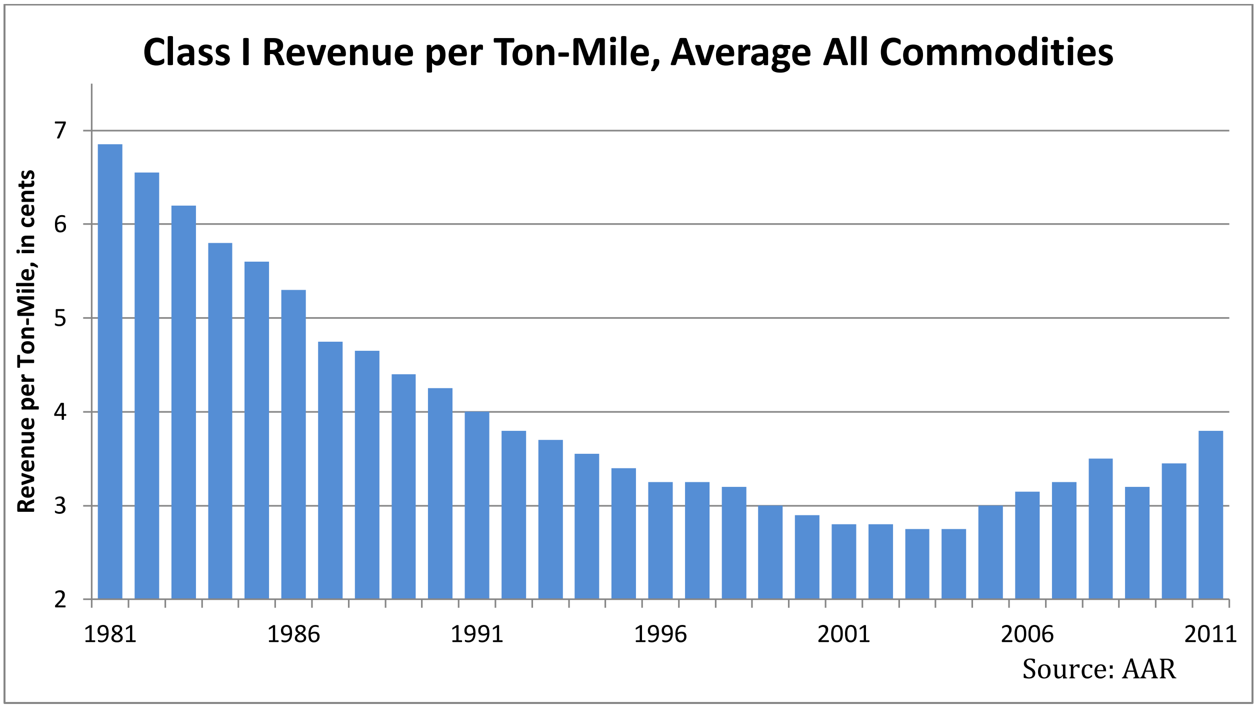


Figure 15 indicates individual rail rates across various sectors---agriculture, coal, chemicals and paper---and demonstrates that the pattern in rates tends to be repeated across various sectors. Rail rates, after two decades of decline, began to increase and rail profitability started to improve when the rate decline leveled out. Rail profitability and willingness to re-invest in capacity are highly correlated in the private rail industry. The rail rates for various commodities reflect both markets and cost of providing rail service. Coal movements are virtually all unit train moves between two points, and are therefore, relatively low rates. Ag shipments are increasing the percentage of tonnage moving by cycling trains from point to point with shuttle operations similar to coal, but single car movements continue in many areas of agriculture, and will likely continue to be part of ag volume, because of the nature of the agriculture sector (decentralized by geography and diversified by food industry, industrial, and export sectors). So soybean and grain movements tend to require more management service from rail than the coal business, with concomitant relatively higher rates.

Figure 15. Railroad Rates Across Individual Commodity Sectors, Deflated

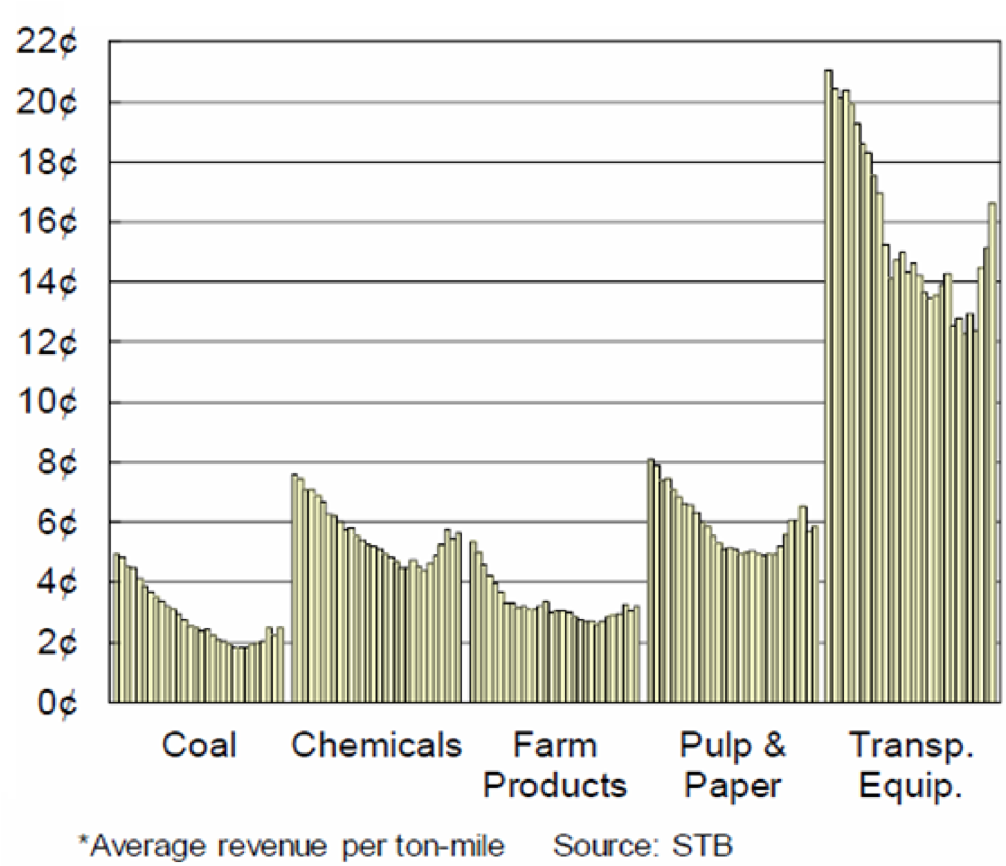
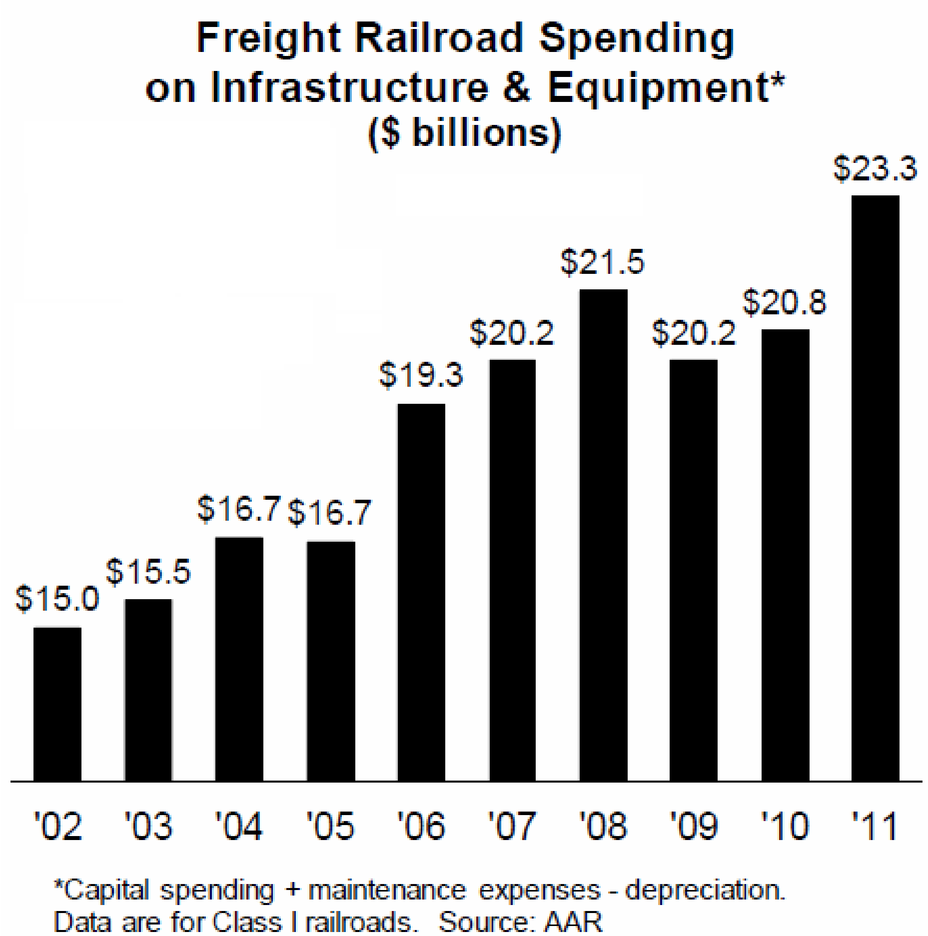


Figure 16 shows that when the capacity shortage occurred the rail industry responded to this need for renewed capacity investment in 2006-2008, as the rate of capital expenditures in the industry began to accelerate. The expansion in capital expenditures was due to two factors: 1) growth in the rail business and the need to resolve some logistical constraints that were impeding expansion to match the growth in customers' businesses; and 2) improved earnings from more carloads and higher per carload revenues. While the improved earnings for railroads continue, as do the higher level of investments in capital spending, the question for the industry remains: <u>When the U.S. economy begins to grow at higher levels, like those experienced in 2002-2006, will the private investment be adequate to avoid rail slowdowns in performance</u>?

Figure 16. Freight Railroad Spending on Infrastructure and Equipment



How do you measure U.S. rail capacity? Rail capacity is determined by a number of factors: 1) locomotive availability; 2) car availability; 3) number of trained employees; 4) infrastructure capacity; 5) logistics systems operational efficiencies; and 6) external factors, such as weather, strikes, congestion at ports. Train speeds had declined previously in the late 1990s, but some of those slowdowns were attributed to the complexities of implementing some major mergers among various Class I carriers that slowed the performance of individual carriers temporarily. The slowdown in 2006 was very different from that. There was not a shortage of power or labor; and there were plenty of rail cars. In fact, the U.S. rail systems might have been slowed somewhat by having too many cars online at the same time, causing congestion beyond the operational capacity to handle it. Had the national economy continued to grow at the same pace the capacity crunch in rail could have become worsened. Instead, the U.S. experienced an economic recession and slowdown in growth that helped the carriers "catch up" with demand and to improve train speeds, and improve predictability in arrival times and trip times. As of mid-2012, about 20% of the U.S. rail car fleet remains in storage. But this 20% "surplus" capacity of cars cannot be reliably used as a benchmark of the U.S. rail industry's expansion capacity when the economy starts to grow more vigorously, as it must if the U.S. is to resume a jobs growth rate that will substantially reduce unemployment. The major railroads all have a target number of "optimal" cars on line for a given amount of infrastructure (track, rail yards, interchanges, etc.) and operational technology/capacity. The experience of 2005-2007 raises the significance of the issue whether rail capacity could at some point become a constraint on a growing economy. Some infrastructure investments in track and handling facilities have been made, but will it be adequate to service a growth-oriented economy?

Figure 17 contains the U.S. Department of Transportation's projections for 2035 for rail traffic in major corridors in the U.S. A substantial number of major corridors that carry soybeans and other grains on both Eastern and Western U.S. routes are shown in red, above the capacity for the particular route. Figure 18 shows similar information projected for freight trucks traveling on highways, projected out to 2040. The yellow and red-shaded highways are those that are rated as "congested, high volume" or "highly congested, high volume." If rail freight traffic expansion cannot be handled on the rails, some freight close to waterways could be shifted to that mode, but most excessive rail traffic would likely move to truck volumes that would exacerbate highway congestion. Traffic volumes for both rail and highways will be driven by economic growth and population growth in the U.S. that is expected to increase by 70 million people by 2035.

How will congestion affect the soybeans, soy products and other sectors? As rail freight markets become congested, train speeds will be affected; delivery schedules will be less predictable; and the freight industry will be less service responsive to agriculture and every other industry. As truck traffic becomes more congested, truck freight becomes less reliable, and it degrades the quality of life for passenger cars, commuters and others sharing the roads and highways with trucks. The Texas Transportation Institute's Urban Mobility Report, 2011 estimates the annual cost of congestion in 2010 was $101 billion on a national basis, with costs coming from longer delivery times, business relocations, additional commuting time, and fuel waste (See Figure 19). While the major points of highway congestion are typically around large cities, of the top 100 cities, many are in the central production belt for soybeans and grain that are noted as having current problems. Cities/municipalities in the top 100 areas for congestion include: Chicago, Dallas-F.W., Minneapolis-St. Paul, Portland Ore., St. Louis, Indianapolis, Kansas City, Louisville, Memphis, Cincinnati, and Columbus, OH. Thus, the central grain states are not immune from congestion issues in the current environment, and without some additional infrastructure investment, will no doubt become worse by 2035.

Figure 17. **Department of Transportation Projected Rail Capacity Levels, 2035 (above capacity routes shown in red) (U.S. Dept of Transportation)**

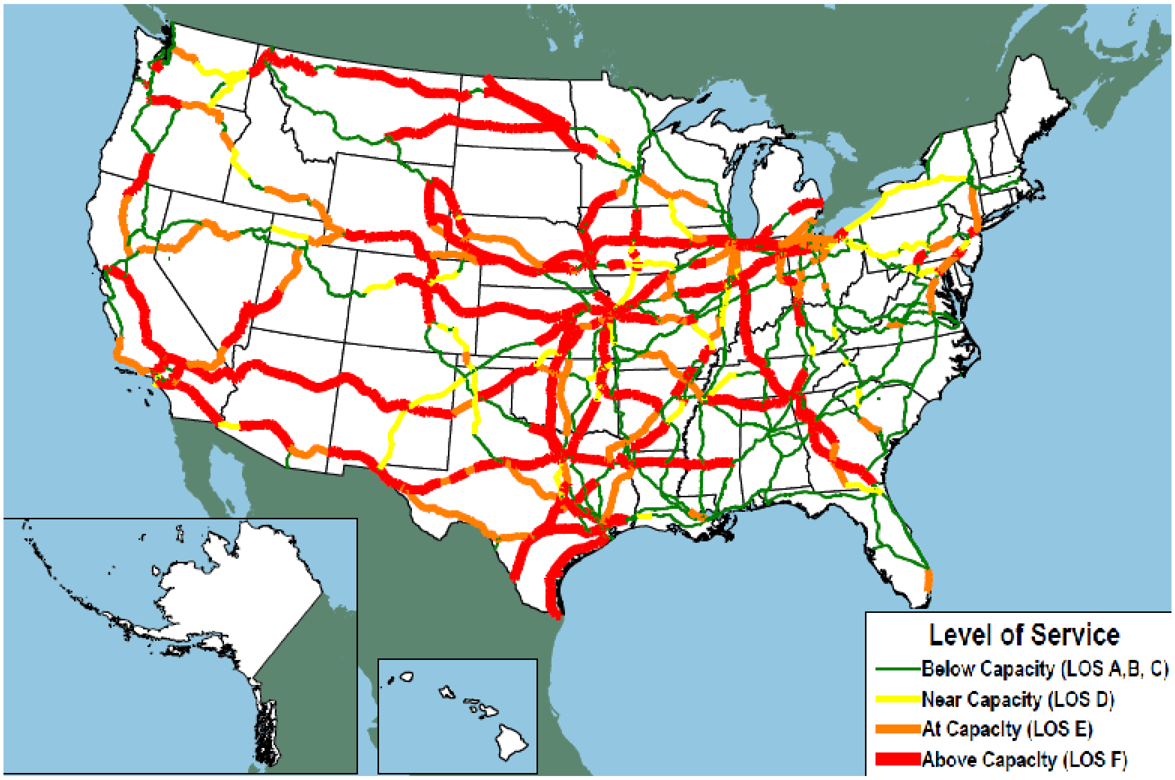
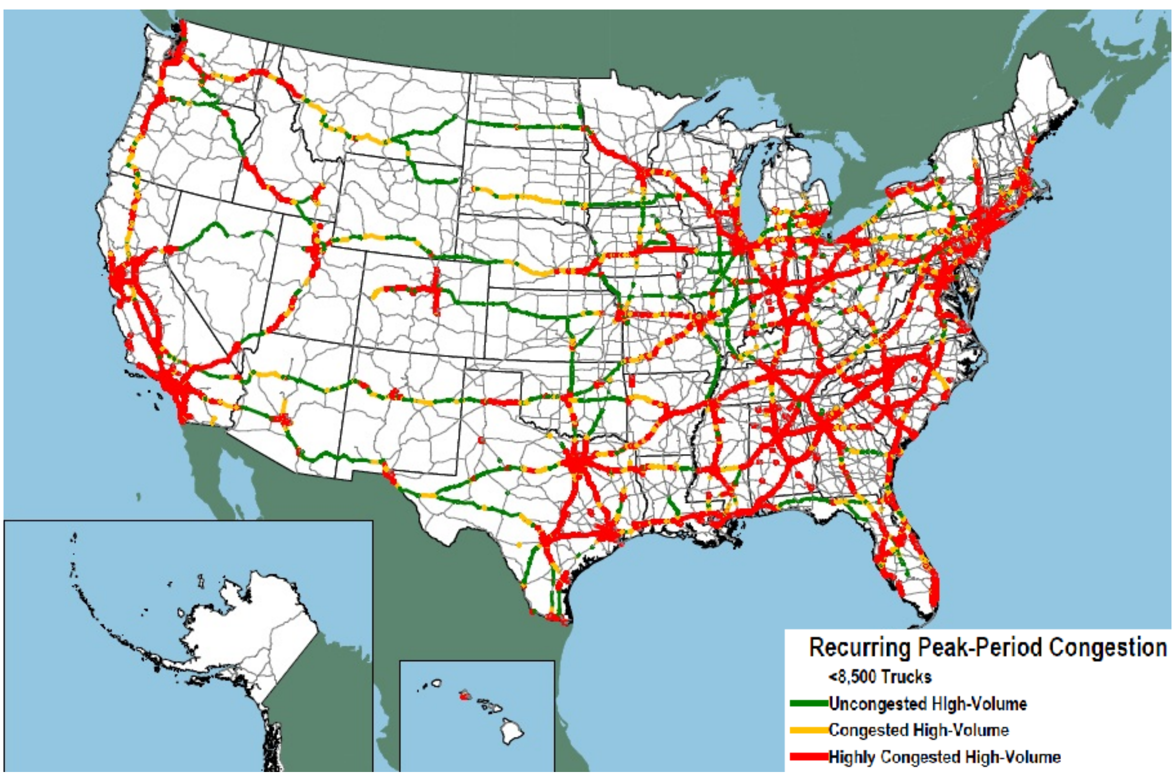
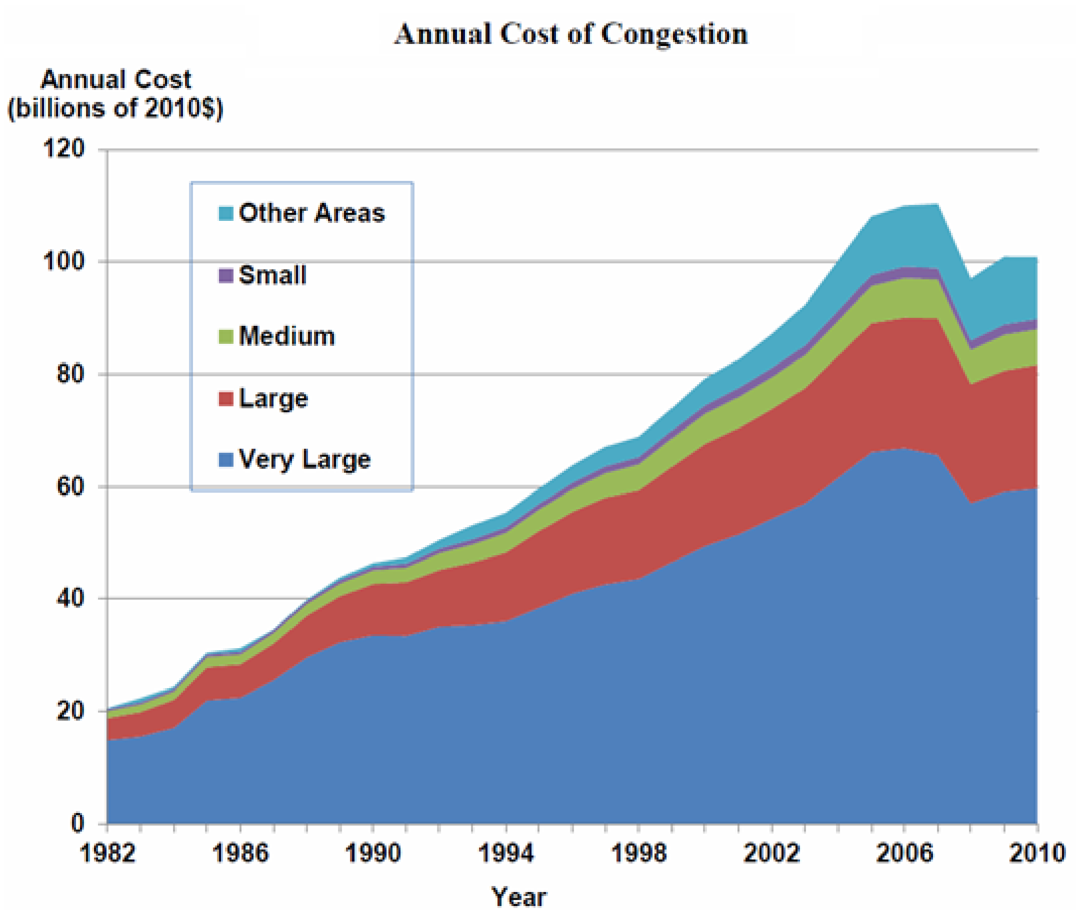


Figure 18. **Department of Transportation Projected Truck Freight Congestion, 2040**



Texas Transportation Institute has estimated the historic cost of congestion since the early 1980s. This data is reflected in Figure 19. The 2010 data reflect a total cost of $101 billion, but that is actually down as highway miles traveled have declined somewhat with the recent recession and high unemployment. Continued economic and population growth are expected to cause economic costs to rise moving forward. The economic cost of congestion tends to be hidden, but is responsible for wasted human resources (time), additional fuel costs and lost productivity.

Figure 19. **Annual Cost of Congestion** (Source: Texas Transportation Institute, 2011)



B. Previous Estimates of the Investment Gap in the U.S. Rail Sector

The need for more investments in transportation capacity to support economic growth in the U.S. has been addressed in several studies from 2007 through 2012. While all known recent national studies on transportation investment have been reviewed as part of this project, the following reports were selected as some of the most significant benchmark studies that have made contributions to the understanding of the nature and potential cost of improving the U.S. transport system:

1. *National Rail Freight Infrastructure Capacity and Investment Study*, published Sept 2007 by Cambridge Systematics, Inc. for the Association of American Railroads (abbreviated "Cambridge Study"). This study is a benchmark research effort, because it is the first and only detailed assessment of long-term capacity expansion needs of the continental U.S. freight railroads; and it received the active participation and cooperation by assigned representatives of all Class I North American railroads. Its primary data sources were Association of American Railroad

private data and Department of Transportation's Freight Analysis Framework (FAF) data through 2006. The FAF data are derived from the U.S. Census Bureau Commodity Flow Survey, conducted every 5 years. However, there are adjustments made in the FAF data to extend the Census data for the years between surveys and FAF data include some movements that the Census data does not cover, such as on-farm movements. This study assessed only the investment gap for rail infrastructure (It did not look at highway investment costs). The study assumed: a planning horizon of 28 years (2007 through 2035), and an 88% increase (taken from DOT) in rail tonnage, no change in modal shares through 2035. This is equivalent to a 2.3% annual compounded rate. Principal study conclusions are:

• Total Rail Infrastructure Investment Needed through 2035 (2007 $)	$148 billion
• Investment Share for Class I Railroad-Owned Property	$135 billion
• Estimated Private Railroad Earnings Available to Fund Investment	$96 billion
• Rail Investment Gap for 28 years, 2007-2035	$39 billion
• Rail Annual Investment Gap (2007 $)	$1.4 billion

2. *National Surface Transportation Policy and Revenue Study Commission (abbreviated "NST Study Commission")*, published Dec, 2007. This effort was conducted under Congressional authorization language of Section 9 of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act–A Legacy for Users (SAFETEA-LU). The study was an extensive 2-year effort by a group of 12 commissioners with diverse transportation backgrounds. It projected gaps in infrastructure funding for the following sectors: public highways, transit, freight rail and passenger rail. The final report was approved by 9 of the 12 appointed commissioners. For highway investments, the study estimated a current gap in annual funding, assuming short-term Federal Highway Trust Fund revenue projections and local and private funding remains steady. The study estimated a "high" investment gap for highways at $115 to $182 billion annually; and a "medium" investment gap of $65 to $120 billion. This "medium" investment gap projects that estimated funds would be adequate to maintain average highway congestion delay constant at the current 5.8 hours per 1,000 vehicle miles traveled. For rail infrastructure, this study relied heavily on the base of information developed in the Cambridge study described in item #1 (above), but expanded the analysis of rail infrastructure investments to consider additional freight investment that could enable some freight being taken from highway trucks onto freight rail to relieve highway congestion.

