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Analysis of the Potential Benefits of Larger Trucks for U.S. Businesses Operating Private Fleets

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Executive Summary

This study examines the current operational and economic performance of a sample of companies that operate private fleets and establishes a present-day baseline of transport productivity and efficiency. It also estimates how transportation performance and environmental impact would likely change if the existing federal limitations were to be lifted, resulting in greater maximum gross vehicle weight (GVW) limits and the use of long combination vehicles (LCVs). The study benchmarked the current transportation efficiency of a sample of companies operating private fleets identified in concert with National Private Truck Council (NPTC). The parameters that were used to define efficiency focused on over-the-road operating costs, cargo transported (both by mass and volume), and miles travelled. It includes measures of fuel use, emission output and truck trips required for the companies' annual transport tasks. The study investigates the change in efficiency under the following scenarios:

- increased GVW of tractor and 53-ft. semitrailer, and
- increased cubic capacity using LCVs (specifically, two 53-ft. trailers—"turnpike doubles") with GVW tied to the bridge formula.

Direct interview and data collection methods were used to compile information and data from selected NPTC member companies.

- First, a general survey was conducted of the NPTC membership.
- Second, a set of seven companies that represent a cross section of the NPTC population were selected for case study analysis to estimate the potential gains from weight and length increases.
- Third, the seven selected companies completed a detailed questionnaire about their annual number of shipments, number of miles driven, the weight and/or volume of their loads, the fuel used, and their total shipping expenses.

Findings

The principal findings of the study are as follows:

1. *Increases in weight and length would have a direct beneficial effect on the challenges facing American businesses.*

   The main future challenges over the next five years that interviewees reported focus on fuel availability and cost, congestion, improved distribution efficiency, and driver availability. In general, these challenges would benefit from the opportunities they see should vehicle weight and length be increased. The analyses show that fuel costs are reduced significantly through the reductions of shipments due to increased vehicle weight and length. Companies' experiences with LCVs in some states suggest some of the congestion reduction and distribution efficiencies these provide. They also explain some of the challenges of moving freight outside of the major highways.

2. *Large numbers of companies can benefit from increased tractor-trailer weight and length.*

The analysis of the potential benefits of increased trailer weight and length provided a number of ways of measuring the benefits. The survey of the NPTC membership found that that 56 percent of the companies' shipments weigh out and 34 percent cube out which present significant opportunities for benefit from either heavier or longer vehicles. Finally, the survey respondents were asked to estimate the percent reduction in shipments/truckloads for their company if the 80,000 pound weight regulation was changed to 97,000 pounds. These estimates were checked against the detailed data collected from the companies to ensure consistency. When discrepancies were found, the companies were contacted and the differences resolved. The estimate of reduction in truck loads was 10 percent if the allowable weight was increased and 6 percent if LCV's were permitted. If both strategies were implemented, then the estimated reduction in truck loads from the members surveyed would be 16 percent.

3. *Companies report significant potential benefits from tractor-trailer weight and length increases.*

The interviews with a cross section of NPTC companies revealed that the gains from increases in tractor-trailer weight and length would be primarily from the cost of operations and vehicle miles traveled, though some companies will also gain from improved customer service, product mix, and reduced time to market. The quantitative analyses of each company's operations bear out these observations.

The major potential operating cost benefit of increased tractor-trailer weight or length would be reduced diesel fuel consumption from needing fewer shipments, either because a trailer that now weighs out could carry more cargo, or a company whose trailers frequently cube out could add a second trailer. The reduction in miles per gallon due to heavier or longer trucks would be greatly offset by the significant improvement in transport efficiency (amount of fuel used per cargo unit transported) and the reduction in total miles driven from making fewer shipments.

4. *Increasing the weight or length of vehicles also provides benefits for the environment and national fuel supply through reduced energy consumption.*

Three impacts of fewer shipments on the overall economy and the environment are less traffic congestion, less fuel consumption and fewer emissions, particularly carbon dioxide (CO_2), resulting from fewer truck trips, less congestion and fewer hours of idling. For the five companies that could benefit from additional cargo weight of 14,000 lbs., their total annual fuel reduction is estimated at 10.8 million gallons, which would result in a reduction of 240 million lbs. (120,000 tons) of CO_2. With an 8,000 lb. increase, the fuel reduction of 7.5 million gallons would result in a CO_2 reduction of 167 million lbs. (83,000 tons); and for the three companies that would benefit from LCVs and would consume 23.8 million fewer gallons, it would be 528 million lbs. (264,000 tons).