• Highway Annual Investment (Federal $) Gap (2006 $)	$65 - $120 billion
• Rail Annual Investment Gap (constant ton-mile rail share)	$1.4 billion
• Rail Annual Investment Gap (increase rail modal share 10%)	$2.1 billion
• Rail Annual Investment Gap (increase rail modal share 20%)	$3.2 billion

3. *Paying Our Way, A New Framework for Transportation Finance*, Feb. 2009, Final Report of the National Surface Transportation Infrastructure Financing Commission. This study is focused on financing strategies for highways and transit and does not provide an independent estimate of the funding gap for highways. However, the report does estimate the total funding gap for roads and highways from six previous studies from transportation organizations and government-related entities. According to the report, estimates for the annual highway funding gap (both state and federal funds) in 2008 dollars falls in a range of $134 billion to $262 billion

(simple average of the six independent estimates is $194 billion annually (2008 $), of which $87 billion is the gap in federal government funding).

• Highway Annual Investment Gap (2008 $)	$134 - $262 billion
• Simple Avg of Estimated Gap (Federal and State) (2008 $)	$194 billion
• (Fed Govt Share of Gap: $60 - $118 billion; $87 billion avg.)	

4. *National Rail Plan –Moving Forward* (abbreviated "DOT NRP") was published Sept 2010 by US Department of Transportation, Federal Railroad Administration. This report, based largely upon the 2007 Commodity Flow Survey of the Census Bureau, estimated demand for future rail transportation based upon projected total tonnage (rather than rail ton-miles). The report estimated that the U.S. annual tons shipped per capita would stabilize at a constant 40.3 tons per year for the next 40 years. Thus, future growth in U.S. freight volumes was projected strictly on the basis of estimated population growth as projected by the U.S. Census Bureau. This study does not provide an estimate of the investment gap in either rail or highway infrastructure. However, it does project a substantially slower rate of growth in total truck and rail freight through 2035 than studies referenced in items #1 and #2 noted above. This study estimates the increase in tonnage from 2010 to 2035 as shown in Table 5 below. The increase in total tonnage across all modes represents a 22% increase in 28 years, 2007 to 2035. Truck tonnage is forecast to rise 24%, while rail tonnage is projected to increase 23% during this same period. These projected increases are quite modest compared to U.S. Department of Transportation's forecast through FAF data Version 2.2 that total shipping volumes would increase 93% from 2002 through 2035, and truck tonnage would increase 98% while rail tonnage would increase 88%. The source of these differences and some possible rationalizations to resolve differences are discussed in subsequent sections.

Table 5. U.S. Transportation Infrastructure and Tonnage Hauled

DOT Estimates of U.S. Freight Movements, 2010, National Rail Plan Based upon U.S. Census Bureau Commodity Flow Survey					
Year	**Population** (millions)	**Tonnage** (billions)	**Tons per Capita**	**Trucking** (bil. Tons)	**Railroads** (bil. Tons)
1993	258	9.7	37.6		
1997	268	11.1	41.4		
2002	288	11.7	40.6	7.84	1.87
2007	301	12.5	41.6	8.8	1.9
2010	310	12.5	40.3	8.8	1.9
2035	380	15.3	40.3	10.9	2.35
Total % change, 2010 to 2035				24.0%	23.0%
Annual % change, 2010 to 2035				0.86%	0.83%

5. *The Economic Impact of Current Investment Trends in Surface Transportation*, American Society of Civil Engineers, July 2011. This study assessed the investment shortfall in U.S. road and highway investment and transit from 2010 through 2040. The study found that the deteriorating infrastructure in the U.S. will cost the American economy more than 876,000 jobs

and suppress the growth of the GDP by $897 billion by the year 2020. This study estimated the highway funding gap at $94 billion per year in 2010 dollars.

• Highway Annual Investment Gap (2010 $)	$94 billion

Summary of Forecasts/Projections for Increased Rail and Highway Traffic and the Investment Gap for Infrastructure.

The available studies forecasting the gap in funding needs for U.S. highways are relatively consistent in recommended additional monies that should be invested by the federal government (or states if revenues are available) to simply maintain the current level of road/highway quality and congestion levels. The table below summarizes the three pertinent studies.

Table 6. Estimated Gap in Highway Investments, Summary of Estimates

Estimated Gap in Highway Investments			
Study	**Forecast**	**Mid-point**	**% Change in Total Funding**
NST Study Commission	$65-$120 bil.	$93 bil.	37%
"Paying Our Way"	$60-$118 bil.	$87 bil.	35%
American Society of Civil Engineers	$94 bil.	$94 bil.	38%

This study is not intended to critique these studies on highway infrastructure needs, but clearly the consistency of these independent efforts confirms that highway traffic growth will continue to put pressure on the government (federal and state) to 1) appropriate higher levels of funds for road building; 2) find ways through gas taxes, tolls or other methods to directly raise revenue designated for highways; and/or 3) develop policies that can help shift some of the commercial truck traffic from highways to rail and barge transportation. The projected investment gap for highways at about $90 billion would be a 36% increase in highway investments each year, a very substantial increase from current funding levels.

The table below shows the recent pattern in federal and state government revenues and expenditures on roads and highways. More recent data than 2006 are available, but are preliminary. Recent rates of expenditures for roads and highways are about $257 billion. Revenues raised from gas taxes, tolls and other sources are not keeping pace with expenditures, so unless substantial changes can be made in the gas tax rate, or appropriate more general funds, the gap in highway funding will continue to widen, forcing governments to look for other solutions to traffic growth.

Table 7. Federal and State Highway Expenditures and Revenues Generated for Roads, DOT

Federal and State Highway Expenditures and Revenues Generated for Roads (billions of dollars)						
Year	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Fed Expenditures	69	78	85	82	85	81
State Expenditures	142	146	153	156	158	176
Total Expenditures	211	224	238	238	243	257
Total Road Revenue	125	131	132	136	147	155
Expenditures less Revenue	86	93	106	102	96	102

The Table below provides the various estimates of growth in historical tons and ton-miles for rail and truck. In addition, in this table there are forecasts of future growth for both tons and ton-miles. The attempt here is to make the data as comparable as possible, using similar time frames of analysis.

Table 8. Historical Data and Summary of Projections for Rail and Truck Tons and Ton-Miles

Historical Data and Summary of Projections for Rail and Truck Tons and Ton-Miles				
			Total % Growth	**Annual % Growth Compounded**
Truck Tons	Historical	Census 1997-2007	15%	1.25%
		FAF-DOT 1997-2007	16%	1.5%
	Projections	Cambridge Study 2007-2035	98%	2.5%
		FAF-DOT 2010-2035	41%	1.4%
		DOT NRP 2010-2035	24%	0.86%
Truck Ton-Miles	Historical	Census 1997-2007	31%	2.7%
		FAF-DOT 1997-2007	11%	1.1%
		BTS Data DOT 1997-2007	26%	2.4%
		BTS Data DOT 81/82-2007	120%	3.1%
	Projections	FAF-DOT 2010-2035	66%	2.0%
Rail Tons	Historical	Census 1997-2007	20%	1.8%
		FAF-DOT 1997-2007	23%	2.1%
	Projections	Cambridge Study 2007-2035	88%	2.3%
		FAF-DOT 2010-2035	30%	1.1%
		DOT NRP 2010-2035	23%	0.83%
Rail Ton-Miles	Historical	Census 1997-2007	31%	2.7%
		FAF-DOT 1997-2007	37%	3.2%
		BTS Data DOT 1997-2007	31%	2.7%
		BTS Data DOT 81/82-2007	110%	2.9%
	Projections	FAF-DOT 2010-2035	33%	1.2%

Table 8 contains a considerable amount of data, but is useful to review as it includes all known publicly available recent measurements and forecasts for U.S. rail and truck volumes. Probably the most important studies to compare forecasts are from the Cambridge Study that was published in 2007 and the DOT NRP Study that was published in 2010. Both of these forecasts use projected tons as the measure of growth (rather than ton-miles). The most shocking part of the entire table is the huge difference in the projections from these two studies, both of which came from highly credible sources. (In fact, both studies used underlying assumptions for future traffic growth suggested by DOT at the time each study was conducted. The DOT assumptions were made in 2005 and 2010.) The rate of growth in tons for both truck and rail projected by the DOT NRP study is almost two thirds less than the forecast growth by the Cambridge Study. Can the 30-year outlook for freight transportation growth change so much in 5 years? The Cambridge Study was sponsored by the Association of American Railroads, but the growth rates were based upon DOT data provided at the time the study was conducted. The DOT NRP Study was also based upon DOT data, but was done with the benefit of an additional Census Flow Survey (2007 data which was released to the public in 2009), and was done in a period of very weak economic growth, following a recession that began in 2007-2008. Section IV of this report will provide a revised estimate of future freight transportation growth based upon some new macro-economic data and the resulting "investment gap" that is believed likely to occur based upon current conditions and expected trends. But this table provides some comparative data that helps guide the analysis in the next section. Some of the important considerations in forecasting freight growth and the need for infrastructure investment include the following:

1) Current information can improve the accuracy of freight forecasts. When the Cambridge Study was done, the U.S. had just completed a very strong and long period of growth, and the resulting long-term growth projection could have been overly optimistic. In contrast, the 2010 DOT National Rail Plan was done in a very slow period of the economy, and the projected growth rate may have been too pessimistic. If the national economy grows at a reasonable rate (which is the only way that the U.S. can again achieve reasonably full employment), the historic growth demonstrated in Table 2 demonstrates that freight will grow at relatively the same rate as national real (deflated) GDP. And this is considerably higher than freight only growing at a rate that is completely parallel with population growth. As personal incomes grow, people consume more goods and products which must be moved by the freight sector. The most probable growth rate in both truck and rail freight is likely between the forecast trend lines contained in these two studies. (The two studies mentioned here predict a low rate of growth of 0.83% to 2.3% annual compound growth in tons. This study will make a revised estimate of growth in terms of ton-miles, because freight traffic is growing in terms of both tonnage and average length of haul. See #2 below.) Ton-miles have been growing faster than tons due both to higher tonnage of movements and longer distances for average movements.

2) Ton-miles is a better measurement unit than tons for freight capacity needs. While both the Cambridge Study and the 2010 National Rail Plan forecast future freight growth in the form of tons, arguably the best measure of freight, if the goal is to make an assessment of the need for infrastructure to provide for optimum service and avoid congestions, is to use ton-miles as the volume measurement. Ton-miles, which reflects both weight and distance utilization within the freight sector, better measures the effect of freight growth on overall infrastructure capacity. Ton-miles are increasing at a somewhat faster rate than tons for both rail and truck, but particularly rail (see the Census data in Table 8). While gross tonnage is increasing, but somewhat more slowly than in periods with more rapid GDP growth, the average distance traveled to destination is on an upward trend. Average rail freight car distance increased from 843 miles in 2000 to 914 miles in 2010. Census data show that average truck distances increased from 133 miles in 1997 to 153 miles in 2007. If the same amount of tonnage stays on rail tracks or highways for a longer period, it has a higher probability of contributing to congestion. That is why ton-miles is believed to be a better measure of traffic growth.

3) Current data suggest that rail freight is likely to grow faster than trucks in the future, reversing past trends in the transportation sector. Both the Cambridge Study and DOT's NRP Study forecast the growth rate for truck freight would continue to outpace rail. However, in the last 10-15 years, railroads have invested heavily in rail intermodal facilities to take some of the long-distance truck movements off the highways. These investments are beginning to impact freight modal share. From 2000 to 2010, intermodal rail freight

(ton-miles) increased 175% faster than total freight. From Table 8, long term freight growth, shown as BTS Data DOT 81/82-08/09, truck ton-miles grew at a 2.9% annual rate, compared to 2.4% for rail. But the data from recent years, whether Census data, FAF-DOT or BTS Data from 1997-2007, rail freight has consistently outpaced truck freight by any measure. This is a trend that, if continued, could make the national economy more cost-efficient, fuel-efficient and environmentally sustainable. It could also help reduce road congestion at a time when additional government spending for highways will be difficult to obtain.

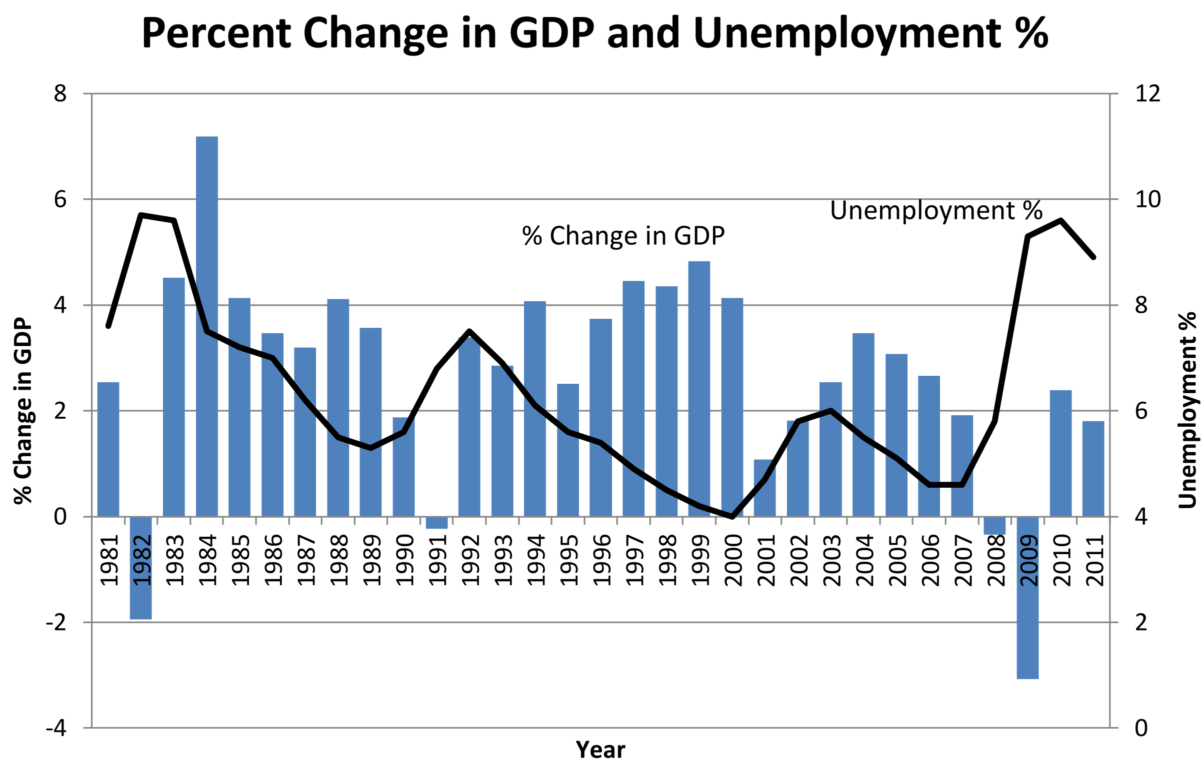
Section IV. A Fresh Look at the Rail Investment Gap Through 2035, and Factors that will Affect Rail System Performance for Soybeans and All Rail-Shipped Commodities

Previous data in Section I of this study compared the close correlation between real (deflated) Gross Domestic Product of the U.S. and rail transportation growth (see Table 2 and Figure 2). From 1990 through 2011, real U.S. GDP grew by 66% and rail traffic, measured in ton-miles, increased by 68%. Thus, this section will rely heavily on publicly available forecasts of GDP growth and outlook for the U.S. However, past trends are not perfect predictors of the future, because fundamental relationships do change over time. This section will look at four (4) facets of rail transportation that are believed to be significant in accurately anticipating the need for rail transportation capacity expansion. After an initial review of GDP outlook, this study will more closely examine four key sectors of the rail business: 1) the coal industry, which is being driven different directions by variations in energy prices, regulations imposed by EPA and international demand; 2) the U.S. oil industry, which has become a major force of expansion in the U.S. economy through fracking technology and is developing in some areas of the U.S. that are near some key agricultural regions and rail corridors used to ship soybeans; 3) potential for intermodal rail growth through U.S. trade expansion and shift from truck to rail; and 4) outlook for the bulk soybean, grain and agriculture sector. Both intermodal and coal are high volume customer segments for the railroads so the mere size of those markets makes some individual analysis important. These significant market sectors have the potential to alter the long-term parallel growth relationship between rail ton-mile volume and economic growth.

A. The Outlook for GDP

Figure 20 shows the pattern of GDP annual real growth from 1981 forward. GDP grew strongly from 1983 to 1989 at an average annual rate of 4.3% across 7 years. After a brief slowdown, the economy resumed rapid growth for a 9-year period, from 1992 to 2000, with an average annual growth rate of 3.8%. Beyond 2000, there were some years of growth in the early and mid-2000 decade, but there was not a single year when the growth rate in real GDP ever reached 3.5%, so recent economic growth was considerably less robust than in the long growth phases of the 1980s and 1990s. Since 2009, even with strong economic stimulus and historically low interest rates via expansionary monetary policy, economic growth is slow and erratic. Unemployment tends to lag behind changes in GDP. Periods of GDP growth that are below 2% tend to push the unemployment rate higher, and GDP growth at 2.0% and above tends to reduce unemployment.

Figure 20. Percent Change in GDP and Unemployment %



Source: Bureau of Labor Statistics, DOL, and Bureau of Economic Analysis, DOC.

Long-term forecasts on U.S. economic growth potential are being affected by the U.S. economy's seeming underperformance in the last several years. Table 9 contains current forecasts for GDP growth through 2035 from government agencies, the Federal Reserve Board and private industry.

Table 9. Economic Projections of Growth in Real U.S. GDP

Economic Projections of Growth in Real U.S. GDP, 2010-2015 and Longer Term (Annual Percentage Growth Rates)		
	2010-2015	**2010-2035 (long-term)**
Annual Energy Outlook, 2011 Forecast (EIA-DOE)	3.0%	2.7%
Annual Energy Outlook, 2012 Forecast (EIA-DOE)	2.5%	2.5%
Office of Management and Budget (Jan 2012)	3.1%	3.0%
Congressional Budget Office(Jan 2012)	2.7%	2.8%
Federal Reserve Board Members (June 2012)	2.2 – 2.8%	2.3 – 2.5%
Blue Chip Consensus (major corps., Oct 2011)	2.6%	2.6%

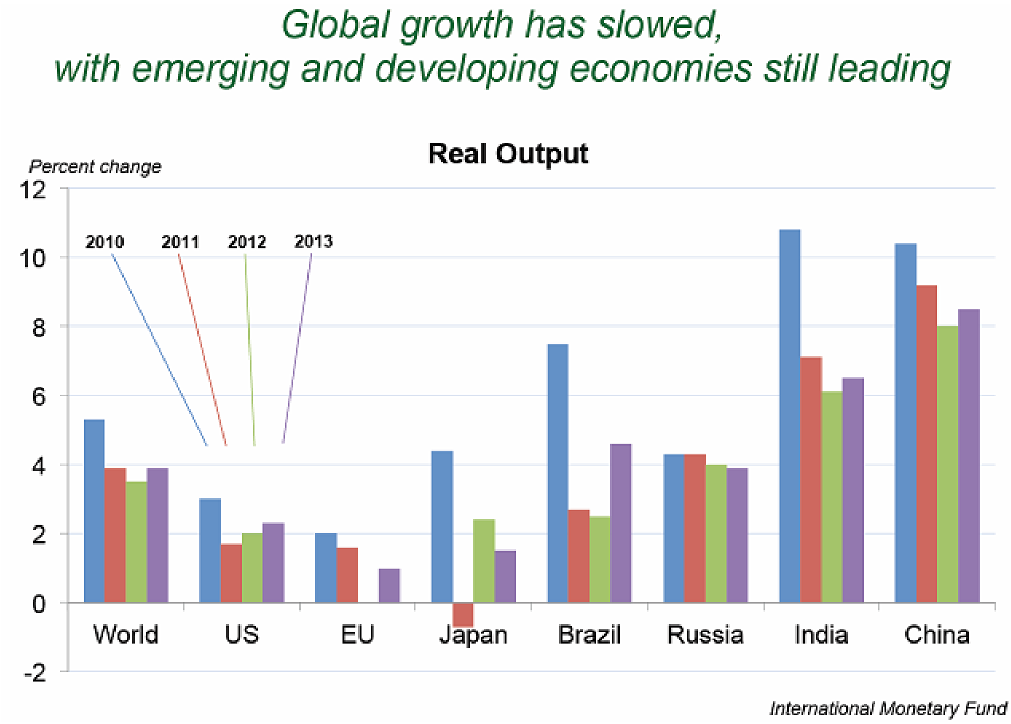
The forecasts of GDP shown in the Table 9 have a strong central tendency toward a long-term expected growth of around 2.5%. Note that the Annual Energy Outlook forecasts were reduced quite a bit (for long term forecasts) from 2011 to 2012. The estimates of Office of Management and Budget, and to some extent Congressional Budget Office, are "outliers" on the high side of available forecasts. The common forecasts from 2-3 years ago for long term U.S. economic growth tended to be in the 3.0 to 3.5% range, and sometimes higher. Why the economic pessimism as reflected in these forecasts? The growth pattern since 2000 speaks volumes about the challenges the U.S. faces to achieve higher growth rates.

One factor that economic forecasters are looking at is consumer debt in the U.S., which has become a drag on consumption expenditures. While a considerable amount of consumer debt has been worked off in the last several years, many families remain heavily in debt.

Economists are also looking too at international growth rates (see Figure 21). U.S. growth rates are hard to grow or sustain if our trading partners are also experiencing serious economic downturns. Figure 21 shows growth rates for major world economies for the last two years and predictions for 2012 and 2013. The significance of the chart is that the EU, U.S. and Japan jointly comprise 45% of global GDP. Forecast growth for those economic units combined is only about 1.5%-2.0% for 2013. It is very difficult for the U.S. to build the momentum for a growth spurt without having participation from other industrialized and developed countries. And the structural problems with EU are likely to take a number of years to repair. The U.S. may have its own structural problems to manage through if it is ever to achieve the long periods of growth experienced in the 1980s and 1990s. For this study, we think the most reasonable approach is to assume U.S. GDP will grow at 2.5% for the foreseeable future. What this also means is that unemployment is likely to decline but remain disappointingly high. In the 1980s the U.S. reached a 9.6% unemployment level, which was eventually reduced to 5.3%, but only after 7 years of strong growth exceeding 3.5% annually. A growth rate of no more than 2.5% will extend the current unemployment problem longer.

*With a GDP growth rate of 2.5%, it is reasonable to predict a similar growth rate in rail freight, based upon historical relationships, but the outlook for coal, intermodal and oil (discussed below) could affect that outlook. For "baseline" growth of rail ton-miles, long term history indicates it should also be 2.5%, roughly the same as GDP. However, in section D below, the most recent 10 year period of Census data, 1997-2007 indicates rail growth has been lagging the economy about 0.3%. Thus **for a baseline growth for rail ton-miles** (that will be further affected by considerations of specific sectors below) this study assumes rail ton-mile growth at 2.2% annually.*

Figure 21. **GDP Growth Rates in World and Country Economies**



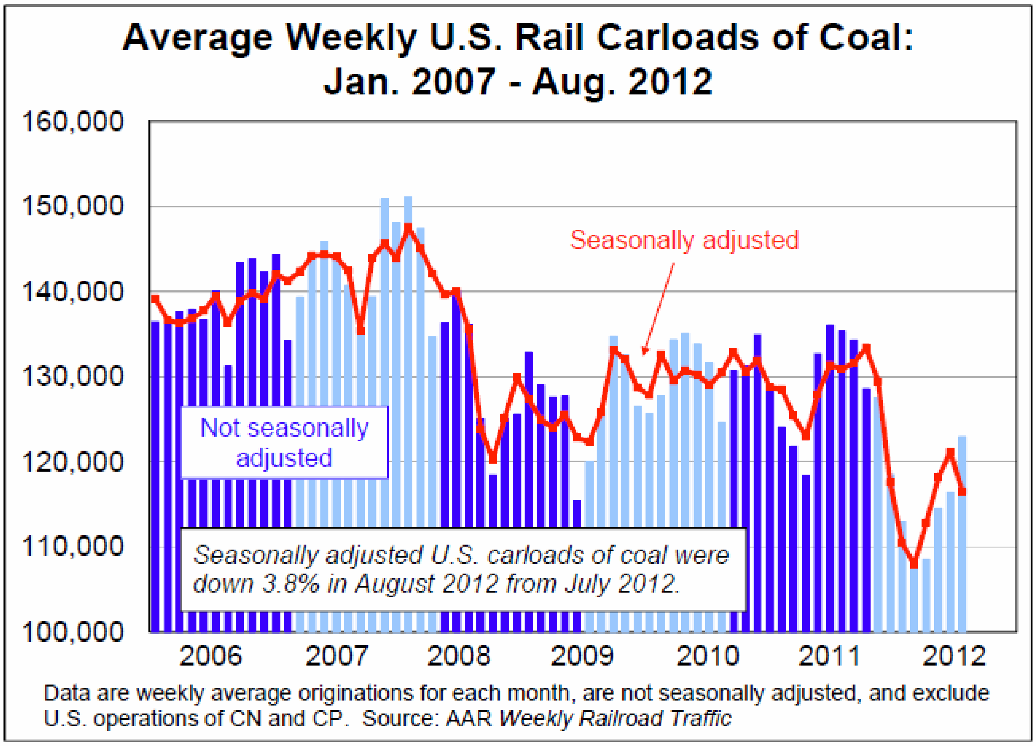
B. The Outlook for Coal.

The United States utilizes coal-fired electric generation plants as a major source of domestic energy. In 2011, coal generated 42% of U.S. electricity consumption, but this was a decline from 50% generated in 2002. Natural gas has been a growing energy source for electrical power generation. Current coal-based electric plants in operation have the capacity to generate 300,000 megawatts of power, but this dominance in electrical generation faces several challenges in the next several years:

- The D.C. Circuit Court in June 2012 upheld EPA's central finding that it has the authority to regulate greenhouse gases such as carbon dioxide. And, EPA finalized a rule on Mercury and Air Toxics Standards (MATS), which is being challenged legally, but if affirmed would be very costly for coal plant compliance. According to the American Coalition for Clean Coal Electricity, coal-generation plants with capacity of 23,000 megawatts of capacity (8% of the national total) have announced they will cease operations by 2015 because of this rule.
- Market prices for natural gas, a primary competitor for coal in power generation, and a fuel often used as a back-up to coal in many plants, have fallen rapidly with the expansion of fracking gas exploration in the U.S. Natural gas prices, which were $10 per thousand cubic feet a few years ago fell to a low of $2.12 in the second quarter of 2012, although prices have drifted upward to about $3.50 since then.
- Exports of coal, while having the potential to be a growth market in the future, have declined recently in response to softer demand from China and other Asian countries.