If a 14,000 lb additional cargo weight allowance (97,000 lb GVW) and Interstate usage of twin 53 ft trailer LCVs were permitted, and the fuel consumption and emissions reduction benefits estimated for this study's subset of vehicle fleets were representative of the national class 8 truck fleet (which is unknown), then the national annual diesel fuel reduction would be nearly 3 billion gallons and the amount of CO_2 produced would be reduced by over 65.3 billion lbs. (32.6 million tons). If only an 8,000 lb cargo increase were allowed (91,000 lb GVW) along with LCVs, then the national annual diesel fuel reduction would be 2.6 billion gallons and amount of CO_2 produced would be reduced by 58.6 billion lbs. (29.3 million tons).

Analysis of the Potential Benefits of Larger Trucks for U.S. Businesses Operating Private Fleets

Introduction

Businesses operating private truck fleets are concerned about the sustainability of current levels of customer service in the face of increasing traffic congestion and customer expectation. These businesses work hard on their delivery standards, including timeliness, because of the important contribution of delivery standards to the variety and freshness of their merchandise. Transportation performance is an important differentiator for these companies with respect to their competitors. In addition, globalization of the marketplace requires companies to fight for even footing on all aspects of the business model, including transportation. There is a significant legislative barrier in the form of the truck size and weight freeze that has been in place for the past 17 years. During this period, most other industrialized nations have optimized size and weight regulation to improve transport efficiency, whereas the U.S policy has remained stagnant, resulting in systemic transportation inefficiencies. It is well recognized that these inefficiencies not only impact businesses and national competitiveness, but also influence national fuel consumption and emissions presenting further challenges to transport sustainability.

There is a significant legislative barrier in the form the 80,000-pound gross vehicle weight cap that has been in place since 1982, and an even longer prohibition that is 53 years old that requires states that want to increase their size and weight limits for the Interstate Highway System to show that they have a "grandfather right to do so" based on state law that allowed higher weight prior to 1956.

The Surface Transportation Assistance Act (STAA) of 1982 mandated a federal weight limit of 80,000 pounds for trucks operating on the Interstate Highway System. It also mandated a federal bridge formula for trucks operating on the Interstate. The bridge formula provides a standard to control the gross vehicle weight of trucks based on the number and spacing of truck axles, but federal law arbitrarily capped the bridge formula GVW at 80,000 pounds. In addition, the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) froze the weights, lengths and routes of operation of longer combination vehicles (LCVs), which the legislation described as vehicles with more than two trailers and double trailer trucks with a gross vehicle weight that exceeds 80,000 pounds. All these limits in federal law represent a significant transportation efficiency penalty when measured against international transportation standards and also internally to the U.S. when measured against states that have grandfather rights for much higher truck weight.

This study examines the current operational and economic performance of a sample of companies who operate private fleets and establishes a present-day baseline of transport productivity and efficiency. It also estimates how transportation performance would likely change if the ISTEA restrictions were to be lifted, resulting in greater maximum GVW limits including the use of long LCVs.

Background

Freight mobility, bottlenecks and efficiency. Highway capacity is increasing at a much slower rate than the demand for freight transportation. Currently, heavy truck vehicle miles of travel (VMT) are increasing at approximately 3.5 percent annually, a rate higher than the 2.5 percent rate of VMT increase for light vehicles. Scenarios have been put forward predicting a doubling of the number of trucks on our roads system within 15 to 20 years. Although there are long-term global warming emission challenges to be addressed, the most immediate issue is traffic congestion and associated bottlenecks that impede truck movement.

Bottlenecks are specific locations where recurring congestion is experienced, causing traffic backups and delays. Bottlenecks have been estimated to account for 40 percent of all traffic delay, and bottlenecks at interchanges on freeways serving as urban freight corridors cause approximately 50 percent of national annual truck hours of delay at an estimated cost of $4 billion per year.[1] Nonrecurring congestion accounts for the remaining 60 percent of all traffic delays. It is caused by unpredictable events such as crashes, breakdowns, extreme weather conditions, construction work zones and faulty traffic controls. Heavy truck movements are of course affected by both recurring and nonrecurring congestion, but the solutions for keeping trucks moving are going to be very different for the two types of congestion.

Bottlenecks and congestion are key strategic issues in any evaluation of transport efficiency. Given various scenarios for future GVW increases, the resulting reduction in truck travel will serve as a countermeasure to congestion.

Societal value from larger trucks. Heavy truck size and weight policy has been the subject of many economic studies over the years. Such studies have attempted to project the reduced operating cost benefits of increased limits against increased public sector costs such as road damage and other highway system impacts.

In the most recent U.S. federal study, a number of scenarios involving heavier and longer vehicle configurations were investigated. The study concluded that:

> Significant productivity benefits are estimated for each illustrative scenario that allows heavier vehicle weights, but these benefits are derived primarily from the use of LCVs, even under the North American trade scenarios. Nationwide use of LCVs would entail significant infrastructure costs, adverse impacts on railroads, and potentially negative safety impacts. Furthermore, officials in many states that currently do not allow LCVs oppose policies that would relax restrictions on LCV use. In addition to concerns about infrastructure costs and safety risks, their opposition likely reflects apprehension about larger trucks by motorists and other interest groups in their states.[2]

[1] FHWA. "An Initial Assessment of Truck Bottlenecks on Highways." Prepared by Cambridge Systematics, October 2005.

[2] March, J.W. "DOT's Comprehensive Truck Size and Weight Study – A Summary. Public Roads." March/April 2001.

The study recognizes the inherent benefits of increased cubic capacity through the use of LCVs, but these units have limitations based largely on infrastructure-related geometric constraints. On the other hand, increasing truck weights will be compatible with existing infrastructure and will produce net benefits on the entire national transportation network. How these two distinct options influence efficiency of the transport system has not been well documented.

Despite chronic difficulties in comprehensive policy development involving private sector benefits on the one hand, and public sector costs on the other, the size and weight issue seems again to be coming under serious discussion. Larger trucks, including LCVs, will not be suitable for all roads, and route selection, permitting and monitoring will be important issues.

At the same time, there is a significant appetite for research that focuses on increasing truck mobility in urban areas and the use of managed and tolled lanes to expedite truck movement.[3] Principles for the successful design and operation of truck-only highway facilities will be investigated in a forthcoming federal study.[4]

From the private fleet perspective, larger and/or heavier vehicles will reduce the number of trips required and thus the exposure of the fleet to at least some types of on-road delays, especially those related to recurring congestion. The actual level of benefits will depend on a number of specific operational factors, but it is likely that the benefits would be leveraged over and above the per-vehicle productivity. For example, if the load could be increased by 25 percent per vehicle, the benefits to the private carrier in accumulated trip time could be significantly larger. It is also likely that the benefits will be expressed over several productivity metrics, depending on individual fleet characteristics such as trip times, total miles traveled and on-time delivery. Additional benefits are anticipated in fuel economy, reduced carbon emissions, driver and equipment utilization, safety, and highway infrastructure usage.

Objectives

This exploratory study benchmarked the current transportation efficiency of a sample of companies operating private fleets identified in concert with NPTC.[5] The parameters that were used to define efficiency focused on over-the-road operating costs, cargo transported (both by mass and volume), and miles travelled. It also included measures of fuel use, emission output and truck trips required for the companies' annual transport tasks. The study investigates the change in efficiency under the following scenarios:

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[3] Sweatman, P.F. "Vehicle Infrastructure Integration (VII) for Heavy Trucks: A New Perspective of Truck Research." Proc. International Conference on Heavy Vehicles, Ecole Nationale des Ponts et Chaussees, Paris, 2008.

[4] Transportation Research Board. National Cooperative Freight Research Program, Announcement of FY 2008 Freight Research Projects. "Project 13 – Developing High Productivity Truck Corridors."

[5] The National Private Truck Council (NPTC) is the only national trade association dedicated exclusively to representing the interests of the nation's private corporate truck fleets. These corporate or "private" truck fleets are operated to meet the inbound and outbound transportation needs of their companies. Private fleets account for 82 percent of the medium- and heavy-duty trucks registered in the United States, travel approximately 53 percent of all the U.S. miles traveled for medium- and heavy duty trucks, and consist of slightly more than two million vehicles and some two million drivers. Private fleets continue to comprise the largest segment of the trucking industry.

- increased GVW of tractor and 53-ft. semitrailer, and
- increased cubic capacity using LCVs with GVW tied to the bridge formula.

The study attempts to bring a fresh perspective to the characterization of productivity benefits by seeking a deeper appreciation of private truck fleet operations, especially the relationship between operational efficiency and quality of service. The participating companies provided data on where and when their trucks operate, and this combined database provided an important future resource for heavy vehicle research.

Project Methodology

The study used direct interview and questionnaire data collection methods to compile information and data from selected NPTC member companies.