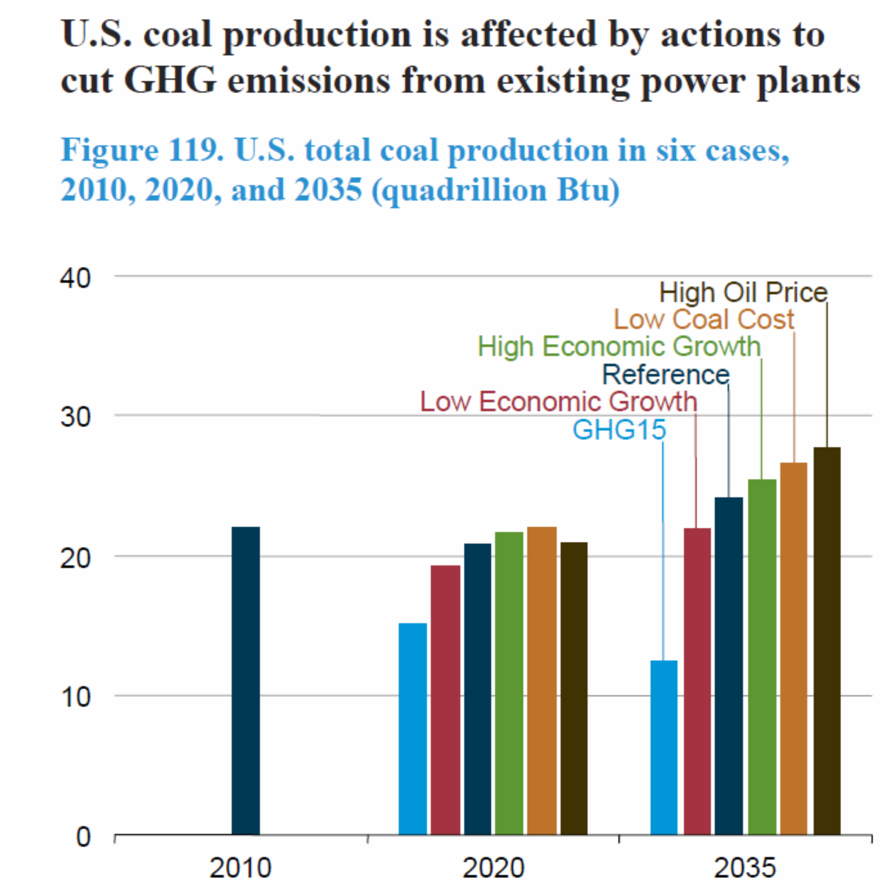
Figure 22 shows the trend in rail car loadings of coal. The first 8 months of loading in 2012 is 9.6% under the same period in 2011. The Energy Information Agency (EIA) of Department of Energy (DOE) estimates a 6% drop in total U.S. coal production in 2012 and another 4% decline in 2013.

Figure 22. Average Weekly U.S. Rail Carloads of Coal



EIA projects a drop in 2012 in the export coal sector of 5-10 % (predictions published September 2012), but exports represent only about 10% of total current production in the U.S. The EIA's long-term outlook for coal production in the U.S. is pictured in the Figure 23 below, published in June 2012. EIA's baseline forecasts (See "reference" bar in right hand side of Figure 23) suggest that compared to 2010 coal production of 22.06 quadrillion BTUs, coal production will decline by 8% in 2015 (20.24 quadrillion BTUs); will recover back to 22.25 by 2025 and increase to 24.14 by 2035. One-third of this projected growth is in coal exports with 2/3 in domestic coal utilization. The total growth in the 25 years is a relatively modest 9.4%. On a compound basis this is only 0.3% annual growth.

Figure 23. Projected Scenarios for U.S. Coal Production



Source: Energy Information Agency, DOE, June 2012 Outlook

There are more pessimistic outlooks for the coal industry. A study published by The Brattle Group, October 2012, Potential Coal Plant Retirements: 2012 Update, estimates that market price declines for natural gas plus the additional regulatory challenges from EPA could cause a substantial increase in the retirement of coal powered plants. While 23,000 megawatts of capacity have already announced plans to close, this study indicates that total could grow to 59,000 to 77,000 megawatts of capacity (representing 20-22% of capacity) that could be shut down by 2016.

For this study we conclude that, given the regulatory headwinds and the economic competition challenges confronting U.S. coal, the best assumption for this study as to how rail coal volumes will affect the industry is to forecast total rail tonnage growth for coal at zero percent from 2011 to 2035. It is assumed that in the early years, coal markets may fall below current levels but recover back to current levels in the long term. What this means for this analysis is that the 2.2% annual growth assumed for ***all*** *rail freight transportation is reduced by ¼ because of zero projected rail growth in coal since coal has represented 25% of the growth in rail ton-miles in the last 20 years. Thus, the impact of coal is a reduction of 0.55% in long term annual rail ton-mile growth through 2035 (.25 X 2.2%)*

This forecast of zero growth in rail coal by 2035 would indicate that EIA-DOE current forecasts are slightly too high with a forecast increase of 0.3% annual growth, but that more pessimistic views, such as those from the Brattle Group, don't fully account for likely adjustments in pricing of various energy alternatives. Underlying this analysis is the assumption that a more realistic outlook for export coal is for an increase of 100% from 2011 levels (this would equate to a level of 215 mil tons exported in 2035 from 107 in this year) and 12.5% decline in coal consumption (from 999 mil tons in 2011) in the U.S. to 875 mil tons in 2035, for a total consumption of U.S. produced coal of 1090 mil tons in 2035.

Additional comments regarding rationale used for this coal forecast:

- The market adjustments going from coal to natural gas started occurring 10 years ago because of regulatory factors, and economics. The recent wave of regulations were many years coming and many of the price adjustments (natural gas vs. coal) have been made by companies utilizing auxiliary natural gas generation at plants designed to use coal as a primary fuel. While domestic consumption of coal for 2035 is forecast at 875 mil tons, consumption is likely to dip below that level in some nearby interim years (2015-2020) as markets adjust.

- Most industry analysts believe $2-4 natural gas is not sustainable for a number of reasons. New gas exploration is being closed in favor of oil wells today (at $3.50 natural gas); gas prices above $5 will cause a shift back to coal at plants that can use both fuels; natural gas prices in the U.S. are "out of line" with both domestic petroleum prices (on a net energy basis) and international natural gas prices which are much higher (2-3 times higher)---a difference that with the advent of liquid gas trading cannot be sustained; and inexpensive natural gas can also be used for fertilizer and other types of chemical-based manufacturing. Relative U.S. surpluses of natural gas as an energy source are likely to be "solved" in the next 5-10 years with a number of market factors making sizeable adjustments.

- The outlook for coal exports is more challenging, as metallurgical coal exported (mostly from Eastern U.S.) to high growth markets like China will depend on international growth rates and west coast exports will depend on future demand and logistical challenges being addressed. A recent study, Heavy Traffic Ahead, Western Organization of Resource Councils, July 2012, assumes that west coast coal exports could grow from 5 million tons annually today to 170 million tons by 2022. This rate of increase could more than double the assumed 100% growth in total U.S. coal exports by 2035, and would increase total ocean vessel tonnage of all commodities from all U.S. ports by more than 1/3---a huge increase in bulk exports in a short time frame---and is not viewed as realistic. More gradual growth in export coal appears to be the most likely outcome.

C. The Outlook for the Oil Industry.

The oil industry in the U.S. is being transformed by the exploration of shale deposits for both gas and oil. Drilling activity is occurring in North Dakota, Ohio, Pennsylvania, Texas and a number of other states. In North Dakota alone there are 210 active drilling rigs. The oil and gas fracking industry has caused a surge in the need for transportation. North Dakota provides an example of the intensity of this "new oil" economics. In the last four years, 2008-2012, the following has happened in that state:

- The number of oil wells increased from 4,100 to 7,100
- The number of active rigs (nearly all are oil, not gas) is 210 (almost 2,000 total active rigs nationwide in mid-2012)
- Rigs dig and fracture a new well in an average of about 3 months
- During the exploration and fracking, an average of 1150 truckloads of material are used

- Sand and proppants railed in from Wisconsin, Illinois, Iowa, and Minnesota average about 25 carloads per well drilled
- Traffic counts by North Dakota DOT show a 54% increase in trucks state-wide, and some counties have experienced a 200% increase in 4 years in vehicle traffic
- Oil production has increased 440,000 bbl per day, a 260% increase (current level is 600,000+ bbl, and growing rapidly)
- Although rail is hauling roughly half of crude oil output (pipelines transport the remainder) 4-5 unit trains per day move oil out of the state, both East and West

The impacts of oil and gas fracking on rail movements are shown in the next two charts that reflect changes in oil and sand shipments.

Figure 24. Percent Change in Combined U.S. and Canadian Rail Carloads of Petroleum

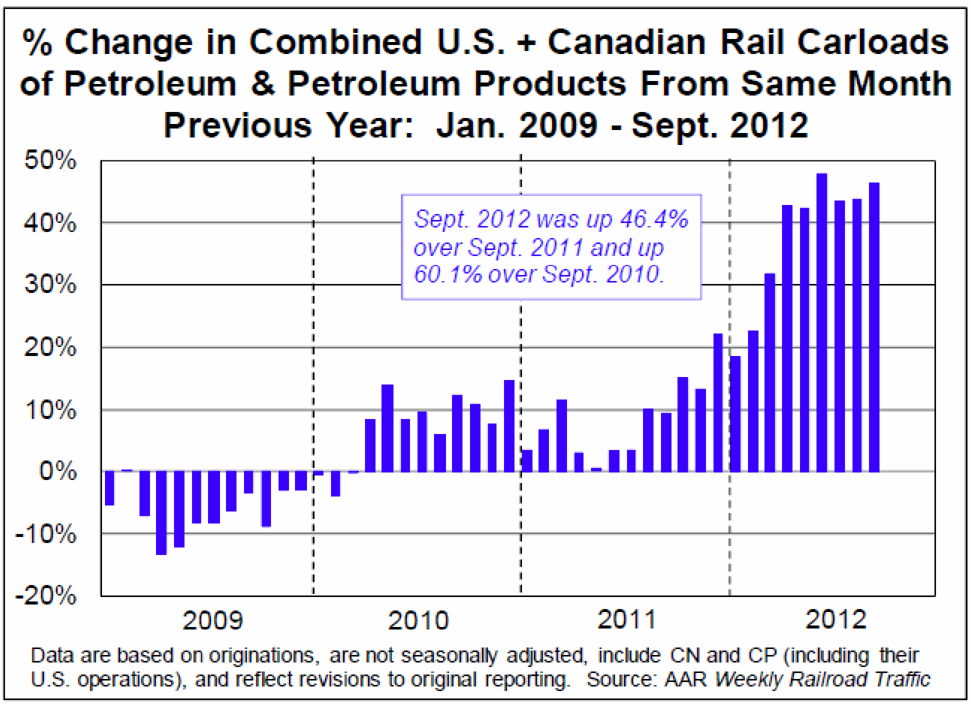
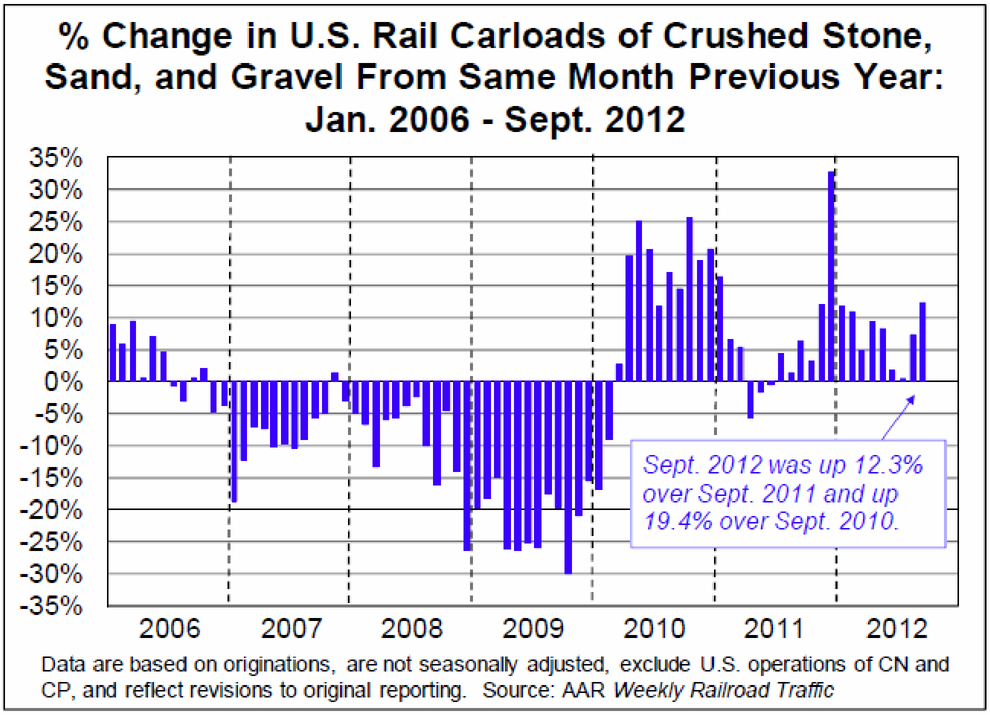


Figure 25. Percent Change in U.S. Rail Carloads of Crushed Stone, Sand, and Gravel



The number of sand cars being shipped into fracking areas has increased an estimated 250,000 per year, or about 1.7% of normal total rail car volumes. Car volumes moving petroleum have caused a net increase of 2.2% in total rail car movements. For the long term, EIA-DOT estimates U.S. oil production from fracking will increase U.S. output by 20% or more by 2025. This should lead to an additional 500,000 annual petroleum cars shipped, which would add about 3.2% to total car volume.

There remains considerable uncertainty about the fracking industry and its impact on the rail sector for the following reasons: 1) The fracking procedures in place in industry today are believed to protect the environment, but EPA continues to monitor water quality and other potential issues; 2) The nature of pipeline development in the future could take away from the volumes available to rail, but rail does have the advantage that it can deliver petroleum to a wide range of destinations; and 3) The price of natural gas and oil will continue to provide the incentives/disincentives over time for development of this industry.

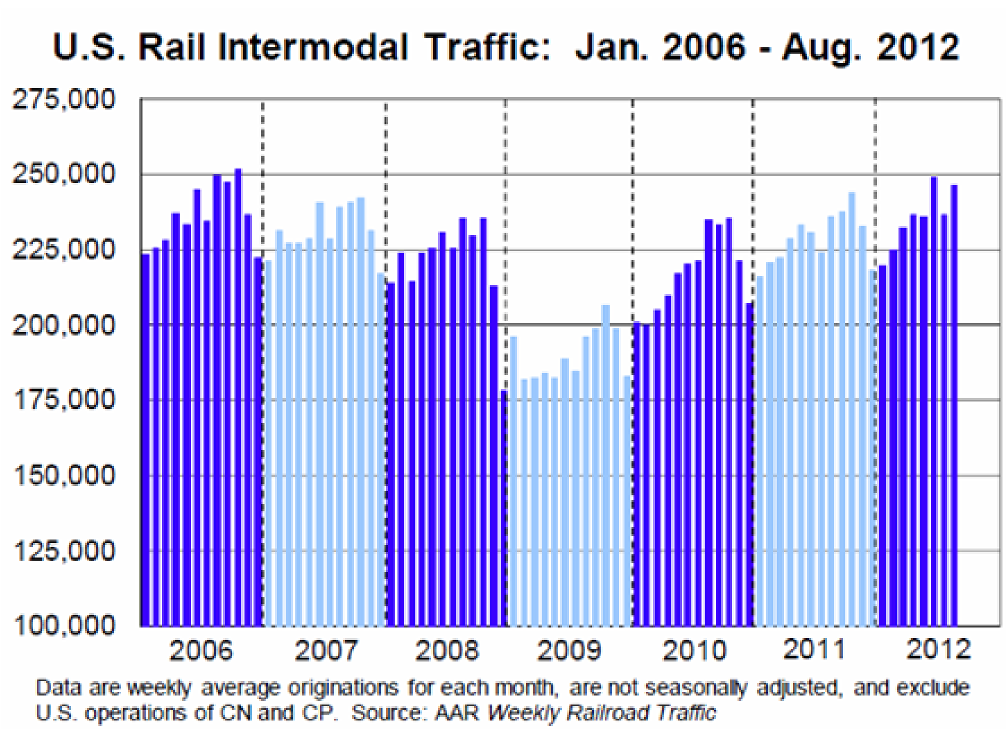
Assuming the EIA-DOT is accurate in its baseline forecast for 2035, the additional volume of oil cars, sand, proppant and related cars will have the effect of increasing by 0.1% to 0.2 % (this study will use the midpoint estimate of 0.15%) the average annual compound growth rate in ton-miles per year over the next 23 years. (Note that the nature of the growth in this industry, while increasing the long term growth rate a modest amount as a proportion of total rail freight, is expected to experience the bulk of this growth in the next 5-10 years before leveling off. This is a very important structural adjustment in the rail and oil sectors that will require new investments in infrastructure to accomplish.

D. Potential for Intermodal Rail Growth through U.S. Trade Expansion and Modal Shift from Truck to Rail.

Intermodal rail has been a growing segment of the rail business. From 2000 to 2010, real GDP grew 16% and intermodal rail grew 23%. Prior to the recession, from 2000 to 2006, the GDP grew 15% in the 6 years from 2000 to 2006 while intermodal rail grew 34%. Why the difference? Why did the recession affect the intermodal rate of growth so much? Intermodal traffic is driven by: 1) railroad investment in intermodal transfer facilities, and there has been substantial investment by U.S. carriers to permit rail to replace more of the long-haul trucking; 2) domestic intermodal business has been encouraged by the intermodal transfer facilities, but the weak economy has kept the growth rate tied to domestic GDP growth plus some shift from truck movements to rail; and 3) international trade has been hampered by the recession, and caused some major cutbacks in container shipments from Asian and other countries into the U.S.

How is intermodal recovering from the recession of 2007-08? Intermodal is a bright spot for rail. Figure 26 below illustrates that recent data intermodal movements in total have nearly regained the level in 2006 which was the peak of the business. Data from the Association of American Railroads indicate that growth in both domestic and international trade-driven business are helping to improve intermodal outlook. But the improvement has been slow, tracking the general performance of the economy and the recovery in the U.S.

Figure 26. U.S. Rail Intermodal Traffic



Global growth in trade has had an immense effect on the container business, both on and off ships. While some containers are taken directly from ships to trucks for delivery, rail has captured a growing share of that business, and an expansion of trade in the U.S. would spur additional business for rail carriers. While the U.S. has fairly low tariffs and relatively few trade barriers compared to our global trading partners, trade historically has not made up a large proportion of the U.S. economy. Table 10 compares GDP of the U.S. and major regions with exports as a percent of GDP and export growth over the period of 2001-2010.

Table 10. Gross Domestic Product and Trade, 2010

Gross Domestic Product and Trade, 2010, $US Trillion				
	GDP	**Exports**	**Exports as % GDP**	**2001-2010 Trade Growth**
World	$87.3	$15.2	17.4%	136%
EU	$17.6	$5.1	29.0%	109%
NAFTA	$17.9	$2.0	11.0%	71%
U.S.	$15.1	$1.3	8.6%	63%

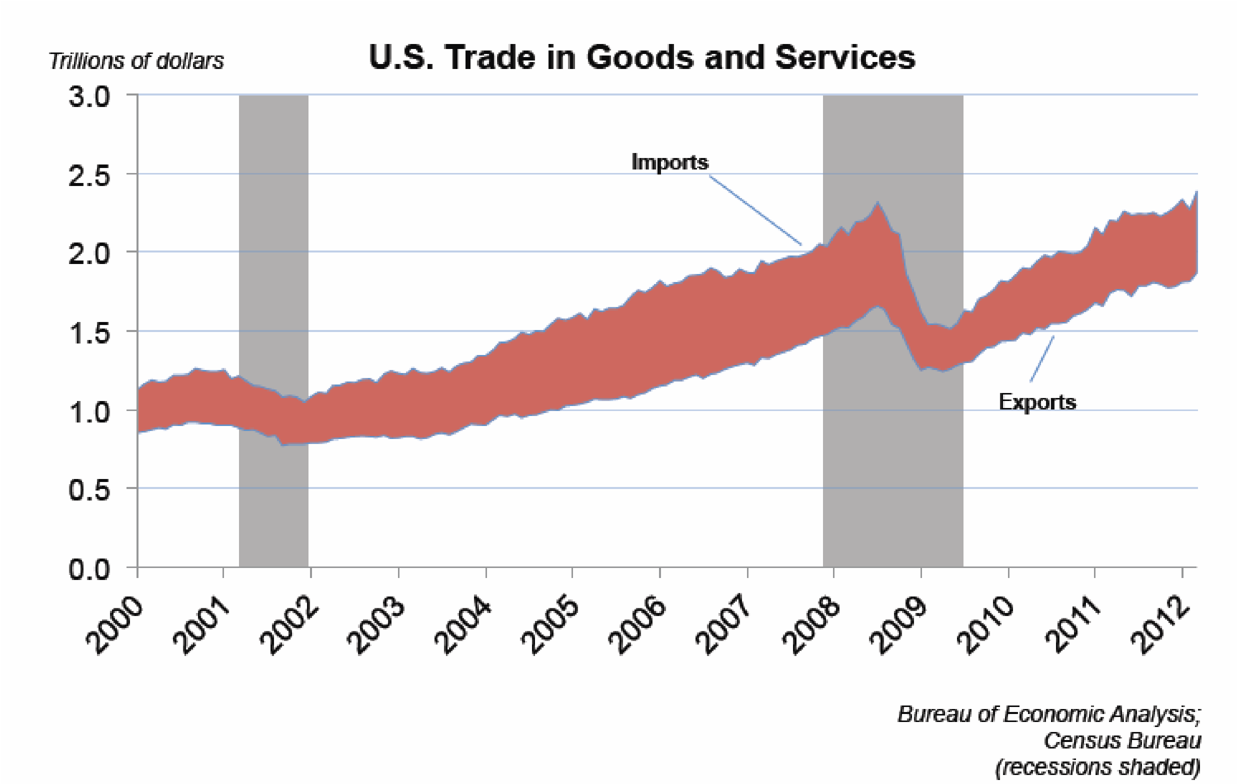
The U.S. has tended to "lag" in trade percentage and trade growth relative to the rest of the world because the U.S. has such a diverse economy, historically most of the trade has occurred within the U.S., i.e., intra-trade among the states. As the U.S. GDP declines relative to other countries (other countries grow more rapidly because of population age, and early development of economies to improve the income base) the U.S.'s pattern of trade should begin to change to more dependence on international supply sources. As the U.S. trade growth is more rapid in exporting services and importing merchandise (see Table 11), products and materials (which need truck, rail or water transportation for delivery), expanded trade for the U.S. will result in more transportation needs. The U.S.'s active pursuit of more open trade through negotiations with the Trans-Pacific Partnership to build stronger links with Asia will also encourage trade volume.

Table 11. U.S. Trade in Merchandise and Services

U.S. Trade in Merchandise and Services, 2001-2010, U.S. Dollars (nominal)				
	Exports	**% Change 2001-2010**	**Imports**	**% Change 2001-2010**
U.S. Merch Trade	1,278	63%	1,969	54%
U.S. Svcs Trade	518	89%	358	76%

Another major consideration with trade is its severe cyclical nature. When the U.S. GDP declines with a recession, trade falls more dramatically. On an annual basis, in the most recent recession, U.S. real GDP fell 3.4% from its peak to bottom two years later. In the same period, U.S. merchandise exports fell 18%; merchandise imports fell 26%. Figure 27 illustrates the depressing effect that recessions have on trade. This steep decline had a big impact on U.S. rail intermodal movements, both imports and exports.

Figure 27. U.S. Trade in Goods and Services



While intermodal traffic tends to be more cyclical, because its international portion is linked to U.S./global trade, intermodal U.S. rail business overall in the U.S. does appear to be growing over time more rapidly than the general economy, more rapidly than other sectors of rail, and appears to be replacing some of the longer distance truck movements.

How much impact will intermodal rail expansion in the U.S. have on transportation infrastructure demands? Table 12 contains data from Department of Transportation's 2012 National Transportation Statistics, and compares ton-miles of major modes of transportation. (Note: Reliable data on truck ton-miles is particularly difficult to find, and often truck data is computed as a residual of rail and water. This particular data series is believed to be the most reliable, because it matches closely with recent Census data (1997, 2002 and 2007) and for historical series, refinements have been made to keep the series as consistent as possible. The data period of analysis was chosen because 1981-82 was a "bottom" in the business economic cycle and 2007 was nearing a bottom. Long term trends are best computed on the basis of "bottom-to-bottom" or "top-to-top" points in identified business cycles to utilize similar periods in identified cycles, to avoid the impact that business cycles might have on computing long-term trend growth. The year 2007 was chosen as the termination date for the series because the Census Flow data was collected for that year, and is probably the most reliable that we have, especially for truck.) The most important numbers in this table are those that compare the change in rail and truck growth rates between the earlier and later period of time. A decline in the rate of growth in GDP affected both modes. But truck ton miles declined from 3.5% to 2.4% in annual growth, while rail declined from 3.0% to 2.7%. Rail had a considerably smaller amount of reduction than trucks and the average growth rate for the most recent period actually exceeded that for trucks. These may seem like small changes, but in fact, the rate of growth for trucks has fallen by about 1/3 at the same time that the rail rate of growth fell by 1/10. And while the percentages on an annual basis are small, if the trends continue, when growth is compounded over time, small differences in the rate of change grow into much larger changes in modal shares, and the direction that infrastructure investment needs to take to enhance service and economic efficiency.