- First, a general survey was conducted of the NPTC membership.
- Second, a set of seven companies that represent a cross section of the NPTC population were selected for case study analysis to estimate the potential gains from weight and length increases.
- Third, the seven selected companies completed a detailed questionnaire about their annual number of shipments, number of miles driven, the weight and/or volume of their loads, the fuel used, and their total shipping expenses.

The NPTC Survey

To understand more about the NPTC companies and their opinions about weight and length increases, a survey was conducted of their membership of approximately 400 companies asking them about their fleets, including questions on:

- the type of business,
- the size of their fleets (tractors and trailers),
- turnover rates of tractors and trailers,
- their use of third party carriers,
- the types and sizes of trailers used,
- the percentage of annual shipments that reach the current weight limit ("weigh out"),
- the percentage of annual shipments that reach the size limit of the trailer ("cube out"),
- their current use of Longer Combination Vehicles (LCVs),
- the percentage reduction of shipments if the gross vehicle weight was changed from 80,000 to 97,000 pounds, or
- the percentage reduction of shipments if their company was able to use LCVs on all Interstate highways in the U.S. (though not on any other roads).

Responses were received from slightly more than 100 companies for a 25 percent response rate. The demographics of the companies are shown in Appendix A. The survey questions are shown in Appendix B. The results of the analyses on the key questions of "weigh out," "cube out," and the estimates of the reductions of shipments if weight and length regulations were changed are included below in the "Major Findings" section of this report.

The NPTC Case Studies: Interviews and Questionnaires

The seven companies chosen to represent a cross section of the NPTC in the case study analysis vary in their types of businesses. The types of businesses include wholesale and retail food, other retail products, building supplies, and industrial supplies. One of the goals in choosing these companies was to generate a cross section of the different types of companies in the NPTC, and consequently illustrate benefits for private fleets throughout the U.S. The selected companies differ in a number of areas such as their products, their distribution systems, the types of trailers they use, their use of third party carriers, their use of LCVs, their percent of local and long distance deliveries, and especially the percent of their shipments/truckloads that weigh out or cube out. In the telephone interviews (see Appendix C), these companies provided confidential details about their distribution system designs, the effects increases in weight or length would have on their operations, and the effects the increases would have for their third party carriers.

In order to gather information on the scale of the companies' shipping activities, a questionnaire was developed and sent to each company (see Appendix D). The questionnaire also gathered data needed to quantify the potential fuel cost savings that would result from needing fewer shipments with higher weight or nationwide LCV permissibility.

The questionnaire's first section gathered historical 12-month data for a period that was more typical than calendar 2008 data, given the economic downturn, i.e., either calendar 2007 or fiscal 2008 ending on, say, June 30, 2008. These data indicated the level of each company's shipping activities and constituted a baseline for calculating the potential fuel cost savings.

Next, there were two sets of questions dealing with the impact of an increased weight allowance, one set for a 14,000 lb. increase in cargo weight, the other for an 8,000 lb. increase. These were followed by a set of similar questions regarding the impact of being allowed to use multiple LCVs nationwide. Finally, participants were asked to indicate any financial impacts other than a reduction in the number of shipments, total mileage and mpg that might occur because of increased weight or length.

Major Findings

The results of our analyses of the three forms of data collection yielded the following findings:

1) **Increases in weight and length would have a direct beneficial effect on the challenges facing American businesses.**

The main future challenges over the next five years that interviewees reported focus on fuel availability and cost, congestion, improved distribution efficiency, and driver availability. In general, these challenges would benefit from the opportunities they see should vehicle weight and length be increased. The analyses show that fuel costs are reduced significantly through the reductions of shipments due to increased vehicle weight and length. Companies' experiences with LCVs in some states suggest some of the congestion reduction and distribution efficiencies these provide. They also explain some of the challenges of moving freight outside of the major highways. As one company executive noted:

> We need a national network of LCVs. For the NY Thruway and out West (Utah, Idaho, Nevada), we now have 45-ft. and 48-ft. trailers. (Oklahoma