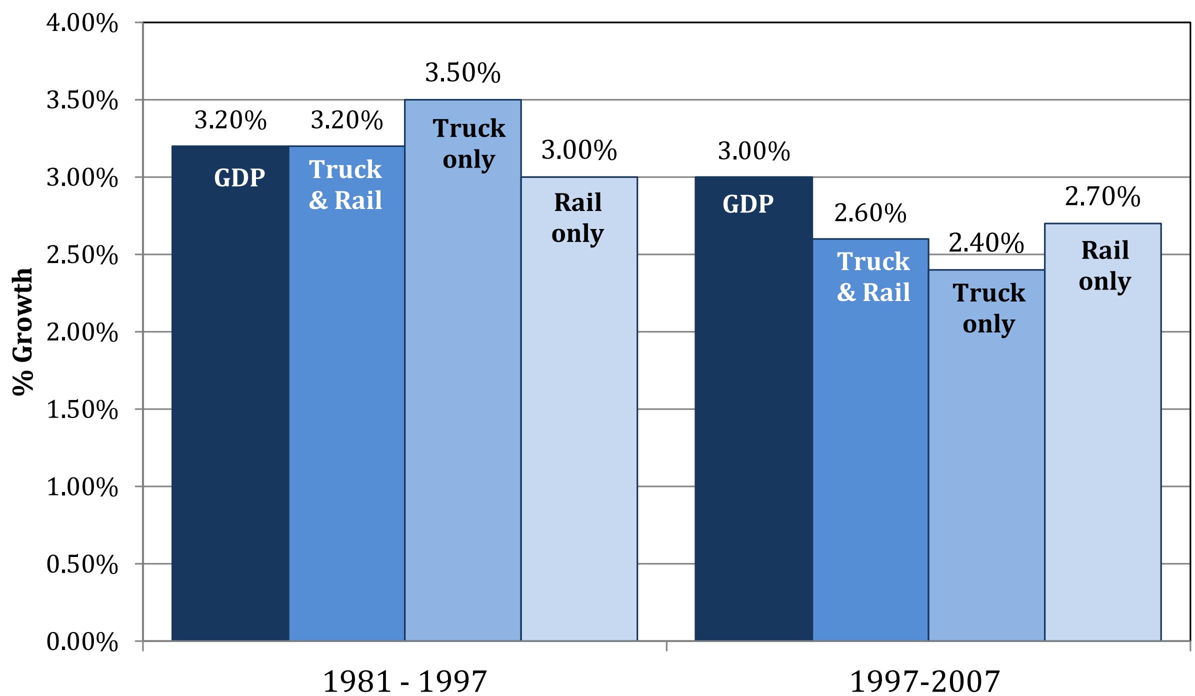
Table 12. Annual Percentage Compound Growth Rates for Rail and Truck Ton-Miles

Annual Percentage Compound Growth Rates for Rail and Truck Ton-Miles in U.S.				
Trend Years	**Truck**	**Rail**	**Truck + Rail**	**Gross Dom. Product**
1981/82-1997 (earlier period)	3.5%	3.0%	3.2%	3.2%
1997-2007 (later period)	2.4%	2.7%	2.6%	3.0%
1981/82-2007 (all years included)	3.1%	2.9%	3.0%	3.1%

Data come from DOT National Transportation Statistics, 2012, Table 1-50.

Figure 28 presents a graphic depiction of the changing relationship between GDP and truck and rail ton-miles shown in Table 12. It appears that rail ton-mile growth has remained more closely aligned with GDP growth in recent years than truck movements.

Figure 28. Comparison of Two Periods of Annual GDP Growth and Freight Growth



Given that intermodal traffic increased at a higher rate than GDP growth in the last decade (the rate of increase was between 50% greater and 120% greater, depending on whether the recession is included in the analysis), and the fact that the U.S. appears to be moving toward a period of somewhat higher growth in trade, *this analysis assumes that intermodal traffic on railroads will increase at a rate of 5% annually, compared to an overall GDP growth rate of 2.5%. What does this mean for rail ton-mile growth? Intermodal units may account for 1/3 of the total railcars on line, but only account for 10% of ton-miles, because the average unit contains less weight than coal, grain or minerals in bulk cars. Thus, the impact on long term growth rate for rail ton-miles should be about 0.25% annually, compounded.*

(Observation: While ton-miles are believed to be the best measure of growth to use overall in considering where to invest in infrastructure, this example with intermodal shows there is no perfect measure. Intermodal business puts a lot more car-miles on the rail system than ton-miles. So if intermodal continues to grow rapidly into the future, the growth in car miles will affect congestion more than indicated here by the expected ton-mile increase from intermodal. Secondly, if intermodal rail grows at 5%, and average GDP growth stays around 2.5%, the long-term rate of growth in truck ton miles could decline from the 2.4% average for 1997-2007 to a range of 1.0% to 1.5%. Part of this is market share loss to rail; part to less dependence on transportation freight for economic growth rates.)

E. Outlook for the Bulk Soybean, Grain and Agriculture Sector.

This study has a particular focus on soybeans and agriculture, but this section is not intended to provide a detailed forecast of the nature of future agricultural growth. It is intended to provide some reasonable trend analysis for U.S. commodity production, related projections in expected transportation usage, and how agricultural demands for freight may be factored into the overall growth rate in truck, rail and barge demand for the U.S.

U.S. agricultural markets have gone through some rapid transformations in the last decade. Corn used for ethanol production and DDG production has expanded to about 40% of the corn market. Soybean markets have benefited from expanded biofuels through biodiesel production. Export markets for both soybeans and wheat have strengthened with global income growth. Pacific Rim country exports have grown rapidly, causing increased demand for U.S. West Coast originations for export moves. The amount of each major commodity transported by various modes has been affected considerably by these changes.

Assumptions underlying this analysis of the ag sector include the following:

- The price of oil will move on trend with EIA-DOE forecasts of roughly $150 per barrel by 2035.
- Soybean acres move up from 75 million acres to possibly 78 million acres, based upon mostly growth in export demand. Wheat acres remain in 55-58 million acre range, depending on global food needs. Corn acres remain in the 90 to 92 mil acre range and ethanol-from-corn production stays at about 13 to 15 billion gallons annually. Total planted crops in the U.S. moves from 250 mil acres to 254 mil acres as CRP declines gradually.
- Yields of crops stay on trend: Soybean yield +1.3% annually; Corn yield +1.6% annually; and Wheat yield 0.9% annually.

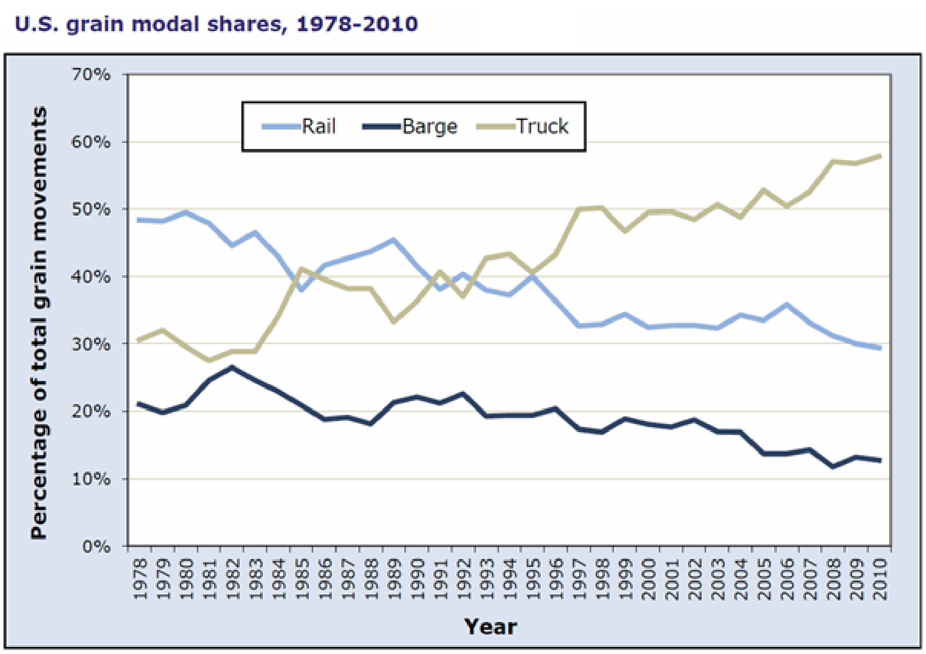
If these assumptions hold for the next 23 years through 2035, we could expect annual bushel volumes to increase as follows:

Table 13. Total Annual Growth in U.S. Bushel Production of Soybeans, Corn, and Wheat

Annual Growth in U.S. Bushel Production of Soybeans, Corn, and Wheat, through 2035	
Average Annual Yield Growth per Harvested Acre	1.33%
Average Annual Growth in Planted Acres	0.06%
Total Annual Production Growth (bushels)	1.39%

The other factor to consider with agriculture is: Will modal shares change as yields and markets adjust? Figure 29 shows the long term trend in modal shares for all major commodities from 1978 forward. And Table 14 that follows Figure 29 provides a more detailed perspective of the last five years.

Figure 29. U.S. Grain Modal Shares



Source: USDA, AMS, Transportation Division.

While the rail and barge share of total shipments have been in long term decline, most of the structural adjustments following the Staggers Rail Act that deregulated rail carriers were complete by the mid-1990s (these structural adjustments include line abandonments; rail mergers; rationalization of the rail business). At that stage rail held about a 35% market share of total movements. But rail has declined further from that point, in particular for corn which became much more dependent on truck movements to supply ethanol facilities. Given that the industrial demand growth for agricultural commodities is expected to be more modest in the future, some growth in whole commodity exports will be needed to utilize production. Exports tend to be more dependent on both rail and barge for shipment to port locations. This will tend to expand the rail modal share, a trend that is already visible (see Table 14).

Table 14. Modal Share Summary: 2010 and 5-year average

Modal Share Summary: 2010 and 5-year average, percent												
	Corn			Wheat			Soybeans			All Grains		
	Export	Dom.	All	Export	Dom.	All	Export	Dom.	All	Export	Dom.	All
Rail												
2010	40	19	22	72	69	70	44	12	27	50	22	29
5-yr avg	38	23	26	70	74	72	42	12	25	48	26	32
Barge												
2010	57	1	10	26	1	13	47	3	24	45	1	13
5-yr avg	53	1	11	28	1	14	46	2	20	44	1	13
Truck												
2010	3	81	68	3	31	17	8	85	50	6	77	58
5-yr avg	9	76	63	2	25	14	13	85	55	9	73	55

Source: USDA, AMS, Transportation Division.

Assuming that rail transportation of agricultural commodities increases from 30 to 35% modal market share in the next 20-25 years through 2035, the average annual growth rate for rail freight demand is estimated at: 2.05% per year (1.39% increase from acres and yield; and an annual increase of 0.66% volume moved by rail caused by the shift from truck to rail). At this rate of relatively positive and steady growth, agricultural shipment volumes should make no material change in overall rail freight demand. Net impact for agriculture is estimated at 0.0% impact, because it's expected to grow at the same general rate as the overall economy and other sectors served by rail. At the same time, agriculture should continue to provide a sound, reliable portion of the rail industry business with moderate growth potential.

F. The U.S. Rail Investment Gap Through 2035.

The previous studies referenced in Chapter III, "Cambridge Study" and the "NST Study Commission," after detailed study of infrastructure needs, both reached largely the same conclusion: there were rail and highway transportation challenges between now and 2035 that probably would not be met by private investment alone by rail carriers. For the 28-year period, 2007 to 2035, the studies forecast that $135 billion in 2007$ would be needed to expand infrastructure in addition to the investments needed in locomotives, cars, and maintenance of existing infrastructure. The studies forecast that private rail earnings would be adequate to pay for $96 billion of the investment, leaving a gap of $39 billion that would require some form of public investment, either grants or other investments by government and municipalities or tax incentives that provide for government sharing of some investment costs. These studies were based upon an assumed growth rate in rail tonnage of **2.3% per year** from 2007 through 2035.

Table 15. Revised Growth Rate for U.S. Freight Transportation to 2035

Revised Growth Rate for U.S. Freight Transportation to 2035	
Estimated base economic growth rate Based upon 2.5% GDP through 2035	2.2% per year
Reduction in growth rate due to <u>coal industry changes</u>	-0.55% per year
Increase in growth rate due to <u>oil fracking/other increased rail</u>	+0.15% per year
Intermodal growth: improved infrastructure/cost savings from truck	+0.25% per year
Agricultural markets: growth potential from exports/higher market share for rail, but tend may not significantly affect total rail freight	0.0% per year
Estimated Economic Growth Rate, Total U.S. Rail Freight, to 2035	+2.05 per year*

*This growth rate is not completely comparable with a previous study (Cambridge) that estimated a 2.3% annual growth rate, as this study estimates that with current trends in rail and truck traffic, rail freight will likely gain about 0.2% per year in market share that will come from shifting trucks to rail movements. Over the 23 years from 2012 to 2035, this results in a 5% market share gain for rail.

Using the Cambridge Study as a base for providing a revised estimate of the rail infrastructure investment gap, calculations follow. The size of the investment gap, driven by a reduction in the growth rate for rail, a comparable reduction in private investment funds available, and the cost to pay for the positive train control technology mandated by legislation results in a <u>funding gap of $1.55 billion annually</u>. The positive train control technology was mandated by safety legislation passed in 2008, and the Federal Railroad Administration has estimated that the total cost to the Class I carriers will be $5.8 billion. While this part of the rail infrastructure investment does not add significantly to rail capacity, it was not anticipated at the time the Cambridge Study was completed in 2007, and is therefore assumed to come out of the Class I railroads' capital available to invest in the rail system.

Table 16. Revised Rail Investment Gap Estimates

Revised Rail Investment Gaps Estimates	
Note: 2.05 / 2.3 = 0.89 This represents the ratio of the two annual growth rates computed above (this study and the Cambridge Study) and is the factor used to reduce the computed estimates from the 2007 Cambridge Study.	
	Revised Estimates
Cambridge Study Annual Investment Needed: $\$4.8\ bil. \times 0.89 =$	$4.3 billion
Annual Investment from Private Class I RRs: $\$3.4\ bil. \times 0.89 =$	-$3.0 billion
Revised Gap for Rail Investment Needed Annually through 2035	$1.3 billion
Adjustment for Investment Needed for Positive Train Control mandated by 2008 rail safety bill ($5.8 bil. total; equal $0.25 bil./yr)	$0.25 billion
Total Annual Rail Investment Gap per Year through 2035	$1.55 billion/yr
Total Investment Gap for 2012 to 2035 ($1.55 bil X 23 yrs)	$35.6 billion

*An annual investment gap of $1.55 billion for 23 years equates to **$35.6 billion** for 2012 to 2035. While this $1.55 billion annual funding gap is comparable with the number that was estimated by Cambridge in 2007, it also accomplishes more than what was assumed in the Cambridge Study, as it projects it will encompass a 0.2 % annual gain in market share coming from truck and by 2035 equate to a 4.7% in total ton-mile share gain for rail.

SECTION V. DEMAND FOR RAIL INFRASTRUCTURE FOR THE COMMERCIAL SOYBEAN INDUSTRY AND OTHER AG SECTORS – U.S. AND SELECTED STATES

Rail infrastructure to serve the U.S. soybean sector, other sectors of agriculture, and all other parts of the national economy that depend on rail can be divided into two parts. First is the general infrastructure---the mainline track, the rail yards, the switching terminals, and bridges--- that are utilized by every rail-served sector, as well as some passenger trains. Secondly, the rail infrastructure at origins or destinations that serve the soybean and other commodity sectors that come from private investments by elevators, processors, port receivers, livestock and poultry operations, food companies or other business linked to the agriculture/food/biofuel system. While the investments made by railroads and rail customers ultimately function as one system of delivery from many points of origin to many destinations, to explain how the market is functioning to encourage infrastructure investments, section A of this chapter looks at the railroads' role in infrastructure maintenance and investment, and the remainder (parts B, C, and D) look at the market factors driving rail customer investments.

A. Railroad Investments in Infrastructure

Among the major freight hauling modes, railroads are unique in that they own, operate and maintain their own roadbed. While there are some rail infrastructure projects in which federal, state or local governments do invest some monies or provide grants when there are recognized public benefits (such as highway congestion reduction), government direct contributions to rail infrastructure are believed to represent less than 5% of the total capital invested by railroads in the upkeep and expansion of the rail system. From 2005 to 2011, the federal government offered short lines a program of tax credits ($1 from the government tax incentives for each $2 invested by the short line) for track rehabilitation, such as upgrading to 286,000 pound capacity rails. This program was very useful in enhancing the efficiency of interchanges between short lines and major railroads, but expired in December 2011. However, this program was re-instated in law through the passage of budget and tax legislation to address the "fiscal cliff" in January 2013. Given that over 40% of food/ag products shipped by rail are either originally shipped or ultimately received on a short line, this provision remains very important to maintaining a fluid agricultural rail system in the U.S. Short lines don't represent a huge part of the ton-miles of rail carriage (about 1%), but for agriculture, they frequently provide the critical link to actually provide access to the ultimate origin or destination.

Other programs offered by the federal government include the Federal Railroad Administration's "Railroad Rehabilitation and Improvement Financing (RRIF)" program (discussed in detail later in this report) which provides for direct loans at reduced interest rates, and TIGER grants (Transportation Investments that Generate Economic Recovery) which are available to rail, transit and highway projects in 2012. The TIGER program allocated a total of about $500 million in grants in 2012. One other program offered by Congress was through the tax extension act of 2010 which provided for a 1-year bonus depreciation of 50% for investments (applicable to infrastructure and locomotives) for calendar year 2011. The impacts of accelerated depreciation will also be covered in Section VI.

With some limited assistance from government, railroads do shoulder a large part of the responsibility for maintaining, improving and expanding roadbeds, ties, rail, and other general rail infrastructure. If railroads are to continue to handle a large part of the ton-miles of cargo handled in the U.S., what kind of investments will be necessary? Where will the money be invested? The 2007 Cambridge-AAR Study which provided a fairly high level of detail, stated, "This study provides a first approximation of the rail freight infrastructure improvements and investments in the continental U.S. rail network that will allow the freight railroads to meet the U.S. DOT's projected (2005 projections) demand for rail freight transportation in 2035." That study emphasized the following rail system needs to meet the additional hauling capacity demands of U.S. commerce:

- Upgrades to Class I mainline tracks and signal control systems
- Improvements to significant rail bridges and tunnels
- Upgrades to secondary mainlines and branch lines to meet 286,000 pound standards
- Expansion of terminals, intermodal yards, international gateways
- Port facilities
- Class I rail service and support such as fueling stations, maintenance facilities

AASHTO (American Association of State Highway and Transportation Officials) in 2010 in its "Bottom Line Report" stated the following rail needs:

- Rail freight productivity is challenged by congestion and capacity choke points along national corridors, at intermodal terminals, and at urban rail interchanges
- Public rail investment historically has treated the bottom of the system: grade crossings, branch lines, and commuter rail services
- Present need is to treat the top: Nationally significant corridors, intermodal terminals and connectors, and urban rail interchanges
- Public investment could produce significant savings in highway infrastructure, highway user, and shipper costs

In essence, what both the Cambridge-AAR Study and the AASHTO 2010 Report indicate is that to attain a continuing share of total freight with possible increases in ton-miles shifted from highways to rail will require investments both in mainline tracks and major interchange points that go well beyond current investment strategies of carriers.

Where do railroads invest money in infrastructure today? Where do railroads spend todays' CapEx dollars (Capital Expenditures)? Table 17 tracks average CapEx spending by Class I's over the last 5 years. Over 50% of total CapEx is in steel rails, ties, grading and ballast---basics of maintaining and expanding a railroad. Locomotives and freight train cars add another 20%. Rail freight customers provide a substantial proportion of the freight cars operated by Class I carriers either through ownership or leasing, such that freight car costs are a relatively minor part of the total.

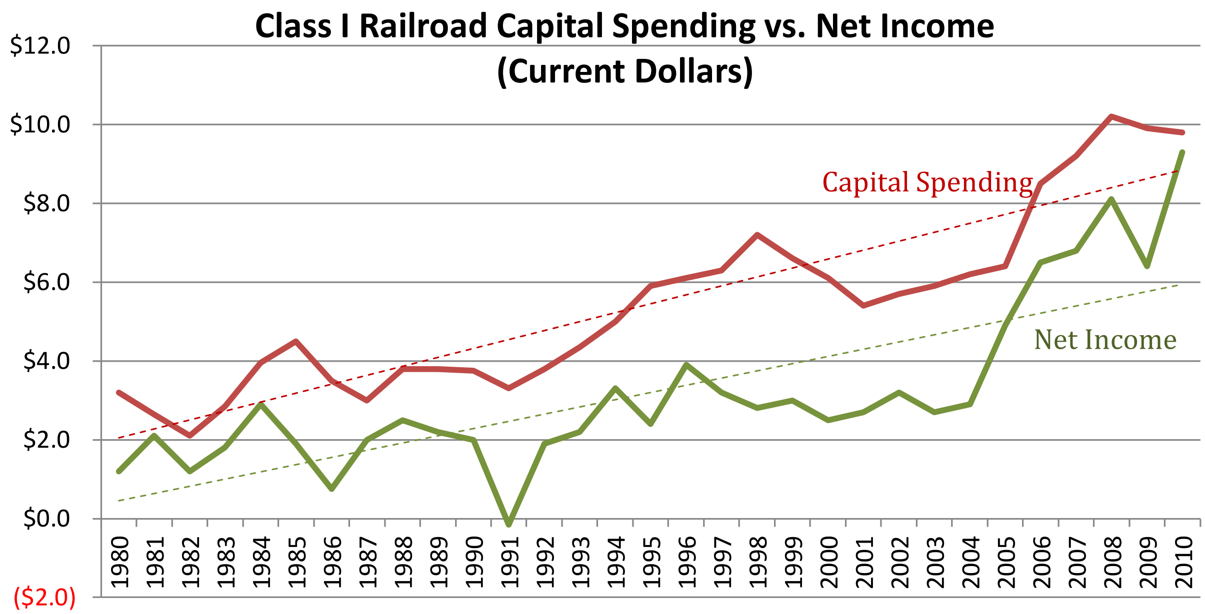
Table 17. Average Capital Expenditures of Class I Railroads, 5-year Average, 2007-2011

Average Capital Expenditures of Class I Railroads, 5-Year Average, 2007-2011 ($ mil.)		
Category Description	**Average Annual Expenditure, 2007-2011**	
Rail & Other Track Material	$2,431	24%
Ties	$1,551	15%
Ballast	$921	9%
Land Acquisition/Grading	$447	4%
Communication Systems/Signals	$787	8%
Other	$1,464	14%
TOTAL ROAD/INFRASTRUCTURE	$7,601	75%
Locomotives	$1,378	14%
Freight Train Cars	$603	6%
Computer Systems	$234	2%
Highway Revenue Equipment	$124	1%
Other	$200	2%
TOTAL EQUIPMENT	$2,539	25%
GRAND TOTAL	$10,140	100%

Source: Association of American Railroads

How do railroads decide how much to invest to maintain their systems? A number of the Class I's have internal business goals of continuing to reinvest 16-18% of annual gross rail revenues back into capital expenditures. And, history provides ample evidence that net revenue of the railroads and actual CapEx spending are correlated closely on a year-by-year basis. Figure 30 reflects the relationship between net income and capital expenditures. While there may be a goal of carriers to return a set percentage of gross revenue back into capital over time, on any given year, it is clear that there is sensitivity also to profitability and the ability to generate returns to pay for expenditures out of current earnings. Both gross returns and profitability seem to be important factors for any given year's CapEx spending.

Figure 30. Class I Railroad Capital Spending vs. Net Income (Current Dollars)



With a growing economy and need for expanded rail freight transportation, will this "business model" of relying largely on private investment from railroads result in expanded service that will support economic growth, or will some kind of additional government support be necessary? It is of some interest to note that roughly 75% of railroads' CapEx spending---the spending on road infrastructure---is a cost not paid by trucks directly, but rather through fuel taxes, tolls and heavy vehicle use tax (maximum of $550 per year). According to DOT data, trucks represent about 10% of vehicle miles traveled on U.S. roads and highways in 2010. With federal and state spending on roads and highways at $257 billion (2006 data), potentially a sizeable portion of this expense could be attributable to truck traffic. Section VII analyzes the specifics of likely highway and road investments driven by truck traffic. Certainly, at least a portion of this needed road investment is being recovered by fuel taxes and heavy vehicle use tax.

B. Soybean and Grain Handling Infrastructure Investments

Since 2005, the commercial soybean and grain handling sector has been in rapid transition as it scrambled to meet shifts in higher volumes of agricultural output in response to the expansion of biofuels (ethanol and biodiesel) and shifting import patterns to a more market dominance by Pacific Rim countries, particularly for whole soybeans. In a study by COBANK, Change on the Rural Horizon: Managing the Expansion of Grain Storage in the Corn Belt, it is noted that total on-farm and off-farm grain storage capacity increased by 17 percent from 2005 to 2011, and commercial capacity grew 24% during this same period. This market response to structural shifts in agriculture has allowed a rapid modernization of the commercial sector to place storage in more optimal locations, to position receiving/loading operations at points that better locate commodities for market accessibility, and utilize faster/newer technology. It has also contributed to a more rapid upgrade of transportation infrastructure than would have otherwise occurred.

This same study observed that "meeting the evolving needs of producers will be critical to the future survival and success of grain handling firms." And the study also cautioned that, while infrastructure investments are important to meet needs, the business environment is also one of greater risks to be managed. Price volatility and buying/selling risks are much higher than in past years. Shifting transportation patterns have changed the flow of commodities, and the rapid rate of investments have created uncertainties about investment opportunities, as the industry pushes farther west for expansion and both shuttle loading facilities, processors and biofuel plants are competing side-by-side for the same bushels. Total soybean and corn planted area has increased 20 million acres (7% of U.S. tillable land base) in less than a decade, and has caused a rapid modernization of the commercial marketing and processing sector at the same time.

Since the early 1980s, many of the investments in rail infrastructure have been focused on reducing the cost of moving soybeans, corn, wheat and other commodities to market. And, for agricultural commodities, that has meant addressing agriculture's natural seasonal peaks and valleys, and providing for higher volumes point-to-point. All the major railroads have instituted unit train movements that price shipments, origin to destination, for trains hauling 75-car, 90-car, 100-car, or 110-car trains. For a number of the Class I's, "shuttle" train programs have been instituted that further encourage loading/unloading efficiency, include dedicated equipment, performance incentives, and attractive rates. The soybean sector's challenges in becoming more efficient on rail movements include:

- The natural growing season will always produce relative surpluses near harvest that will cause soybeans to seek a "home." Markets can resolve dislocations caused by excess surplus (caused by good crops), but at a price.
- U.S. soybeans have an especially intense seasonality component, as 75% to 80% of export soybeans must be moved in the September through February period to optimize North American export opportunities, prior to South American harvest and shipping season.
- Seasonality issues, plus the intensity of harvest to put soybeans/grain in storage as quickly as possible to maintain high quality means that elevators and processors need high capacity dumping. Many facilities have truck dumping capacity to handle 30 to 50 trucks per hour. And the entire marketing system has had to build considerable excess capacity to ensure timely harvest service.
- For the physical marketing sector, surplus capacity costs money, but with railroads, surplus car/power capacity is particularly expensive. With grain car leasing costs at $500-$600 per car, it is not inexpensive to leave such equipment idle for extended periods. Seasonality of railcar usage is a fundamental problem with reducing cost in the soybean and other bulk agricultural sectors.

To meet the challenge of efficient utilization of equipment and to encourage soybean and grain shipments throughout the year, not just during the rush of harvest, shuttle programs have been developed by the Class I carriers to obtain commitments from shippers to utilize dedicated locomotives and cars throughout the year. Railroad shuttle programs vary by carrier, but many have the following features:

<u>Railroad Shuttle Programs</u>

1) Dedicated power (locomotives) and equipment (cars, which may be rail-owned or private)
2) Specified shuttle origins and destinations that can handle allowable train sizes (75s, 90s, 100s or 110s)
3) Restricted time to load and unload (generally 15 hours)

4) Destinations for western railroads include export locations, domestic feeders and a number of facilities in Mexico
5) Adequate track at shipper and receiver location to load a train as a single unit (110 car train requires about 7,400 feet of track)
6) Commitment by shipper (or receiver) to load/receive a specified number of trains per month for an identified period (generally for 1-year, but it could be for 6-months or 2-years)
7) In some programs, if shuttle capacity is not needed by a shipper, the shipping capacity can be sold to other shuttle loaders on the railroad's system through auction systems

Advantages/Disadvantages of Shuttle Programs

1) Railroads provide supply source and destination flexibility by continuing to add to origins and destinations capable of handling shuttle-sized capacity
2) Shuttle programs are market responsive; if loading capacity is surplus it can be traded and repositioned to other locations
3) The commitment to utilize equipment throughout the year helps the railroad manage assets and reduce costs
4) The shipper/receiver and farmer benefit from lower rates (a 20 to 35-cent/bushel difference in single car rates compared to shuttles is common in the western U.S); in the eastern U.S., 15 to 25-cent/bushel differences are typical, but will vary depending on distance to market; in some markets, pricing differences are handled through contracts with the receiver
5) In addition to market rate differences, some shuttle programs pay efficiency payments and trip incentives to the loading facility. These are generally privately negotiated between carrier and shipper and will depend on a number of factors
6) A disadvantage of shuttles to the shipper is that he must make a firm commitment to utilize the rail freight, and ship during periods of time when shipping may not be profitable in immediate markets. Of course, the shipper can sell the shuttle in the auction market, but losses on individual shuttles will generally occur in soft markets regardless of which facility does the physical loading; while this creates risks for the shipper, without this commitment, the railroad would not have as much incentive to engage in such program
7) To participate in shuttle programs, the shipper or receiver must make sizeable investments in track and equipment (to meet the 15-hour window for loading). The track investment alone for industrial track and grading can be $2-3 million (see additional information below)

Investment Cost of Shuttle Loading Facilities

The attractive economics of shuttle loading has driven investments and the number of locations has increased rapidly, more than doubling since 2000. But the investment costs are sizeable. Many of these facilities are located outside existing townships (so-called "greenfield" locations) to permit handling areas for large trains and associated storage/handling operations. Recent shuttle facilities are costing investors in the range of $18 million to $25 million in investment costs. A recent facility in South Dakota was built at an announced cost of $35 million. Where is this money being invested? Some recent typical cost ranges are shown in Table 18.

Table 18. Current Investment Costs for Rail Shuttle Facility

Investment Item	Current Cost (approx.)
Track and Grading	$2 - 3 million
Facility (concrete, 2 mil bu storage, office, control room, utilities)	$12 - $14 million
Land Costs	$0.5 - $1.5 million
Fertilizer/Receiving (if fertilizer distribution is part of plant)	$6 - $8 million

C. Example Investment Facilities: North Dakota and Minnesota

Shuttle Loader: Alton Grain Terminal, Alton, North Dakota

This shuttle facility, located in eastern North Dakota, equi-distant between Fargo and Grand Forks, was originally built in 2001 with about 2 million bushels storage and 14,000 feet of rail track to be able to load shuttle trains going both north and south. It can load up to a 130-car train. The plant originally cost $9 million to build. In 2004 an additional 2 million bushels capacity of storage was added, as was a fertilizer rail receiving, storage and truck load out facility. The fertilizer portion is owned by Alton Agronomy LLC, which is comprised of five of the original owners of Alton Terminal and one other cooperative. Fertilizer capacity was expanded in 2008 to 40,000 tons of storage. This facility is located on the BNSF Railway, and was one of the first in the area. It ships corn, wheat and soybeans. In past years, corn was the highest volume commodity, but since an ethanol plant was located in Casselton (50 miles to the south), soybean shipments have come to dominate movements. Annual volumes are running about 27 million bushels with 60-70% of that amount comprised of soybeans. Alton Grain Terminal is owned by Halstad (Minn.) Cooperative and 7 other nearby cooperatives that ship part of their grain and oilseeds through the Alton plant. This terminal does business sourcing with approximately 50 elevator locations in eastern North Dakota and Western Minnesota, and the typical elevator shipment to the shuttle facility is 30-35 miles. Direct producer deliveries are about 50% of the elevator's volume, and farmers deliver direct from as far as 50 miles away or more.

Profile of Facility

Facility: Alton Grain Terminal, Alton, North Dakota shuttle loader, BNSF Railway connection

Location: Eastern North Dakota, 50 miles north of Fargo, at the crossing point of Interstate 29 and highway 200, just west of the Minnesota border.

Receives: All truck receipts, 50% from farmers, 50% from elevators; receives soybeans, corn and wheat. Currently 60-70% of volume is soybeans. Every truck receives an official grade from North Dakota Grain Inspection prior to dumping. This is a little unusual as probably only 10% or fewer of U.S. shuttle operations officially grade every load. Official grades are used for consistency of inbound and outbound movements. Dumping capacity is 45 trucks per hour.

Draw Area: Generally within a 75-mile radius.

Ships: Shuttles of soybeans, corn and wheat; shuttles generally go west, but can move east and south, depending on market demand.

Fertilizer Receiving: Facility is owned by Alton Agronomy LLC and leased to Agrium and Mosaic; receives 30-50 car units from Agrium; and 85-car units from Mosaic. It is associated with a buying group and handles and loads for movement to surrounding area cooperatives and farmers. Alton Terminal runs the logistics of the operation for the owner, Alton Agronomy.

New Infrastructure Considerations: While the facility has plenty of track for loading soybean and grain trains, management for the operation is considering putting in a rail spur to handle cars related to the fertilizer operation. Generally there is adequate capacity, but in some cases, an additional rail spur would alleviate a problem of where to locate fertilizer cars during busy soy or grain train loading periods.

Image 1. Alton Grain Terminal, Alton, North Dakota

Image 2. **Alton Grain Terminal, truck weighing and dumping; 3 dump pits with 45 trucks/hour capacity**

Image 3. **Alton Grain Terminal, owned by Alton Agronomy, LLC, Fertilizer Receiving Terminal**

Soybean Processor, Minnesota

(The researcher for this study visited a soybean processing plant in Minnesota that has made some modifications to its transportation/logistics systems for bean receipts and meal/oil shipments. This description/evaluation is presented on a generic basis for Minnesota soybean processing plants.)

Minnesota is the fourth largest soybean crushing state in the U.S. by total volume. Ranked in order of total volumes crushed, the top five states are: Iowa, Illinois, Indiana, Minnesota, and Missouri. The table below offers a comparison of the U.S. and Minnesota on production, crush, exports and export customers (counting net importing states as "importers" of Minnesota-produced meal).

Minnesota and U.S. Soybean and Soymeal Production and Exports, 3-year Average -Average of 2010/2011 to 2012/2013-				
	U.S.		**Minnesota**	
Soybean Production (mil bu)	3,100		301	
Soybean Exports (mil bu)	1,350	(44%)	130	(43%)
Soybeans Crushed (mil bu)	1,630		157	
Soymeal Produced (thous s.t.)	38,800		3,750	
Soymeal Consumed Internally (thous s.t.)	30,200		1,000	
Soymeal Exported (thous s.t.)	8,600 (22% out of U.S.)		2,750 (73% out of MN)	
Soymeal Export Receiving Points (in order of volume)	All Gulf Shipping Points		Western States	
	Mexico		Exports from U.S.	
	Canada		Pacific N.W. States	
	Atlantic Ports		South Central States	
	Pacific Northwest Ports		Northeastern U.S.	

Source: Private company data and ProExporter, Inc. proprietary data.

As can be seen by the table, soybean processors in Minnesota are very focused on producing meal and oil and moving almost 3/4 of the meal out of the state. Thus, there is a very heavy reliance on rail movements to meal markets outside the state.

Receiving Soybeans: Soybean processing plants typically rely on both producer deliveries and elevator deliveries to keep plants operating. Having local producers that have on-farm storage can produce a stream of soybean inflow throughout the year, and having elevator capacity nearby can help ensure timely deliveries during slow farmer delivery periods. Processors generally have ample storage capacity to ensure continuous operation, as unexpected plant shutdowns for any reason (lack of soybeans, logistical congestion, or operational problems) are very expensive for halting and restarting operations. Many processors, particularly those dependent on producers for a large percentage of volumes are investing more into receiving infrastructure, building capacity to dump 60 to 80 trucks per hour in some cases. Obviously, this kind of capacity is built solely to serve the harvest-time capacity needs, but increasingly such capacity is needed to serve customers that are attempting to harvest in a short time period to maintain crop quality and quantity. The benefits to the farmer are quick truck turn-around at harvest and the ability to manage harvest flows of equipment and soybeans with greater precision and predictability. Keeping trucks on the road rather than waiting in line to dump is worth money at harvest. Both the soybean farmer and the processor benefit by improving soybean harvest quantity and quality.

Shipping Soybean Meal: While 25% to 30% of the typical Minnesota soy processor's meal output is trucked to local or regional feeding operations, the biggest changes in meal markets are coming in the rail markets. Minnesota is participating in a wide range of rail meal markets----exports out of the U.S., California and Washington feed markets, Canada, South Central U.S. and even the Northeastern U.S. As rail markets for whole soybeans and other grains have transitioned in the last 10 years toward 100-car unit trains and shuttle trains, so have meal markets, but somewhat more slowly. Some meal shippers, and some domestic receivers, are building capacity to handle up to 100-car trains. Sometimes receivers of such trains break the trains apart or load out some of the meal onto trucks at destination for subsequent delivery to other users. The value of the unit train shipments is to reduce out-of-pocket costs as rail costs and rates are reduced by $8 to $12 per ton by improved cycle time and equipment utilization. (Note: Many soybean shipments are moved at confidential contract rates, but this level of savings is a realistic valuation, based upon single-car vs unit train whole soybean rates.) Having capacity to ship larger trains also provides the soy processor the ability to reach additional markets and to build a more diverse customer base. While building rail infrastructure to manage unit train loading may entail an investment in an additional 1.5 to 2.0 miles of side track ($3 to $5 million), increasingly, the capacity to move product quickly, at higher volumes, is being viewed as a trend in supplier operations that customers will want and demand in coming years. So, while the soybean processing industry will continue to ship meal in a wide variety of shipment volumes, where transportation savings can be earned by larger volume movements, investments are being made to capture those savings for the benefit of the marketing industry and the producer.

D. State-by-State Supply-Demand Deficits

With a $20 million price tag for a new shuttle-loading operation, and a cost for a new soybean processor in the range of several hundred million dollars, positioning new plants is done very carefully by commercial businesses. Every state has a very different and distinctive profile of supply and utilization for soybeans, corn, wheat and other grains. The ProExporter Network maintains an extensive private database on soybean and grain production, usage by category, shipments by rail into and out the state, crush and distribution of oil and meal, and similar products for corn and wheat. As processing plants are added; as ethanol plants are built or at times are idled such as in 2012 with drought conditions; and as soybean and grain plantings drift westward, supply-utilization trends are important to commercial interests to locate in areas that are near adequate sources of supply to serve plant needs adequately.

On the next three pages are estimated net state export (or import) data for major oilseed producing and consuming states. The gray circles indicate a surplus that is available for export. The white circles indicate a deficit that has to be filled by bringing the commodity into the state. As an example, the way these calculations are made for soybeans: the following items are estimated and taken into account for each state on an annual basis:

- soybean production
- meal production
- animal consuming units
- other protein meals fed
- rail movement of soybeans
- crush
- oil production
- soybean fed in state
- oil shipments
- net exports
- state carryover
- barge movements of soybeans
- total state usage

Figure 31. **Estimated Net Soybean Exports for the 2012 Crop Year, by State and Export Port**

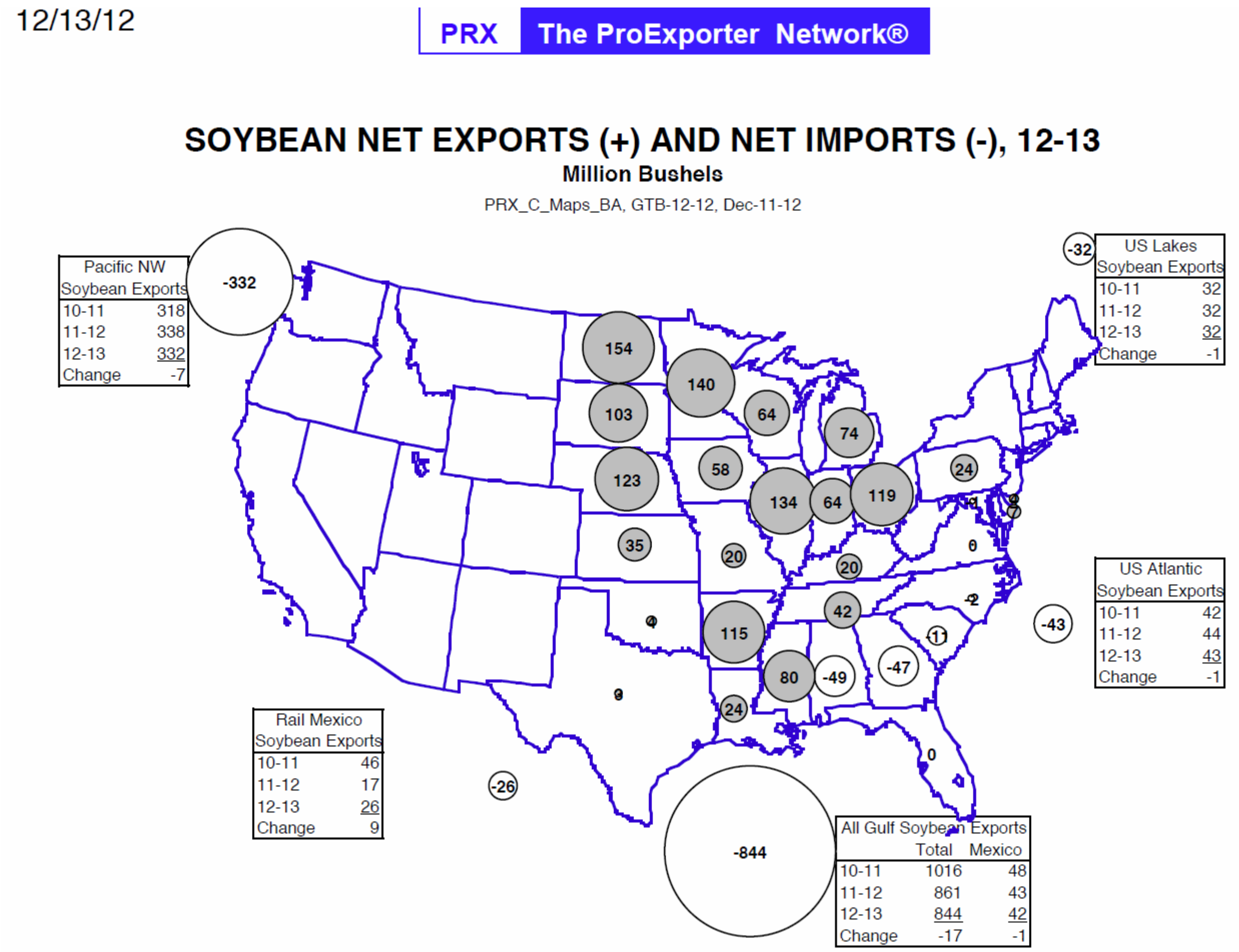


Figure 32. Estimated Net Corn Exports for the 2012 Crop Year, by State and Export Port

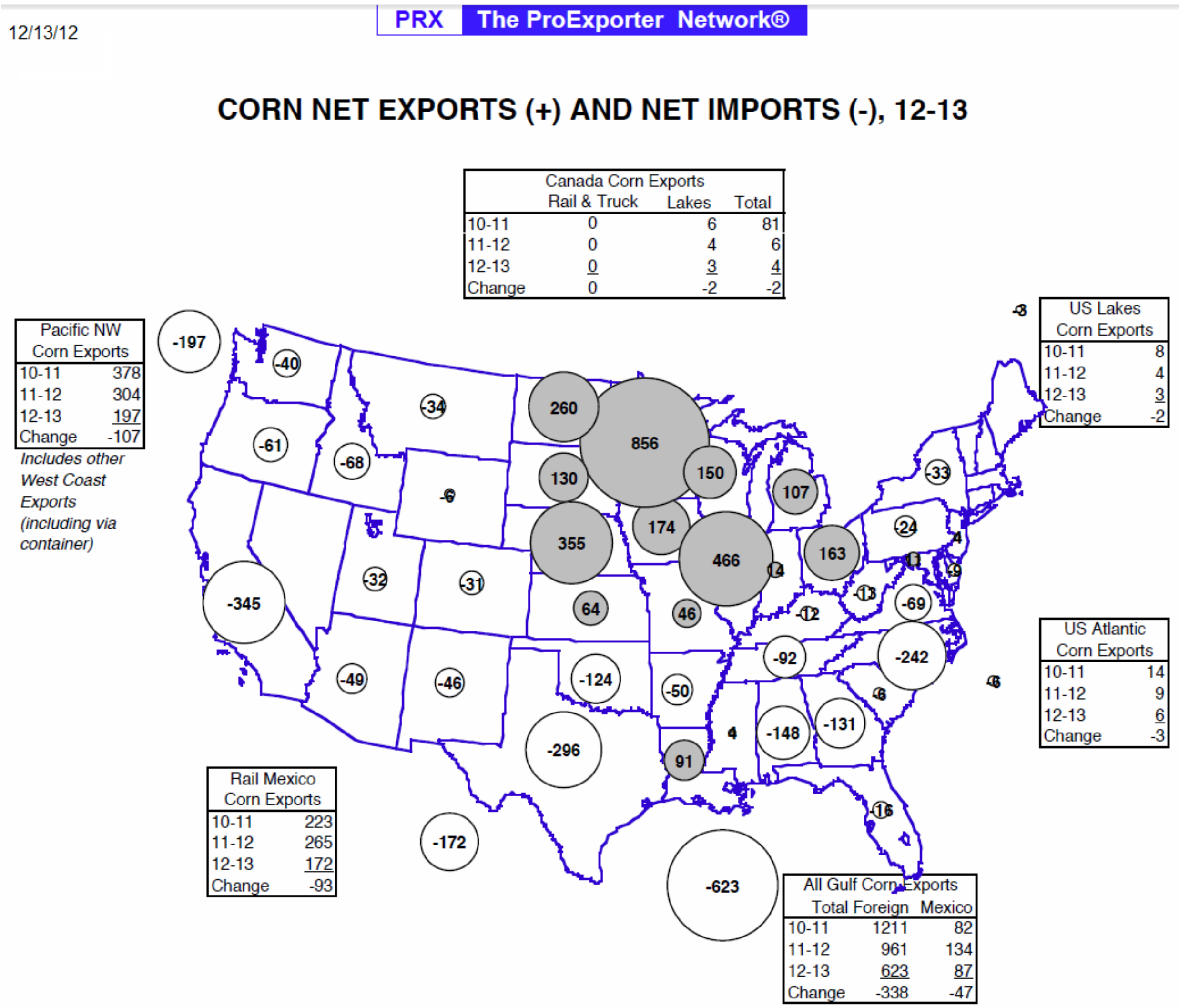
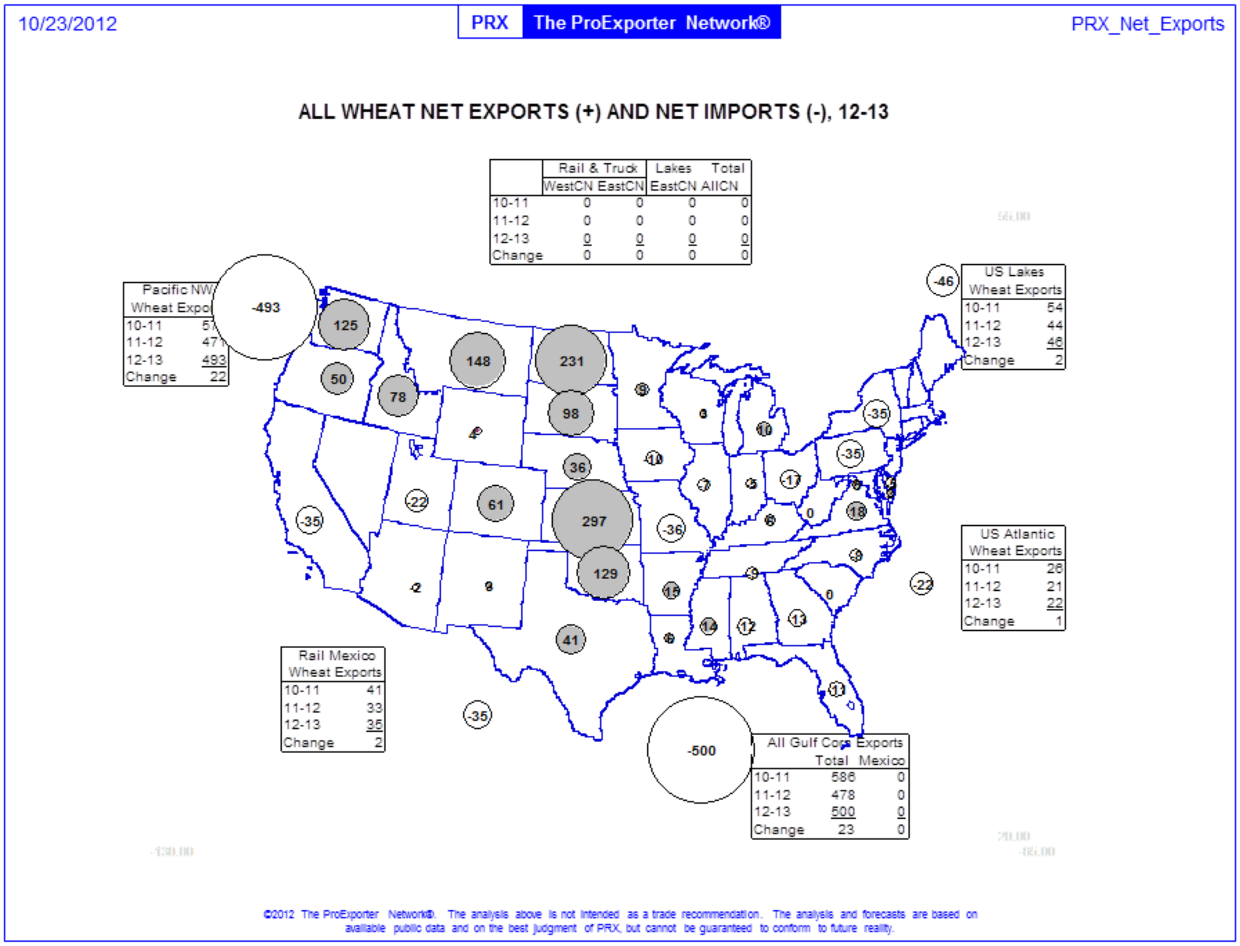


Figure 33. Estimated Wheat Net Exports for the 2012 Crop Year, by State and Export Port



Computed "net exports" of course vary considerably by year because weather patterns and production can greatly affect actual net exports for a given year, which is what happened in 2012 with the drought conditions in much of the center U.S. that dramatically affected corn yields, and to some extent soybeans.

Soybean and corn net exports for 2012 will be constrained in both Iowa and Illinois by the drought conditions. With an estimated 332 million bushels of soybeans being shipped out of the Pacific Northwest and 844 million bushels out of the center gulf, soybean exports will be down from 2011, but still a pretty healthy export volume is expected.

Gulf corn export movements are expected to be down by 338 million bushels for center gulf movements, and the river movements of corn will likely be much more affected than the Pacific Northwest Port moves.

The pattern of wheat net exports by state, not surprisingly, is quite a bit different than for corn and soybeans. Kansas and North Dakota are in strong surplus positions for 2012, and total export movements out of all the major U.S. ports are expected to be slightly higher than for 2011.

To look at net export data without the variability that one-year's weather (like 2012) can have on exportable supplies from individual states, we calculated 5-year average net exports for 17 states that are being reviewed as part of this study. These data are presented in the table below for both individual commodities, soybeans, corn and wheat, and a combined total, labeled "all commodities." However, we made one adjustment to the data. Because of the dramatic impact the 2012 drought has had on yields in selected states, for states falling below 10% of historical average yield, we replaced 2012 yield with the average for 2010 and 2011, and replaced in-state utilization with the average for the same two years, 2010 and 2011. These adjustments are intended to "normalize" the data for 2012 to eliminate the drought impact and essentially portray the data more closely from the standpoint of the production and supply that was intended by farmer plantings to be produced in 2012. We think these adjustments may more fairly reflect the current trends markets that will affect net exportable supplies in the future.

Table 19. 17-State Net Exports of Soybeans, Corn and Wheat, 5-yr Average, 2008-2012

17-State Net Exports of Soybeans, Corn and Wheat, 5-year Avg., 2008-2012*, in million bushels					
Region	**State**	**Soybeans**	**Corn**	**Wheat**	**All Commodities**
Eastern	Indiana	77	266	0	343
	Kentucky	7	45	7	59
	Michigan	72	147	12	232
	Ohio	102	230	-13	319
	Tennessee	38	-99	-8	-69
Central	Illinois	170	1066	-7	1229
	Iowa	99	306	-8	397
	Minnesota	115	547	14	676
	Missouri	60	116	-38	138
	Wisconsin	70	144	5	219
Western	Kansas	69	207	250	526
	Nebraska	171	473	45	689
	North Dakota	115	93	225	433
	South Dakota	128	215	112	455
Far West	California	0	-294	-31	-325
	Oregon	0	-32	48	16
	Washington	0	-21	120	99

*Crop yield data for states heavily affected by the 2012 drought were adjusted to reflect more normal yields (reflected by an average of 2010 and 2011 data) and more normal utilization patterns (using the average of 2010 and 2011 data)

Figures 34 and 35 display bubble maps for soybeans and for all three major commodities combined taken from the data in Table 19.

Figure 34. 17-State Net Exports of Corn, Wheat, and Soybeans, 5-yr Average, 2008-2012

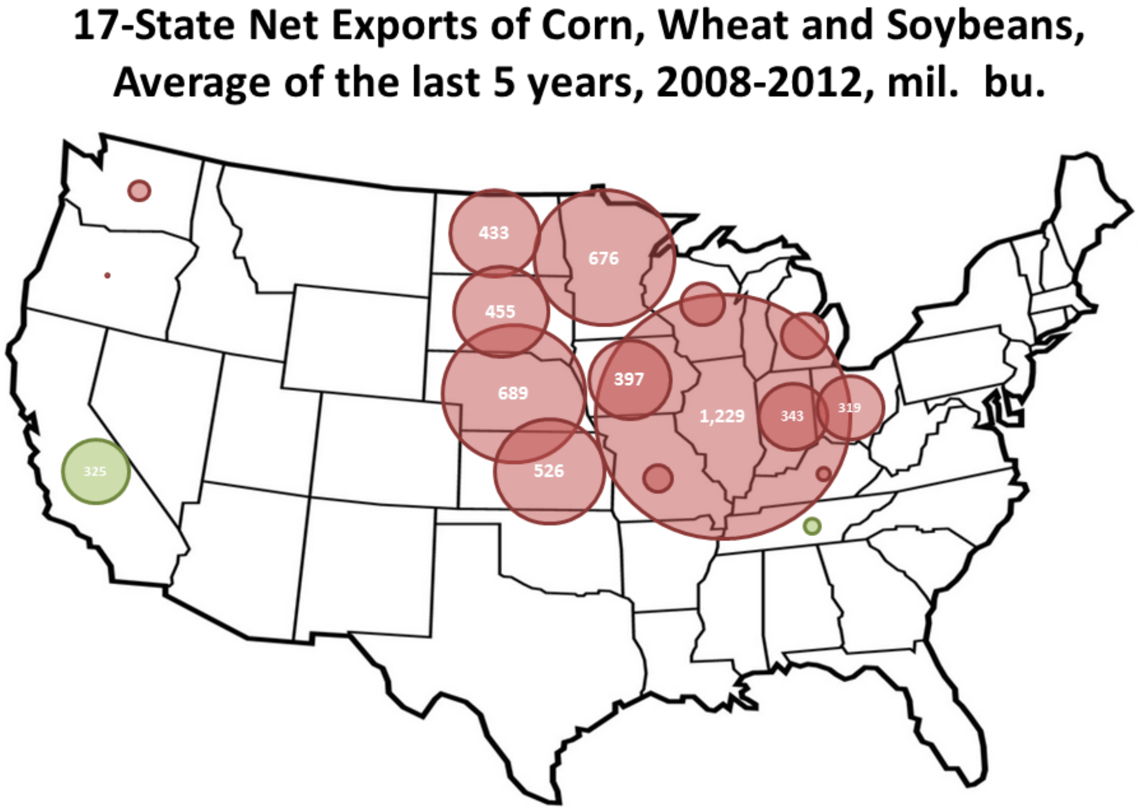
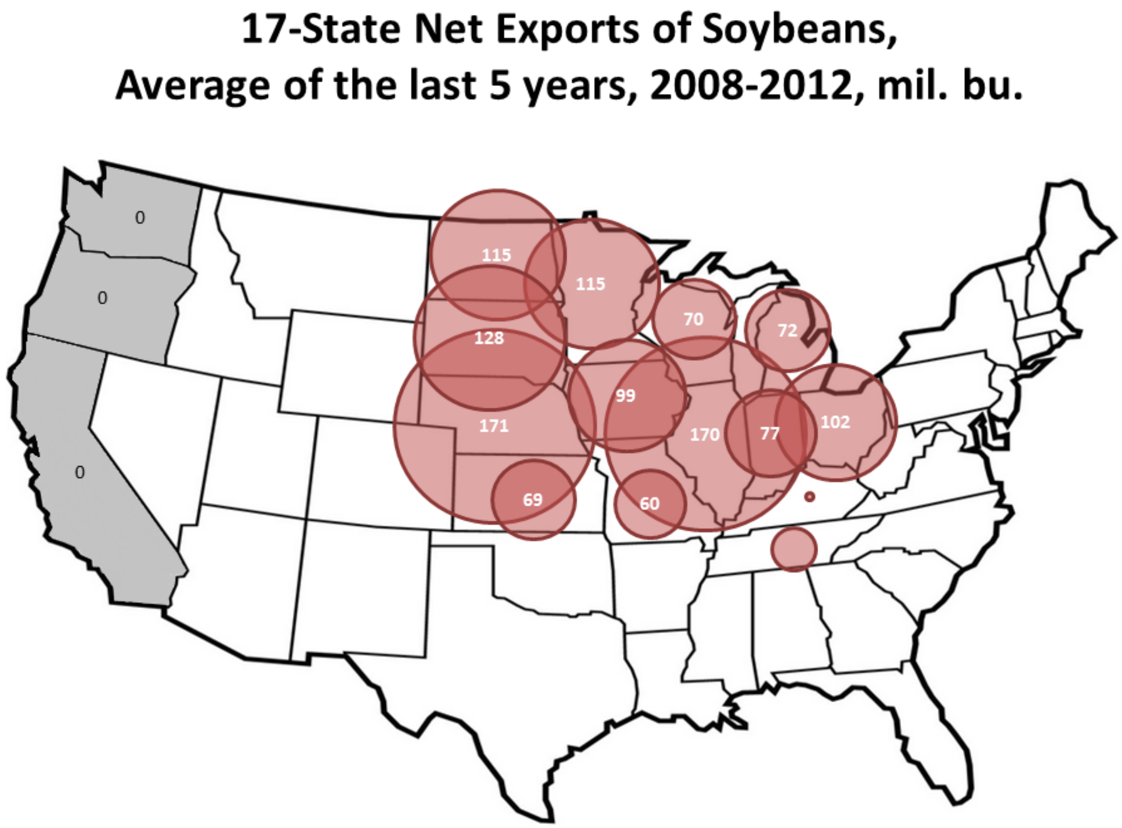


Figure 35. 17-State Net Exports of Soybeans, 5-yr Average, 2008-2012



As much detail as is provided by Table 19 and the maps in Figures 34 and 35, there are other variables that commercial investors have to account for in choosing wisely for the placement of a new loading facility or looking at which facilities should be upgraded to address improving yields or higher levels of planting which could lead to new business. Illinois is a good example of a state where the net exports are huge. There are shuttle loaders being built in that state because of that fact, but there are risks. In a year like 2012, Illinois' state "net exports" are estimated at 600 million bushels, virtually one-half of normal. Illinois has very large commodity production, but it also has large volume processing plants. Those plants may temper demand some in a drought year in response to high market prices, but the reductions in in-state plant usage are rarely one-for-one with yield reductions, so that when yields drop 25%, net exportable supplies may drop 50%. And, for shuttle shippers, in a state like Illinois that has ready access to the river system, unless it is a very unusual year, waterway movements will take much of the surplus out of the state via barge operations

Shuttle loading operations continue to be built in a number of states, but of recent announced shuttle loaders, most have come in the Dakotas, Nebraska, Kansas, and Illinois. How quickly future investments in shuttle loading capacity is added will depend much on whether corn and soybean production will stabilize at today's current high levels, or potentially even grow. Future expected yields will also factor in heavily. Coming off some years of very friendly and stable weather patterns for U.S. production, we have observed 3 years of below trend yield. Will this affect future expectations on yield trend or variability? And for the soybean sector, a key ingredient of future demand will be soybean export demand. Oilseed global exports have had one of the strongest records of any commodities in the last 12 years, increasing more than 120%. Will this kind of growth continue? China is importing 57% of global soybeans. Will that trend continue? Investments in new infrastructure by commercial agriculture companies serving soybean farmers and others have yielded big dividends in the last decade. There will be future investments, but the rate of investment could be tempered by the perception of a bit more risk moving forward.

E. State and Regional Modal Movement Patterns for Soybeans and Grain

In this section, we examine more closely the relationships between truck, rail and water movements of grain and soybeans in the 17 states reviewed in this study. The most recent data available in the U.S. Department of Transportation's FAF-format (Freight Analysis Framework) which is based directly on Bureau of Census Flow data is from 2007. This data is then compared to USDA modal share data from 2007 to draw some comparisons about the structure of the data and what it means for this analysis. FAF data is broken into Cereal Grains (02) which includes: wheat, corn, rye, barley, oats, grain sorghum, and rice. Soybeans in the FAF data is contained in Agricultural Products Except for Animal Feed (03), which includes soybeans, cottonseed, canola, other oilseeds, cotton, sugar beets, tobacco, and a wide variety of fruits and nuts. Thus, in northern corn belt states (that do not grow cotton and tobacco) 03 data may provide a reasonable approximation of soybean movements. In states such as Michigan, California and Washington that grow considerable quantities of fruit compared to field crops, the data from 03 do not represent soybeans very well. (For this reason, the far western states of California, Washington, and Oregon are excluded from Table 21.) So, to analyze this section, the data review grains movements and soybean movements separately, and the conclusions drawn from the 03 data in Table 21 will necessarily have a lower level of confidence, because the soybean data are being combined with other crop data to give a composite data series.

All the data in Tables 20 and 21 are FAF-DOT data except for the very bottom row of each chart that shows how USDA data on modal shares compares to FAF data. The data in the two tables are presented in million tons (rather than ton-miles) to help simplify the comparisons and the conclusions that can be drawn. FAF data are assimilated in such a way that any movement of grain in a conveyance is counted as one movement. Thus, the number of total tons recorded as being moved by truck, rail and water is several times the total recorded production for the state for that year. When the producer hauls bushels to farm bins or a commercial elevator from the field at harvest, that's one truck move. Any further truck moves down the marketing chain are also then recorded, so bushels are counted multiple times. For the most part, barge and rail movements are recorded only once for the same bushel, although some bushels do travel by rail to barge. The far right-hand column shows total truck tonnage divided by the bushels produced. For grain movements, shown in Table 20, the average number of truck moves is the lowest in the Central region comprised of IL, IA, MN, MO and WI. This probably reflects how close processing plants---e.g., ethanol, wet corn mills and flour mills---are in this region compared to others. This region has a high proportion of regional exports that move by rail and water, both of which tend to be readily accessible, which also keeps the number of truck moves lower than in some other states.

Table 20. Grains (excluding Soybeans) State and Regional Modal Movement Patterns

Grains (no Soybeans) State and Regional Modal Movement Patterns, DOT Freight Analysis Framework (FAF) Data, 2007					
(million tons)					
State/Region	**Truck**	**Rail**	**Water**	**Production**	**Truck Tons Divided by Production (ratio)**
Indiana	50.6	10.2	1	28.8	1.8
Kentucky	12.6	0	4.4	5.3	2.4
Michigan	28.5	2.1	0	9.1	3.1
Ohio	41.1	7.1	1.4	16.2	2.5
Tennessee	8.1	1.5	0.7	2.8	2.9
Eastern Region	**140.9**	**20.9**	**7.5**	**62.2**	**2.3**
Illinois	117.3	23.4	26.1	66.4	1.8
Iowa	129.6	8.6	4.5	68.3	1.9
Minnesota	82.4	22.9	13.3	36.1	2.3
Missouri	40.4	7.3	15.3	14.1	2.9
Wisconsin	39.9	2.9	0.1	13.5	3
Central Region	**409.6**	**65.1**	**59.3**	**198.4**	**2.1**
Kansas	76.7	17.7	0.6	28.9	2.7
Nebraska	85.7	16.8	0	44	2
North Dakota	44.1	16.3	0	16.9	2.6
South Dakota	52	4.6	0	20.3	2.6
Western Region	**258.5**	**55.4**	**0.6**	**110.1**	**2.3**
California	30.1	1.6	0	1.8	16.5
Oregon	10.8	0	0.5	1.7	6.5
Washington	19.3	2.2	2	5.1	3.8
Far West Region	**60.2**	**3.8**	**2.5**	**8.6**	**26.8**
17-States FAF-DOT	869.2	145.2	69.9	379.3	2.3
Percent	80%	13%	7%		
50-States FAF-DOT	1,183.6	164.3	82.9	456	2.6
Percent	83%	11%	6%		
U.S. USDA Data	193.6	132.9	49.4	456	0.4
Percent	52%	35%	13%		

Source: U.S. Department of Transportation, Freight Analysis Framework.

Table 21. Soybeans State and Regional Modal Movement Patterns, DOT Freight Analysis Framework (FAF) Data, 2007

Soybeans (plus other non-grain commodities) State and Regional Modal Movement Patterns, DOT Freight Analysis Framework (FAF) Data, 2007					
(million tons)					
State/Region	**Truck**	**Rail**	**Water**	**Production**	**Truck Tons Divided by Production (ratio)**
Indiana	5.9	1.2	0.1	6.3	0.9
Kentucky	4.9	0	0.9	0.8	6.1
Michigan	9.4	0.5	0	2	4.7
Ohio	7.5	1.8	0.8	5.8	1.3
Tennessee	2.8	0	0.5	0.5	5.6
Eastern Region	**30.5**	**3.5**	**2.3**	**15.4**	**2**
Illinois	14.6	1.5	9.2	10.5	1.4
Iowa	13.7	1.1	2.2	13.2	1
Minnesota	15.9	2.5	3.4	7.6	2.1
Missouri	7.9	0.9	4.5	5.1	1.5
Wisconsin	18	0.1	0.1	1.6	11.3
Central Region	**70.1**	**6.1**	**19.4**	**38**	**1.8**
Kansas	5.9	0.5	0	2.5	2.4
Nebraska	5.9	0.8	0	5.7	1
North Dakota	3.8	2.3	0	3.1	1.2
South Dakota	4	1	0	4	1
Western Region	**19.6**	**4.6**	**0**	**15.3**	**1.3**
14-States FAF-DOT	120.2	14.2	21.7	68.7	1.7
Percent	77%	9%	14%		
50-States FAF-DOT	364.9	17.2	27.9	80.3	4.5
Percent	89%	4%	7%		
U.S. USDA Data	48.4	19.5	16.3	80.3	0.6
Percent	58%	23%	19%		

The bottom two rows of Table 20, comparing U.S. data from FAF-DOT with USDA's estimates of modal shares demonstrate how different the two data sets are. USDA data looks at the grain and soybean crop (from USDA crop reports); has an accurate estimate of barge grain and soybean movements from the Army Corps of Engineers; and utilizes waybill sample data from the Surface Transportation Board to accurately gauge rail grain movements. Truck modal share for USDA is derived purely as a residual from the other modal data. For USDA data, if grain was ever moved by barge or by rail, then that grain is classified as a barge or rail move. The only grain that is classified as a truck move is grain that moved purely as truck, from farm to end-processor or export. In USDA data, any combination move of truck-to-rail; truck-to-barge; or rail-to-truck (at destination) is classified as barge or rail.

The FAF data provide a much truer sense (in particular for grains shown in Table 20) of the transport movements near the farm level, and how important truck movements are in delivering soybeans and grain to market. Most truck moves are within a 50-mile radius of the destination, although some moves go well beyond this range to reach processors or shuttle-train loading elevators. But even though the moves are generally short, they are none-the-less necessary to reach markets. The USDA modal share data provide the best reflection of the final modal move to the destination, although some of the movements by truck are at destination where shuttle trains are sometimes unloaded into trucks for further distribution.

Table 21 which is the most accurate approximation of soybean movements contains quite a bit more variability than Table 20 for grains, and that is to be expected as soybeans are being combined with some other crops (this is the nature of the FAF data which cannot be avoided). But there are some general conclusions to be drawn from Table 21 as well. The states with soybean processing plants: IN, OH, IL, IA, MN, MO NE, and SD tend to have very low ratios of truck tons moved to tons of production (shown as far right-hand column). In these states, some soybeans can be trucked directly from the field to the processor. And for many of these states, for soybeans not processed within the state, some may be loaded directly to barge or rail to be exported out of the region. Minnesota is somewhat higher than other soybean crushing states, but this may be due to the variety of other crops that are grown in that state. Other states without soybean crushing capacity tend to reflect a higher number of movements, but these same states also have a variety of other crops produced, so the data are probably reflecting a combination of factors influencing the data in the table. These states would include TN and WI. For the major producing states of soybeans and corn, there is a relatively consistent pattern of fewer truck moves for soybeans than for the grain crops, which may reflect both industry structure and marketing and on-farm storage preferences of producers.

SECTION VI. GOVERNMENT INCENTIVES FOR RAIL INFRASTRUCTURE: INVESTMENT COST IMPACTS

Previous portions of this report have estimated the potential investment gap in rail infrastructure that could limit economic growth in the U.S. or reduce the service and timeliness of performance of railroads serving U.S. soybeans and other industries. While government funds much of the highway system and a portion of the waterway system (a portion of infrastructure plus dredging and other maintenance), government incentives for rail investment have come in the form of government loans, tax incentives, accelerated depreciation and other tax-based incentives. This section will look at measuring the financial and cost impacts of these various forms of government incentives. (Note: This study will not cover the short line railroad track maintenance tax credit program that was available 2005 through 2011, and was reinstated by Congress in January 2013. This program, while highly successful and very important for the soybean industry, is focused largely on track maintenance and upgrades to heavier weight track specifically for the short lines. This program provides for an investment tax credit of $1 for each two dollars spent by a short line railroad to renovate track, and has a very successful record of encouraging short line upgrades.)

Government programs addressed in this analysis will look at comparative impacts of the following programs:

1) RRIF (Railroad Rehabilitation and Improvement Financing) Program. This is a government loan program run at no additional cost to the government that may provide for loans at attractive interest rates to borrowers for rail-related projects.
2) Investment Tax Credit of 25% and Accelerated Depreciation. This program has not been passed by Congress but was proposed several times during 2007-2011, and the most recent bill was S.3749. This bill was drafted to be effective for a 5-year period, and the accelerated depreciation permitted 100% expensing of investments in the first year of service.
3) Accelerated Depreciation and "Bonus" Depreciation. In the December 2010 general tax bill that extended business and personal tax breaks (H.R.4853), the bill also provided for 100% expensing of investments in the first year of service for any investment made from September 2010 through December 2011. The bill also offered a "bonus" depreciation of 50% during the first year for any investments made in 2012, over and above any normally permitted depreciation schedule for assets.
4) General Business Tax Rate Reduction. There is some current interest in Washington from general business organizations to work toward a reduction in the general corporate business tax rate from 35% to 25%, which would make the U.S. more comparable with corporate rates in other countries. For comparison purposes, this analysis will look at how such a program might influence investment strategies of companies.

A. Railroad Rehabilitation and Improvement Financing Program (RRIF)

(Note: To insure clarity in the explanation of this program, an interview was conducted with Barbara Barr, the administrator of this FRA program. Her contact information is provided within this report.)

General RRIF Program Description:

The RRIF program was established by the Transportation Equity Act for the 21st Century (TEA-21) and amended by the Safe Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Under this program the Federal Railroad Administration (FRA) is authorized to provide direct loans or loan guarantees up to $35 billion, of which $7 billion is reserved for projects involving short lines and regional railroads. As of October 2012, approximately $33 billion in funds remained eligible for future loan applications.

This program can be used for rehabilitating rail track and some types of rail-related facilities; it can also be used to finance some new track and rail infrastructure projects (such as intermodal); it generally requires the involvement of at least one rail carrier in a project, but there is an exception to this rule that permits a shipper that is "captive" to also qualify as a borrower. A shipper is captive under RRIF regulations if "he/she does not have reasonable access to an alternative railroad to ship products."

The RRIF program has been in existence for 12 years. In those 12 years, the program has made 33 loans. The largest proportion of borrowers are short lines and regional railroads, although one class I carrier, Kansas City Southern Railway Company, and Amtrak have both been successful at borrowing through the program. And, despite some disappointment that the program has not been used by more rail-related businesses, the RRIF program has generated repeat business through several companies. RRIF loans have been made to one railroad three separate times and four other railroads have received loans twice. Loan amounts have been as little as $56,000, and the maximum has been $563 million. Most RRIF loans have been in a range from $2 million to $100 million. For additional information on successful loan applications under this program, see http://www.fra.dot.gov/rpd/freight/1770.shtml

One major attraction of the RRIF program is its <u>length of term,</u> as loans of up to 35 years can be made. Also, it is possible for some borrowers to qualify for <u>low effective interest rates</u>, as the rates are based upon rates currently in effect for government borrowing through treasury notes and bonds, although loans are also subject to a calculated credit risk premium that can raise the effective interest rate. Another attraction of the program is that loans can be made for any reasonable term length, and the effective interest rate will be based upon that specific term length for government borrowing costs. For example, if a company wanted a 35-year loan, the base lending rate would be the government's interest rate on 30-year bonds (currently about 2.8%). If a 10-year loan were sought, the base interest rate would be the 10-year Treasury note rate, which is about 1.7% at the date of this writing. (Again, both of these government rates are the base rate of interest for the loan; the calculated risk premium can raise the effective rate of interest.)

The drawbacks of the program are: 1) the applicant must pay up-front costs to pay for the administrative costs of the credit risk assessment (up to 0.5% of the loan value), and this cost is not reimbursable if the loan is rejected; 2) the time required between the loan application and a final decision approving or rejecting the loan is 9 months and can be longer; and 3) the fact that the credit risk premium (CRP) that will apply to the loan (and determine the ultimate effective interest rate) is not known until the CRP is finally approved by the Office of Management and Budget.

Outline of RRIF Program Specifics:

Eligible borrowers include railroads, state/local governments, government-sponsored entities such as ports, joint ventures that include at least one railroad, or shippers that are captive and without reasonable access to an alternative railroad.

Eligible Projects include improving or rehabilitating intermodal or rail equipment or facilities, including track, bridges, and yards. New intermodal facilities and new track are also eligible.

Costs: Investigation fees pay for the independent Financial Advisor, and potentially external counsel when necessary, to analyze the requested transaction and is charged up front. Maximum fee is 0.5% of the loan amount, but can be much less ($25,000 to $50,000). This fee is non-refundable.

Interest Rate: The interest rate is the applicable government borrowing cost for the length of term of the loan. For a 10-year loan, the rate would be the rate for 10-year Treasuries on the date of the loan closing or signing of the term sheet. If the loan is for 35 years, the rate would be the rate for 30-year T-Bonds on the date of the loan closing or signing the term sheet. The term sheet is the document that sets and fixes the interest rate for the life of the loan.

Credit Risk Premium: This figure is a number between 0 and 100% of the loan. Its calculation is conducted and approved as part of the loan process by FRA-DOT and the Office of Management and Budget of the Federal Government. The premium is payable up front as the loan is disbursed which raises the effective interest rate on the requested loan amount. FRA DOT does not provide informal guidance on what credit risk premiums might be expected, because loans and risks are wide ranging. Officials of the agency have indicated that credit risk premiums in the range of 2 to 3 % are not uncommon, but some risk premiums have been as low as zero, and as high as in "double digits." FRA-DOT normally has a significant number of pre-application meetings with potential borrowers and is able to provide general "estimates" of this premium when information is provided for review.

The Process for Application:

- The agency urges that borrowers participate in a pre-application meeting with officials of FRA-DOT to ensure that the prospective borrower is eligible and that the project is also eligible. The borrower is not required to travel to Washington, D.C. for this pre-application meeting.
- The time required between written application submission and approval is generally about 9 months, but can take a year.
- Loans for projects must go through a National Environmental Protection Act (NEPA) assessment, which requires one of the following: an Environmental Impact Statement (EIS), Environmental Assessment (EA), or Categorical Exclusion (CE). If an endangered species, an historic property, or serious environmental cleanup/prevention is identified as part of the project, significant delays can occur with the loan approval. Potential NEPA problems may be identified in pre-application meetings and in consultation with FRA Environmental staff.

Questions and Answers about Using the RRIF Program

Question: I've heard that the application process is complex and that some applicants hire consultants to fill out the paperwork to improve chances of success. Is this recommended?
Answer: FRA officials state that hiring consultants for the loan process is not a requirement and that many successful loans have been done directly with the loan applicant doing all the necessary

paperwork. While FRA does not encourage or discourage the use of consultants, FRA personnel is willing to assist potential applicants on process and documentation completion.

Question: What if I fill out the paperwork for a loan and misinterpret what is being requested in a particular question or if I fail to fully complete all the responses to the satisfaction of FRA reviewers?
Answer: FRA officials will do a quick review of an application and telephone the applicant if there are obvious problems with the submission. We do not wish to waste the applicant's time or the time of government employees.

Question: What is FRA looking for in the types of rail projects that are most attractive?
Answer: Some of the priorities for the program are to seek projects with some public benefit which might include economic development and employment; enhancement of the environment and safety; and projects that enhance or maintain intermodal service to small communities. Projects that are included in your state's transportation plan are also viewed favorably.

Question: How about a project that is simply a build-out of a short connection to a railroad that would serve a single plant? Would that be considered?
Answer: Assuming there would be public benefits in the form of development and construction jobs and possibly permanent jobs on an ongoing basis, such a non-railroad applicant may qualify for a RRIF loan if there were not any reasonable alternative access to a railroad. Potential applicants are strongly encouraged to contact the RRIF program office to set up a pre-application call to discuss their proposed project needs.

Question: Sometimes elevators that were single-car shippers have not upgraded with side-track to hold enough cars to load a unit train, and have thus lost effective access to rail markets, resulting in the elevator only loading out grain by truck to short destination markets. If this business wanted to add enough side track to gain access to rail service again in unit trains, could he/she qualify for a RRIF loan?
Answer: It is possible that such a situation may qualify for a RRIF loan. However, it would depend on circumstances, and whether the shipper had shipped by rail in the last several years, or continued to have real economic options to ship single cars by rail, but chose for business reasons to ship to truck markets instead. Based upon the description given here, situations could vary as to whether the shipper continued to have reasonable access to rail for the movement of goods. Potential applicants are strongly encouraged to contact the RRIF program office to set up a pre-application call to discuss their proposed project needs.

Question: If a potential loan applicant has a question about the eligibility of the business entity or the project eligibility, is there a quick way to get a determination?
Answer: We would suggest that the person contact the administrator of the program to expedite any clarification of eligibility, but applicants should understand that eligibility does not assure final success with the loan application. We suggest submitting specific questions to: Barbara Klein Barr, Chief, Credit Programs Division, Federal Railroad Administration, U.S. Dept. of Transportation, 1200 New Jersey Avenue, SE, West Building-Mail Stop 20, Washington, DC 20590. Email address is Barbara.barr@dot.gov. Phone: 202-493-6051.

Question: Are you looking for any particular type of loan applicant(s) for this program?
Answer: Generally, applicants are railroads or railroads in combination with other interested business people or entities. Projects that have a combination of interested groups, including municipalities,

shippers or receivers, and other local community people are of interest because with strong local support, the prospects for business success and achieving broad public benefits are likely enhanced.

Question: How does the credit risk premium work? How does it affect the out-of-pocket costs for financing the borrowed capital?
Answer: The credit risk premium is based upon a financial model that essentially calculates the risk of default on the loan. If the loan being requested is for $10,000,000 for 30 years; the up-front investigation fee is 0.5% ($50,000); and the credit risk premium is computed by OMB at 4% ($400,000); using the 30-year T-Bond interest rate and the loan has a principal balance of $10,000,000 when fully drawn. The borrower can obtain total loan proceeds of the requested $10,000,000 but also must pay the credit risk premium cost ($400,000) as they draw down loan proceeds. Or, the $400,000 credit risk premium can be paid up front at the time of loan origination. (Editor's note: From the financial perspective of the customer, combining the up-front cost of 0.5% of the loan and credit risk premium of $400,000 raises the cost of the 30-year loan from the 2.8% 30-year bond rate to 3.15% effective rate for a 30-year RRIF loan. Another example: If the borrower wants a more short-term loan of 10 years, and the up-front investigation fee is $50,000 and credit risk premium is 4% ($400,000), with a 10-year Treasury note current rate of 1.7%, the total effective rate for borrowing $10 million through the RRIF program is a 2.6% annual compounded rate.)

B. Investment Tax Credit of 25%, Accelerated Depreciation (first year expensing)

S. 3749 introduced in August 5, 2010 of the U.S. Senate contained legislative language that was identical to bills introduced in both Senate and House as early as 2007. The incentives in the bill were a 25% tax credit and first-year full expensing of new investments (100% depreciation taken in the first year). The purpose of the bill(s) was to "amend the Internal Revenue Code to provide incentives to encourage investment in the expansion of freight rail infrastructure capacity and to enhance modal tax equity."

The bill, if it were passed by Congress, would accomplish the following:

- Provide for a 5-year period of time, during which qualified rail investments would provide the investor a 25% tax credit of the original investment value
- Provide for accelerated depreciation of 100% expensing in the first year
- Qualified investments include: bridges and tunnels expansion or replacement; railroad grading; track, terminals, yards; railroad signals and communications systems; intermodal transfer or trans-load facilities or terminals
- Specifically excluded from qualification were land investments; rolling stock, except for new locomotives that expanded rail power capacity; and property used predominantly outside the U.S.
- The bill clarified that owners/investors qualifying could be railroads or other owners of qualified rail infrastructure property (e.g., such as shippers, receivers, ports, terminal yards)

The language of the bill is transparent for the most part, but because the application of new tax law is ultimately interpreted by Department of Treasury, applicability to specific situations is not for certain until IRS releases guidelines for application. The legislative language appears to cover a wide spectrum of new infrastructure and facilities, and contains the following language regarding "trans-load facilities." "(The bill shall be applicable to)…intermodal transfer or trans-load facilities or terminals, including fixtures attached thereto, and equipment used exclusively therein." Among other types of operations, this language could cover some of the track construction costs (other than land acquisition costs) for some types of grain and processing facilities built during the duration of the applicability of the law.

C. Accelerated Depreciation and "Bonus" Depreciation

When the "Tax Relief Act of 2010" (H.R. 4853) was passed in December 2010, a bill that generally extended individual and business tax reductions for two additional years through December 31, 2012, there was additional language in the bill that provided two tax-based incentives to encourage investments by all U.S. businesses (not just confined to rail carriers). The bill provided that all investments made between September 9, 2010 and December 31, 2011, would be allowed to accelerate depreciation to 100% expensing of investments in the first year (2011). The bill further provided for "bonus" depreciation of 50% in the first year for investments made in calendar 2012. Technically what this bonus depreciation provided for was 50% expensing of the investment in the first year in addition to using the normal depreciation schedule for the other 50% of the investment. So, the accelerated depreciation of 100% in the first year and a bonus depreciation of 50% for the first year for investments made in the second year were actually two programs operating in successive years to provide additional incentives for investment in capital. The goal of the tax incentive was to spur the economy into new investments to create more jobs and economic activity immediately.

D. General Business Tax Rate Reduction

There is some current interest in Washington from general business organizations to work toward a reduction in the general corporate business tax rate of 35% to 25%, which would make the U.S. more comparable in corporate business tax rates with other countries. While this study is not intended to provide an overall review of corporate tax policy, because of the fact that there is some national interest in such a concept at the time the study is being conducted, some computations are included here to provide some comparisons.

E. Comparison of Government Incentive Programs

(Note: This comparison of government incentive programs analyzes impacts of individual and combination policies for low interest loans (RRIF), tax credits, accelerated depreciation and bonus depreciation. The analysis also addresses possible impacts of a policy of general corporate tax rate reduction for comparison purposes, but that analysis is done separately. The table below compares the cost of an investment under different tax/interest rate scenarios, and measures each case against the same investment made under current law, and allowable depreciation schedules. The analysis of a general business tax reduction is not directly comparable, because it is tied to general profitability and outlook of industry, and therefore requires an assumption about how such improved profitability (induced by reduction in general tax rates) will affect investment behavior of businesses. This is an unknown that is beyond the scope of this study, but some analytical information is offered on historical business behaviors to provide for some information.)

Table 20 compares each of the above policy proposals (except for the general business tax reduction) on the basis of: net after tax cost of the investment. All the investment situations are assumed to involve a $1 million investment, so that the results can be scaled according to the size of an individual project. The assumptions behind each example are as follows:

Table 20 Assumptions for Financial Comparisons of Government Incentive Policies:

- Cost of infrastructure investment: $1 million, all of which is financed for 8 years.
- Depreciation assumed to be 7-year double declining balance-to-straight-line after the 5th year. This particular depreciation schedule goes to zero in the 9th year to coincide with the assumed loan schedule. Many other depreciation schedules are allowed under law, but this is a commonly used one that utilizes 69% of the depreciation in the first four years.
- For any investment that is assumed to include borrowing costs, the loan term is assumed to be for 8 years, to coincide with the depreciation schedule.
- 5% interest rate assumption is used on commercial loans. RRIF loans assumed at 3% interest rates.
- For purposes of computing interest costs, for Investment Tax Credit and Accelerated Depreciation, the analysis assumes the loan principal is paid down immediately with any available additional net after tax revenues generated by the incentive program.
- Current corporate tax rate used is 35%. While this number is slightly less at lower levels of profitability of any business, as long as the business remains profitable, for any earnings above $75,000, the marginal rate is at least 34%, so this 35% assumption is useful to simplify comparisons.

Table 22. Comparison of After-Tax Investment Costs of a $1 million Rail Infrastructure Project

Comparison of After-Tax investment Costs of a $1 million Rail Infrastructure Project Under Various Government Incentive Programs							
(Current dollars, $1,000 units)							
	Tax Incentive						
Type of Govt Policy	Investment	Depreciation Expense	ITC	Total	After-Tax Cost of Investment	Additional After-Tax Govt Incentive****	After-Tax Cost of Interest* at 5% for 8 yrs, Assuming 100% Investment Financing
1. Current Policy (35% Corp Tax Rate/ Double Decl Bal Depreciation)	$1,000	$350	$0	$350	$650		$140
2. 25% Investment Tax Credit	$1,000	$262	$250	$512	$488	$162	$105
3. 25% Investment Tax Credit/ Accelerated Depreciation (100% 1st Yr Expensing)	$1,000	$262	$250	$512	$488	$162**	$57
4. 50% Bonus Depreciation (50% Depreciation Added in 1st Yr)	$1,000	$350	$0	$350	$650	$0**	$119
5. Accelerated Depreciation (100% 1st Yr Expensing)	$1,000	$350	$0	$350	$650	$0**	$72
6. RRIF Loan Obtained at 3%	$1,000	$350	$0	$350	$650		$81***

*No interest charges are assumed in the table other than the costs shown in this column. Calculations assume that the loan principal is paid down anytime additional funds become available through investment tax credit revenue or accelerated depreciation.

**Accelerated depreciation shows zero additional tax investment incentive compared to the current policy, because the same amount of total depreciation is unchanged from existing law. However, there are substantial benefits from higher cash flow benefits of rapid depreciation, and this is reflected in the reduction in interest payments (last column). If money is not borrowed, the cash flow benefits can be used to invest funds toward alternative uses.

***The benefit of the RRIF Loan at a discounted interest rate is $81,000, and the "value" of such a loan compare to the current policy is a $59,000 reduction in interest cost ($140-$81). The value of lower interest rates is particularly sensitive to the length of term of the loan. For example, if this 3% loan was extended from 8 years to 20 years, the after-tax interest savings increases from $59,000 to $164,000.

****Present values are not reviewed in the table. Using a 6% discount rate (reflecting interest cost and risk), comparative present value calculations for the additional after-tax government incentive (col. 6) for policies #2, #3, #4 and #5 are $179,000, $212,000, $23,000 and $45,000,respectively.

The first policy example 1 in Table 22 indicates that a $1,000,000 investment would, under current law, provide for an after-tax investment cost of $650,000. The reduction is due entirely to the 35% corporate tax rate that permits 100% deduction over the tax-life of the asset. If the investment money were borrowed at a commercial rate of 5% interest over 8 years with equal installments, after tax interest would total $140,000. (Total interest is $216,000 which is reduced to $140,000 by the corporate tax rate.)

Example #2 shows the effect of a 25% investment tax credit. It provides an immediate $250,000 payback in reduced taxes in the first year. However, the difference in the government incentive compared to existing policy is $162,500, or $87,500 less than the actual tax credit of $250,000. This is the result because the depreciation is applied to only the $750,000 remaining value in the asset after the tax credit of $250,000 is taken. The interest cost of the investment is reduced as the $250,000 investment tax credit creates cash flow to reduce the amount of total outstanding credit after the first year.

Example #3 is a case study of a 25% investment tax credit coupled with accelerated depreciation that permits 100% of the investment to be expensed in the first year. The depreciation benefit is $262,000 and the value of the investment tax credit is $250,000, but the total value of the after-tax government incentive is still $162,000, the same as example #2. However, the interest cost of the investment is further reduced to $57,000 over the life of the loan because of the cash flow benefits of receiving the investment tax credit and full expensing depreciation in the first year.

Example #4 shows the effects of a 50% bonus depreciation that was effective for investments made in 2012 under current law. The depreciation allowable under this program is $350,000, the same as example #1 reflecting current policy. However, the cash flow benefits of receiving an additional 50% of the depreciation in the first year reduce the interest cost on the loan from $140,000 to $119,000.

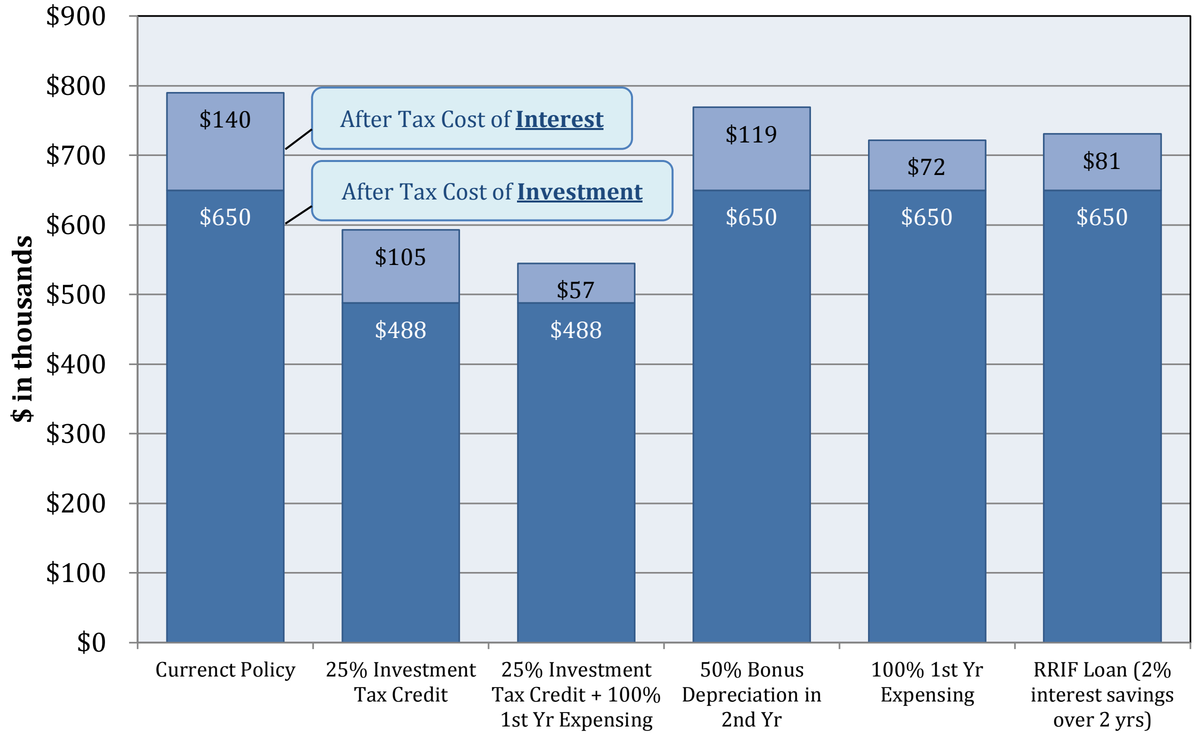
Example #5 reflects the impact of accelerated depreciation (100% expensing in the first year) . The major benefit of this policy to the investor is the same as #4 by reducing the amount of interest payable on the loan taken out for the investment.

Example #6 demonstrates a hypothetical impact of a RRIF loan, assuming a RRIF loan can be obtained that saves the borrower two points on interest over an 8-year period. The RRIF loan is assumed to be made at 3%. Savings are not huge at $59,000 ($140,000 reduced to $81,000 by the RRIF loan; $140-$81), but the savings are not inconsequential, and this value would grow substantially with an increase in the term length of the loan. Increasing the length of the loan term from 8 years to 20 years with these same interest rates increases the cost savings from $59,000 to $164,000 for the life of the investment.

All of the data contained in Table 22 are current value dollars. However, present value is an important concept particularly for longer term investments. The last footnote in the table reflects what the additional government incentives are for each example using a 6% discount rate. It should be noted that these present values in the footnote assume a certain rate of interest; therefore, these footnoted gains cannot be added to the savings in interest cost as reflected in the body of the table.

Figure 36 presents a graphic depiction of the data contained in Table 22.

Figure 36. After Tax Investment Cost of $1 Million Rail Investment



Note: These tax-based incentives and the RRIF program have varying levels of impact on the out-of-pocket cost of investments. But there are other differences that should not be overlooked. First is the availability of the program. The RRIF program has been available since 1998, and seems likely to continue, although Congress could decide to not re-authorize it at some stage. Many tax credit and accelerated depreciation programs are designed for short-term only---one to five years. The legislation that offered a 25% tax credit and accelerated depreciation for rail investments was to be offered for only 5 years. While tax policies changes often are limited in time scope, once authorized by Congress, they become "automatic" in operation, in the sense that businesses invest and file taxes, taking deductions in accordance with law as amended. Once imbedded in the tax code, the business incentives are available to anyone meeting IRS guidelines. While some tax interpretations may be challenged by IRS, there is no regulatory "pre-clearance." In the case of the RRIF program, any business that wishes to take advantage of the program must be cleared in advance by a government process that may be challenging for potential qualifiers. The RRIF loan process likewise takes some additional time, possibly 9-months on average, while taking advantage of tax incentives adds no additional time to the normal business process of evaluating prospective investments. Thus, the nature of a particular business investment, and whether there is adequate time to await a lengthy process of loan qualification clearance, could be the deciding factor for a RRIF loan.

F. Policy of General Corporate Tax Reduction: 35% to 25%

Rather than using tax policies designed to specifically induce capital investments by offering specific rewards (e.g., tax credits, accelerated depreciation, bonus depreciation), there could be some consideration given to a general tax reduction for business. How would such a tax policy change compare to those policies summarized in Table 22?

Comparisons of a general business tax reduction, such as a reduction in rates from 35% to 25%, with other investment incentive alternatives will vary greatly depending on company circumstances, including general expenses, profitability, existing investments and other factors that affect the existing tax exposure of the company. To get a general idea with a hypothetical situation, for a moderate-sized company with $200 million gross revenue, $195 million in cost of goods sold plus operating expenses and $5 million in annual profitability, a reduction in corporate taxes from 35% to 25% would generate an additional $4 million in after tax revenues over an 8 year period---$500,000 annually. The $4 million could be used for new or replacement capital investments, or for other items. While a $1 million investment in capital would receive a lower immediate deduction for depreciation expense (only $250,000 on a $1 million investment rather than $350,000 under current law), the net benefit of the tax rate reduction is actually more beneficial to the company by a sizeable measure for any company that maintains profitability, because the rate reduction applies to all gross net income, not just the income generated from the new investment.

While we do not have definitive data to predict how companies might respond to these various incentives, and even for those examples displayed in Table 22, we do not know how strongly companies will respond to programs specifically designed to incent new investment decisions, historical data may provide some limited information about how rail industry investments have compared to financial performance information over time.

Figure 37. Class I Railroad Capital Spending vs. Net Income

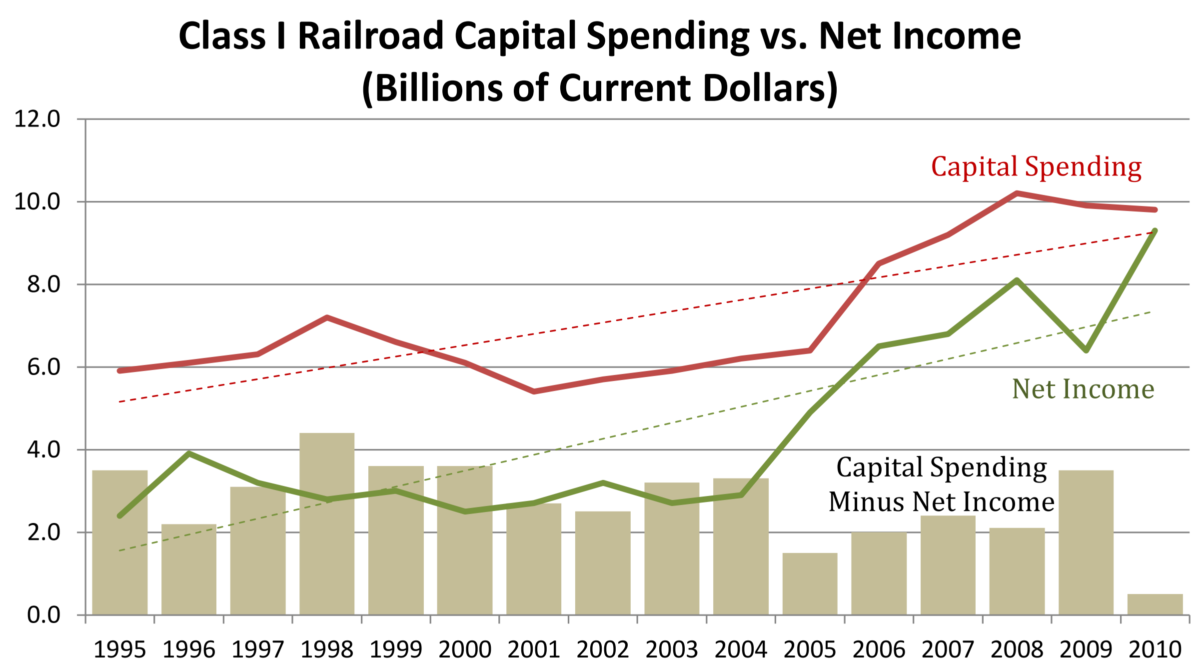


Figure 37 compares 16 years of data, 1995 to 2010 for Class I railroads: net income (after taxes), capital spending (replacement capital and expansionary capital), and capital spending minus net income (shown as bars). The long term trend in the difference (bars) seems to be trending downward slightly since the late 1990s, reflecting a narrowing of the spread as net income has risen. Actually, the most stable relationship over time appears to be rail capital expenditures expressed as a percentage of gross revenue, displayed in Table 23. With the exception of a few years, this percentage has remained in the 15% to 20% range over a long period. However, this relationship does not provide a good predictor of behavioral response to a prospective general tax decrease, because the tax decrease would only affect after tax net income, not gross revenue.

Table 23. Class I Rail Capital Expenditures, as a Percentage of Rail Gross Revenue

Year	Capital Exp. Divided by Gross Revenue (%)
1995	18.27
1996	18.54
1997	19.50
1998	21.62
1999	19.58
2000	17.89
2001	15.61
2002	16.15
2003	16.12
2004	15.31
2005	13.88
2006	16.28
2007	16.85
2008	16.67
2009	20.71
2010	16.78

Table 24 looks more closely at capital expenditures relative to net income in three five-year periods. The clearest trend in this table is that the absolute difference between these two variables over time is declining, which suggests that capital expenditures and net income are changing over time at different rates. To attempt to measure the rate of change, Table 25 reviews the rate of change in the relative growth of capital expenditures and net income. The long term average (1995 to 2010) of the ratio of the rates of change is 83% (top line in Table 25), measured by a comparison of three-year averages at the beginning and the end of the period to avoid undue influence of any individual year. Then the rate of change is reviewed for some recent short term periods that might be relevant. Most of these short term periods end with 2010, the most recent data available. But there is an argument for using 2008 as the end period, because 2009-10 was a period of considerable volatility in net income returns. Depending on the choice of years for the short term trend, and using an Olympic average of throwing out the high and low, most of the observations seem to be centered within a range of 60% to 80%. This would suggest that, assuming other prospects of the rail business appear reasonably promising, an additional $1 billion in rail profitability generated by a general tax reduction might be expected to induce additional capital investment of $600 to $800 million annually. This kind of analysis comes with a caveat, however, in that based upon the very strong historical relationship between capital investment and gross revenue (staying consistently in a range from 15% to 20%), unless gross revenue from rail transportation services increased in tandem with new investment, using a general tax reduction to encourage new expansionary rail capital investment is likely not sustainable. In short, the underlying investment---the railroad business opportunities---has to be viewed as promising and prove itself over time, or re-investment will decline over time regardless of what incentives are in place. Excess profitability would be invested in alternative enterprises, other than rail.

Table 24. Comparison of Class I Railroad Capital Expenditures and Net Income for Three 5-yr Periods

Comparison of Class I Railroad Capital Expenditures and Net Income for Three 5-year Periods ($ billion)				
Years	**Capital Expenditures**	**Net Income**	**Cap Ex. Minus Net Income**	**Cap Ex. Divided by Net Income**
1996 – 2000	$6.5	$3.1	$3.4	$2.1
2001 – 2005	$5.9	$3.3	$2.6	$1.79
2006 – 2010	$9.5	$7.4	$2.1	$1.28

Table 25. Growth of Capital Expenditures vs. Net Income Growth for Selected Periods

Growth of Capital Expenditures vs Net Income for Selected Periods				
	Periods	**Capital Exp. Growth**	**Net Income Growth**	**Growth in Capital Exp. Divided by Net Income**
Long Term	Avg. 1995-1997 to 2008-2010	3.9%	4.7%	83%
Short Term	2005 – 2010	3.4%	4.4%	77%
	2006 – 2010	1.3%	2.8%	46%
	2007 – 2010	1.6%	2.5%	64%
	2004 – 2008	4.0%	5.2%	77%
	2005 – 2008	3.8%	3.2%	119%

How would a tax reduction affect the Class I carriers' income-expense statement? The following statement is an average composite income statement for all Class I's for the years 2009 and 2010 (Source is Association of American Railroads). The year 2009 was relatively weak, but in 2010 the industry recovered most of its loss during the dip caused by the recession, so an average of the two years is fairly representative of recent rail carrier results.

Table 26. Condensed (and Consolidated) Income Statement of Class I Railroads, Avg. of 2009 and 2010 Fiscal Years

Condensed (and Consolidated) Income Statement of Class I Railroads* -Average of 2009 and 2010 Fiscal Years ($ millions)-	
Total Operating Revenue	$53,128
Operational Expense	$39,967
Net Operating Revenue	$13,161

Interest/Amortization	$1,212	
Adjustment for Other	$551	
Income Taxes	$4,654	(35% of net operating revenue)
Ordinary (After Tax) Income	$7,846	

*Source: Association of American Railroads

A reduction in the income tax rate of 35% to 25% reduces the federal taxes for railroads by $1.315 billion annually. Assuming 60% to 80% of this amount is reinvested in capital expenditures (taken from the analysis above), it would be expected to have the effect of adding $0.79 to $1.05 billion in additional capital investments annually. Table 16 in Section IV estimated that the investment gap in needed rail expenditures was $1.55 billion annually. So, a general tax reduction could have the effect of closing one-half to two-thirds of the projected investment gap.

Investment tax credits, accelerated depreciation, bonus depreciation, RRIF loans all have the potential to more directly reward a specific investment by offering incentives that help to reduce total investment costs and limit the risks. Therefore, these programs can also help close the projected investment gap for the rail sector. However, any incentive program will be limited by the outlook for the underlying business. Business people interviewed for this study said that without question business prospects were the first and primary consideration in deciding to make additional capital expenditures, and if a project does not make business sense on its own merit, tax incentive programs or lower taxes would have little effect. At the same time, companies often budget a certain amount of capital for investments in a given year, and have a list of potential projects that are considered worthy of investment at some stage. Tax incentives can effectively "move projects up the list" for consideration if the after-tax consequences make the project more affordable within budget parameters. What about the limited term of such tax-based incentive programs being offered for a limited duration? Does this accelerate potential investments that might otherwise be delayed? Some companies interviewed for this study stated that when the tax bill was passed in December 2010 providing for a short interval of accelerated and bonus depreciation, that some investment decisions were expedited to take advantage of the program. But when such programs are passed on such short notice by Congress, it is difficult to meet such a tight time frame with new investments. It would seem that if specific investment tax incentives are to be constructively utilized and allow for some business planning, at least a 5-year duration for such policy is advisable to permit companies to incorporate the program into their planning horizon for investments.

SECTION VII. MARKET AND SOCIETAL IMPACTS OF PRIVATE AND PUBLIC INVESTMENT IN RAIL INFRASTRUCTURE

(Editor's note: This concluding section looks at micro impacts of how infrastructure investments affect specific projects, and economics of soybean movements, and it looks at the macro gains to the private industry and the public at large from: 1) expanded rail capacity; 2) improved economic efficiency in moving soybeans and products; and 3) reduced highway investment needs and highway congestion.)

A. Rail Cost Efficiencies and Modal Pricing Structure

Section II of this study looked at the historical relationship between the rates for various modes. The table below compares more recent data for truck, rail and barge movements of grains.

Table 27. Comparison of Truck, Rail, and Barge Movements for "Typical" Grain Movements

Comparison of Truck, Rail, and Barge Movements for "Typical" Grain Movements (Current $ per ton-mile)			
	Truck* Avg. Cost Per Ton-Mile	**Rail* Avg. Cost Per Ton-Mile**	**Barge* Avg. Cost Per Ton-Mile**
$4.17/mile for first 25 miles (applies to truck only)	$0.153		
$2.33/mile for first 100 miles	$0.087	$0.032 (Range: 0.02-0.045)	$0.020 (Range: 0.015-0.03)
Marginal per mile cost over 100 mi. (applies to truck only)	$0.063		

*<u>*Source</u>: AMS-USDA Grain Transportation Report, Aug 31, 2012, for average truck rate data. Association of American Railroads data summaries of Surface Transportation data for average rail rates for all agricultural commodities. The range in typical rail rates was estimated from the ranges typical for different size shipments (0-25 cars vs 100+ cars) and distance (less than 500 miles and 1,000 miles+) contained in USDA's <u>Study of Rural Transportation Issues</u>, April, 2010. Barge rate data come from AMS-USDA Grain Transportation Report, Nov 15, 2012, and reflect market barge rates from Minneapolis to New Orleans, averaged for the past calendar year (current barge rates in November are approximately $0.030 per ton-mile, which is near the high for the year).*

Table 27 is intended to provide some general guidelines on current market rates for transportation. Truck transportation generally applies to shipments of 200 miles or less, but movements can sometimes go further. The fixed cost of loading and unloading the truck vehicle makes shorter distance trips more expensive on an average rate per ton-mile basis. Going beyond 25-miles in a truck raises the <u>marginal</u> cost for additional ton-miles by $0.063. This rate is based upon an approximate $3.75 per gallon diesel fuel price. About 40% of the variable cost in truck miles is the price of fuel. (This compares with railroads for which fuel costs represent about 20% of the variable operating cost.) So, <u>a 10% rise in the price of diesel will cause an increase of about 4% in the truck rate.</u> Truck rates can also increase during periods of heavy truck demand.

The rail rate in Table 27 is an industry average published by AAR for 2011, but is confirmed as realistic by some current rail rates. USDA reports a Nov 2012 unit train rate plus fuel surcharge of $3,823 per car for soybeans from Minneapolis to New Orleans. This rate is equivalent to $.028 per ton-mile. The Nov 2012 rate plus surcharge for a corn shuttle train from Des Moines to Galveston is $.031 per ton-mile. The Nov 2012 rate for a soybean shuttle from Fargo to Seattle is $.037 per ton-mile. Rail rates will vary by season, by size of shipment, by distance to market, by type of commodity, fuel pricing and other market factors.

Barge rates are market-determined by buyers and sellers of barge freight and vary according to season, demand for export-related moves, river conditions and other factors.

The three modes provide for competition, but also cooperate in combination movements. Barges tend to provide the lowest cost on a per ton-mile rate basis, but barge shipments tend to be slower in reaching destination.

The inland waterways provide a major basing point for competitive pricing of high tonnage freight (such as grain, coal, fertilizer, gravel, steel and other products) that competes at least in certain markets (near the river) with rail.

The fundamental cost-efficiencies offered by rail are through savings in fuel, labor and other variable operating costs spread over a higher quantity of bushels than for trucks. The cost of accessing rail, including cost of loading, unloading, scheduling, and providing product at a rail loading point are the primary barriers in shifting from truck to rail movement. Beyond the economics of fuel efficiency and variable cost savings provided by rail over truck movements, railroads can gain significant further efficiencies by increasing unit shipment sizes and incentivizing shippers/receivers to load and unload quickly to accelerate cycle times. In the western U.S. typical shuttle trains make 3 or more cycles per month between the Midwest and destination markets on the west coast. Single car shipments as part of a merchandise train may require almost a month for the same round trip. In the eastern U.S., unit train and shuttle-type shipments can save 7-9 days from the normal cycle time of trains.

Improved cycle times not only gain efficiencies in the utilization of cars and locomotives, but also in the other variable cost factors per ton of product moved. All variable costs are being spread over more tons of soybeans and grain. Because unit trains and shuttle rail movements are so important to saving operating costs, the railroads price such freight significantly less than single-car shipments, typically in the range of 20% below single car rates. In the East, this means a reduction of <u>15 to 25 cents/bu</u> for the shipping elevator and in the West, which tends to have longer moves to market, <u>20-35 cents/bu</u>. How much of this rate incentive the elevator retains to pay for his rail-loading facility upgrades, and investment risk will depend on many market considerations. To meet incentive programs, a shuttle elevator has to generate a relatively high turnover rate, so market bids have to be aggressive enough to attract additional soybeans and grain. Grain industry persons interviewed for this study indicate that it is not unusual for the producer-seller to receive <u>50-60% or more</u> of this rate differential through improve bids, but the share to the producer will depend on the crop size, general market demand, and the need to attract volumes to meet business commitments.

The benefit to the producer of other rail efficiencies such as constructing improved short-lines or rail linkages that improve efficiency are not so easily analyzed as every situation is unique. Some short-lines or regional railroads compete directly with truck traffic, which generally requires that the short line have both agricultural and non-agricultural customers to build adequate volumes to be competitive. Other short-lines function as economic linkages to a mainline railroad move, and provide the benefit that the elevator shipper or receiver can have direct access to rail that avoids a physical transfer of product. While these kinds of investments clearly benefit the producer and the market, the benefits are not quantified in this paper due to lack of specific documentable evidence.

B. Benefits of Government Incentives for Rail Infrastructure

In Section VI, Table 22, the direct benefits of government tax incentives to the investor are analyzed. A government policy that provides for a 25% investment tax credit plus accelerated depreciation (100% depreciation in the first year) was found to reduce the after-tax cost of a $1 million investment by $162,000 in current dollars or $212,000 in present value terms. Thus, the discount on investment cost is 21% of the initial cost of the investment, and that would be applicable to qualifying investments related to new rail infrastructure that adds to capacity. For a new "greenfield" shuttle loader, the investment discount might be only applicable to about 15% of the entire new investment (for $3 million in new track to serve a $20 million new facility). For a shipper that wants to renew a 12-mile linkage at a cost of $5 million, the 21% discount could apply to the entire amount of the investment. For a soybean processor that wants to add $3 million in new track to be able to store meal cars to be able to load 100-car units, the entire discount of 21% would apply. For new rail investments made by railroads that expand capacity, it is assumed for this analysis that 100% of expansionary investments would qualify for the tax incentive. For the soybean sector, it is also assumed that a 25% investment tax credit program with 100% depreciation is aggressive enough to double the rate of increase in investments, such that infrastructure capacity expansion that would normally require a 10-year horizon would be completed in a 5-year period, during which the incentive program is in effect. (Previous Senate and House bills similar to this contained 5-year limitations on the applicable benefits.)

Assumptions and parameters for this analysis:

- This analysis is generally focused on the costs and benefits after a 5-year period of adjustment that allows the market to make new investments, and for freight rates and traffic flows to adjust. The benefits are summarized at the end for the final year after a 5-year phase-in, and presented on an annual basis for that point in time. While much of the cost to the government occurs during the first five years, many of the changes that generate benefits, such as more efficient transportation, less congestion and lower highway maintenance costs, would be a permanent benefit extending well beyond the initial 5-year period.
- Investment tax credit of 25% & 100% 1st year depreciation, applicable for a 5-year period.
- Tax incentive equivalent to 21% reduction in present value of investment to railroads and one-half that amount (10.5%) for shipper and receiver investments because some portion of shipper investments would not qualify for the tax credit.
- The tax credit doubles the rate of investment in the soybean sector capacity expansion-related investments (this does not include investments for replacement capital) over the 5-year applicability of the investment tax credit.
- The tax credit is adequate to cover the "investment gap" needed in rail infrastructure for the next 10 years. This annual total capital expansion investment needed was estimated in Section IV to be $4.55 billion per year, of which $3 billion was expected to be invested by railroads, leaving a gap of $1.55 billion. A tax incentive that closes the gap by providing a 21% reduction in investment costs would reduce federal government tax revenues by $0.95 billion annually (21% of $4.55 billion = $0.95) for railroads, or $4.75 billion over the five years. For shippers and receivers at soybean loading facilities and soy meal processing and

receiving facilities, it is assumed that 150 facilities would be upgraded to handle unit train capacity to meet the increased volumes and that the average cost per facility would be $5 million in tax-incentive qualifying investments. This would be an additional $750 million that would qualify for the 21% reduction in investment expense for an additional $157 million in tax revenue foregone by the government. Thus total cost to the government in lost revenue would be $4.75 billion + $.157 billion = $4.907 billion. Annual cost: $0.981 bil.

- The major benefits expected to accrue from this program are: 1) reduction in capital investment costs by carriers and carrier customers; 2) expedited general rail capacity investments that improve traffic flow and rail performance and importantly reduce the risk of a capacity shortfall in the next 10 years; 3) expedited agricultural marketing and processing industry investments to facilitate a greater proportion of soybeans and soybean meal to be shipped in unit trains and shuttles; 4) reduction in transportation rates from more capacity being available; 5) gain in rate reductions from that portion of traffic shifting from trucks to rail; and 6) societal benefits from lower road building costs and less congestion.

1) Gain from reduction in capital costs: effect on general rate levels and rail market share: With an after-tax government investment incentive of almost $1 billion annually there should be some reduction in general rate levels. Current dollar normal rail operating expense and depreciation for rail carriers is $40 billion. An infusion of capital from the government would represent a net gain to railroads of $1 billion from this amount or 2.5% of total expenses, distributed annually over the course of 5 years. This analysis assumes that the government $1 billion infusion gain plus the gain in market share from truck traffic (we predict that rail would pick up 1% of total truck ton-miles after a 5-year period at an annual gain rate of 0.2%) would translate into a rate reduction of 1.0% (40% of the 2.5% of the incentive) after a 5 year period of adjustment. It is believed that this is a conservative estimate of possible gain for rail customers as the rail industry would gain by seeing both improved margins and higher market share.
2) Gain from reduced risk of severe capacity shortfall in the next 10 years: Figure 13 in Section III depicted an event in the rail markets from 2002 to 2006 in which a rapid increase in rail traffic, driven by expansionary growth in the national economy, caused reduced cycle times and challenged rail capacity to accommodate demand. Rail ton-mile growth jumped from 2.5% annual growth in the late 1990s to 3% growth in 2003, 7% in 2004, followed by an additional 6.6% volume added through 2006. Rail pricing had to adjust to help ration the limited capacity among markets, and rates increased during 2004 to 2007 by 27% compared to a 15% increase in the Rail Cost Adjustment Factor reported by the Surface Transportation Board (see Table 28). While arguably analysts could say that this rate increase only corrected a supply-demand imbalance for rail freight that had been in relative surplus (and thus depressing rail rates and revenue) from 1995 to 2003 (see Figure 29, Section V, comparing net rail income to the trend for this period), the tight market conditions that occurred in 2004 to 2007 would be less likely to occur in the future, during a period in which government was incentivizing rail capacity growth. This benefit of reducing future uncertainty of transport capacity through accelerated investment is very real, but realizable benefits are conditioned upon unknown probabilities of untimely rail capacity shortages of unknown duration. Therefore, this analysis is not assigning a specific monetary value to this benefit. A rail shortage capacity that became severe would, however, have potentially very serious consequences in terms of both timely shipping and costs, until such shortage could be corrected.

Table 28. **Freight Revenue per Ton-Mile vs. Rail Cost Adjustment Factor**

Freight Revenue per Ton-Mile vs. Rail Cost Adjustment Factor (cents per ton-mile and RCAF Index, 2007=100)		
Year	**Revenue per Ton-Mile**	**RCAF, including fuel cost**
1995	2.4	0.68
1996	2.35	0.69
1997	2.4	0.71
1998	2.34	0.71
1999	2.28	0.72
2000	2.26	0.73
2001	2.24	0.76
2002	2.26	0.76
2003	2.28	0.79
2004	2.35	0.83
2005	2.62	0.89
2006	2.84	0.94
2007	2.99	0.95
2008	3.34	1.12
2009	3.01	0.95
2010	3.33	1.07

3) Expedited agricultural marketing and processing industry investments would increase the number of unit train and shuttle loaders in the soybean and soy processing industry. In the USB study, Farm to Market—A Soybean's Journey, Informa Economics, July 2012, it was estimated that 60+ percent of soybean rail shipments were moved in unit trains 50 cars or more. Over the next 10 years, we assume for this study that percentage could grow to 80% of the rail market with no government incentive, and would reach 80% in 5 years with a government investment tax credit. For soybean meal, it is estimated by industry that about 20% of meal rail movements are currently shipped by 100 car trains. Without government incentives, it is estimated that this could grow to 50% of the market in 10 years and reach that level in 5 years with an investment tax credit program. Based upon rail data from 2009 published in Soy Transportation Coalition "Railroad Movement of Soybeans and Soy Products", the following soybean industry impacts are estimated:

Table 29. Impact of 25% Investment Tax Credit/Accelerated Depreciation on Soybean Sector

Impact of 25% Investment Tax Credit/Accelerated Depreciation on Soybean Sector, after 5 Years
1. General Rate Reduction — Base Rail Revenues, Soybeans (2009) Soybeans (2009) $791 mil Soymeal $510 mil Soy Oil $176 mil Total $1,477 mil $1,477 million x 0.010 = **$15 million**
2. Gain from reduced risk of severe capacity shortfall: No monetized benefits assigned to this item.
3. Expedited agricultural marketing and processing industry investments: a. Avg. savings per bushel for shifting more soybeans to shuttles/unit trains: 23 cents/bu ($7.67/ton). This savings is applicable to an additional 20% of soybean rail movements. 27.8 mil tons total railed soybeans (for 2009) x (20%) x $7.67/ton = **$43 million** b. Avg. savings per ton of soymeal shipped by 100-car train: $6.40/ton. This savings is applicable to an additional 30% of soybean meal rail shipments. 20.7 mil tons total meal railed (for 2009) x (30%) x $6.40/ton = **$40 million**
Total Savings for the Entire Soybean Marketplace is $98 million.

Note: Because the savings in soybean shipments and soy meal shipments is the result of investments made by the shipper and receiver, it is expected that only 50% of these gains would go back to benefit the producer. Because the general rate reduction is more market-wide and the result of general rail investment incentives, it is likely that all or nearly all of the $15 million gain in #1 would go to the producer. Thus about $57 million of the total $98 million in benefits would be expected to go to the producer.

The results shown in Table 29 reflect industry-wide average benefits in the soybean sector. Producers most affected by rail movements of soybeans and meal would benefit the most. On average, though, the savings in rail freight average cost is about 4% for the average producer and about 6.6% for the entire soybean sector. This analysis does not take into account any multiplier effects of new rail investments. U.S. Department of Commerce has estimated that every $1 invested in new rail infrastructure would generate more than $3 in total economic output. And, each $1 billion of new rail investment would create about 20,000 jobs.

Table 29 presents gains that are specific to the soybean sector, but the projected 1% general rate reduction after 5 years would be applicable to all rail shippers. The total gain for other shipping sectors industry-wide would be: 1% of $65 billion (current rail gross revenues) less $15 million already noted in Table 29. This gain would be $635 million.

There is also a gain that will be realized from the freight gain on the 1% of the total market that shifts from truck to rail. Based upon average shipping rates, a gain of $.03 or more per ton-mile might be realistic. However, the most likely traffic to shift would be that traffic where current rail and truck freight have a narrower difference than the industry average. Therefore, this analysis assumes that a 1% market shift from truck to rail after five years would yield a gain of 2.0 cents per ton mile, applicable to 1 percent of truck ton-miles of 1,342 billion (Census data from Table 4). So, a 1% market shift from truck to rail after 5 years of adjustment would, on average, yield $268 million in annual cost savings to the shipping community. While this is a general benefit, it would be captured entirely by those shippers that actually switch modes from truck to rail.

This analysis also assumes no competitive impact on other modes of freight, but a general rate decline in rail that is induced by tax incentives should have some dampening effect on truck and barge transportation too.

Given the changes going on in the oil fracking industry, causing the need to rapidly build new infrastructure in Western North Dakota and in Wisconsin, Illinois, Iowa and Minnesota for sand movements, where soybeans are also moving on a seasonal basis, there is a need for new capital to come into the rail industry to ensure adequate capacity. For the future, coal exports out of the Western U.S. may grow in significance to replace lost domestic coal markets due to regulatory issues and low natural gas prices. The rail industry is already making very significant investments to manage the adjustments in the oil and coal industries, but whole soybeans being exported out of the U.S. are increasingly dependent on a highly seasonal rail market to transport the vast majority of export soybeans from September through February. Fluid rail capacity to handle the surge in volume during those months is critical to the soybean industry continuing to maximize the farm value of soybeans to the producer.

C. Impacts on Highways, Roads, Traffic and Societal Benefits

Congestion Issues: The Texas Transportation Institute, in its 2011 Urban Mobility Report, estimated that congestion added $101 billion to the cost of operating vehicles on America's highways. This estimate only accounts for the wasted time and fuel. Lost productivity and cargo delays further add to the cost of congestion. Congestion costs are focused mostly on urban regions, and tend to be more concentrated in the Eastern U.S. where population is most dense. Congestion costs can be reduced by either expanding highway investment or reducing the rate of growth in truck freight traffic competing with cars for available highway travel lanes. The results of this study suggest that over the next 23 years, 2012 to 2035, the rate of growth in truck traffic could be reduced by an estimated 2/10 of one percent per year by more aggressive investment in rail infrastructure that reduces the projected gap in private rail capital investment. (See Tables 12, 15 and 16 in Section VI.) Total road and highway truck vehicle miles traveled in the U.S. were 286.6 billion for 2010. A reduced rate of expansion in truck transport growth of 2/10 of one percent annually would therefore shrink expected truck miles by 580 million each year between 2012 and 2035. At the end of the 23-year period (2035), projected truck miles would be 4.7% less than would otherwise be expected, for a total reduction of 13.4 billion truck miles traveled. After 5 years, a 1% reduction in truck miles would be expected, representing a decline of 2.9 billion truck miles.

Based upon the Federal Highway Administration's Cost Allocation Study, revised in 2000, it is estimated that trucks add an additional 20.06 cents in congestion costs per mile traveled. If truck miles are reduced by 0.2 percent in the first year and grow to a 4.7% reduction by 2035 (compared to the truck traffic that would otherwise be expected), the first year reduction in truck miles would be 580 million, resulting in a $119 million reduction in congestion costs in the first year, $595 million after 5-years and a reduction of $2.7 billion by 2035.

Road Damage and Repair Issues: It is widely acknowledged and well-documented that heavier trucks cause a great proportion of the highway and road damage that leads to more frequent repair, maintenance and need for replacement . The Congressional Budget Office, Economic and Budget Issue Brief: Spending and Funding for Highways (January, 2011), found that pavement damage by trucks ranged from about 5 to 55 cents per mile, depending on truck weight, the number of axles and its operating range (urban vs. rural, and interstates vs. paved roads). A recent study that has particular applicability to data available for the national highway system is: Feasibility of Containerized Transport in Rural Areas and its Effect on Roadways and Environment: A Case Study, Agribusiness, Food, and Consumer Economics Research Center, Report number CP-03-11, by F. Fraire, S. Fuller, et al, 2011. From data contained in this report and from Dept of Transportation data from 2012 National Transportation Statistics, Bureau of Transportation Statistics, the analysis in Table 30 was constructed.

Table 30. Pavement Costs of Truck Travel Above the Level Compensated by Fuel Taxes*

Type of Road	Truck Miles, 2010	Uncompensated Marginal Pavement Costs Per Loaded Truck-Mile	Annual Cost Pavement
Interstate	68.8 bil miles	$0.047 per mile	$3.23 billion
Principal Arterial	137.6 bil miles	$0.204 per mile	$28.1 billion
Minor Aterial	40.1 bil miles	$0.283 per mile	$11.3 billion
Collector Road	40.1 bil miles	$0.686 per mile	$27.5 billion
TOTAL ANNUAL COST			$70.1 billion

*Data in this table was derived from: Report No. CP-03-11 referenced in the text, Fraire, Fuller, et al; DOT-BTS data on the proportion of total highway traffic that is comprised of heavier and lighter weight trucks; and the Fraire-Fuller study results were adjusted by a CBO study analysis comparing the relative damage for light weight trucks. In essence, this results in the Fraire-Fuller study estimated truck road damage impacts being reduced by approximately 20% to account for 38% of trucks on highways being on average substantially smaller than 80,000-pound vehicles.

The reduction in road maintenance and building costs of a policy like an investment tax credit that contributes a net reduction in highway truck traffic would reduce the initial year costs by $140 million (.002 X $70 billion). After the first five years, the annual savings would grow to $700 million annually and by 2035, the annual savings to the tax payer would be $3.3 billion annually, and over the course of the time horizon, the average annual cost reduction to the U.S. treasury would be $1.6 billion annually.

Based upon the Federal Highway Administration's Cost Allocation Study, revised in 2000, it is estimated that trucks add an additional 20.06 cents in congestion costs per mile traveled. If truck miles are reduced by 0.2 percent in the first year and grow to a 4.7% reduction by 2035 (compared to the truck traffic that would otherwise be expected), the first year reduction in truck miles would be 580

million, resulting in a $119 million reduction in congestion costs in the first year, $595 million after 5-years and a reduction of $2.7 billion by 2035.

Table 31 summarizes the major and most direct benefits of a government policy to incentivize expansionary rail capacity investments. After 5 years, annual costs invested over the course of the first five years would be expected to yield $2,296 in annual benefits at an annual cost of $981 million in foregone tax revenues to the federal government. These data do not assign any value for the savings in fuel costs. While this gain is real, it is assumed to be captured in the rate differentials gained from the adjustments in truck volume shifting to rail. However, to the extent that burning less fuel from greater reliance on rail is friendlier to the environment, there is a gain not captured in these data. This analysis does not provide for any multiplier effects of the jobs created in construction of the new infrastructure U.S. Department of Commerce has estimated that for each $1 billion in new rail investment, an additional 20,000 jobs are created. The additional annual amount of rail investment believed to be created by the tax incentive program is $1.5 billion (the amount of the estimated rail investment gap). This would be expected to create an additional 30,000 jobs that would exist during the building phase of the infrastructure.

Table 31. Annual Impacts (After 5-yr phase-in) of Investment Tax Credit/Accelerated Depreciation

Annual Impacts (After 5-year phase-in) of Investment Tax Credit/Accelerated Depreciation ($ millions)	
Annual Cost to Government in Lost Tax Revenues	$981
Annual Benefits to U.S. Soybean Sector ($57 million of this is producer benefit)	$98
Annual Benefits from General Rail Freight Reduction from Added Capacity	$635
Annual Gain, Market Shift from Truck to Rail (rate savings on marginal shift)	$268
Annual Benefit in Savings in Highway Maintenance and Construction	$700
Annual Gain from Reduced Highway Congestion	$595
TOTAL ANNUAL BENEFITS	$2,296