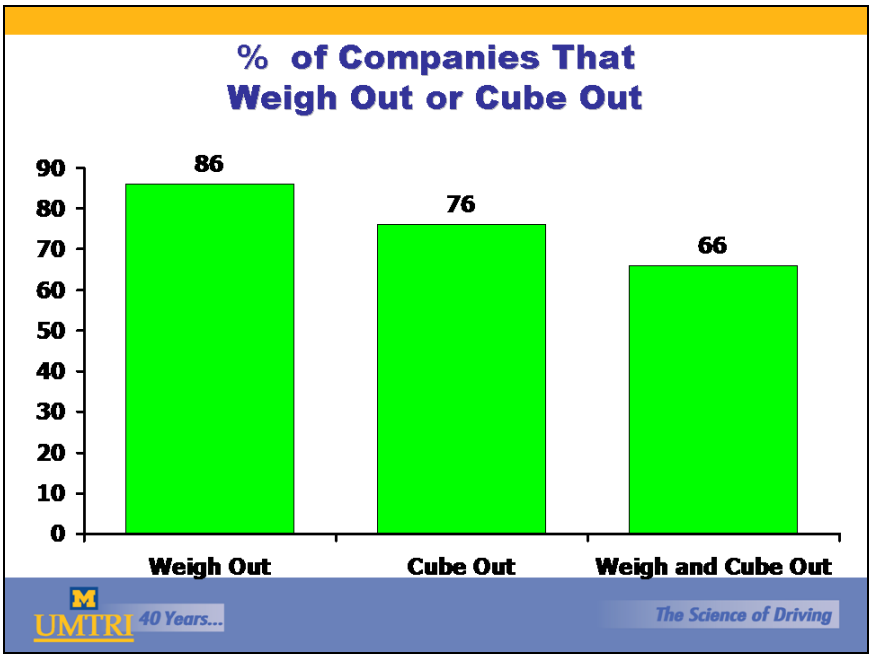
allows two 53-ft. and also triples.) We now take LCVs to large cities, but they cannot enter the city unless the Interstate goes through it. They move from our distribution center to a staging area to break up the LCVs. The staging area is an added expense. It consists of a yard to stockpile trailers. We need these compounds to break them down. Some states allow LCVs but don't provide compounds. The advantages of pulling LCVs over long distances are huge. We use one driver and get better mileage because of using less fuel [relative to the weight hauled] and emit less greenhouse gas emissions over using two tractors and drivers to move the same loads.

The need for more drivers in the future as a large number of drivers retire also is mitigated by the reduced number of shipments required due to increased trailer weight and length. It was felt that this cost reduction would be significantly lower than the fuel cost reduction and harder to estimate. Nevertheless, it is definitely a financial benefit, especially given the industry's concern about future availability of drivers.

2) Large numbers of companies can benefit from increased tractor-trailer weight and length.

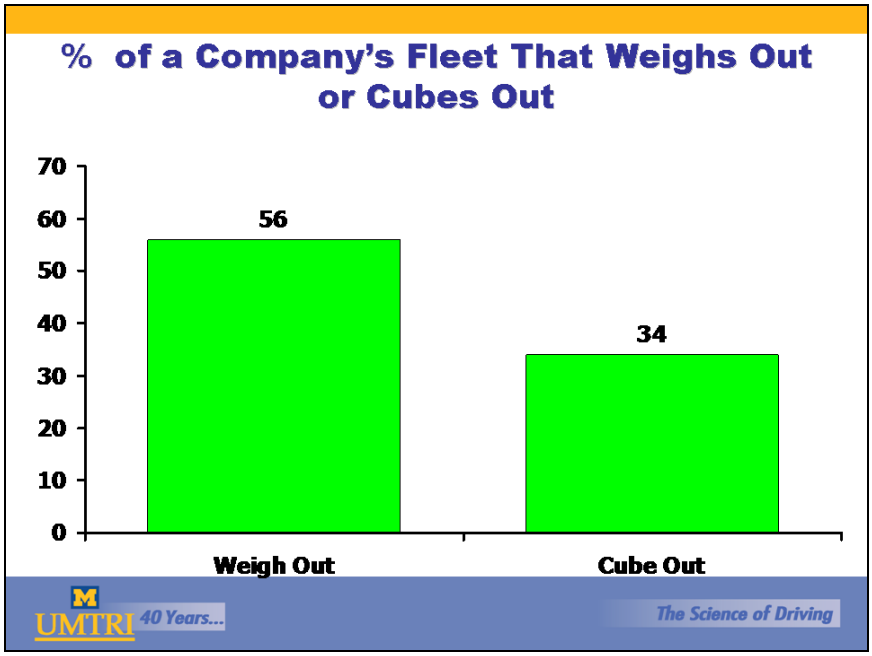
Our study of the potential benefits of increased trailer weight and length provided a number of ways of measuring the benefits. As can be seen in Figure 1, our survey of the NPTC membership found that when considering the loads transported by the company, 86 percent of the companies experience some weigh out, 76 percent experience some cube out, and 66 percent have both weigh outs and cube outs.

Figure 1



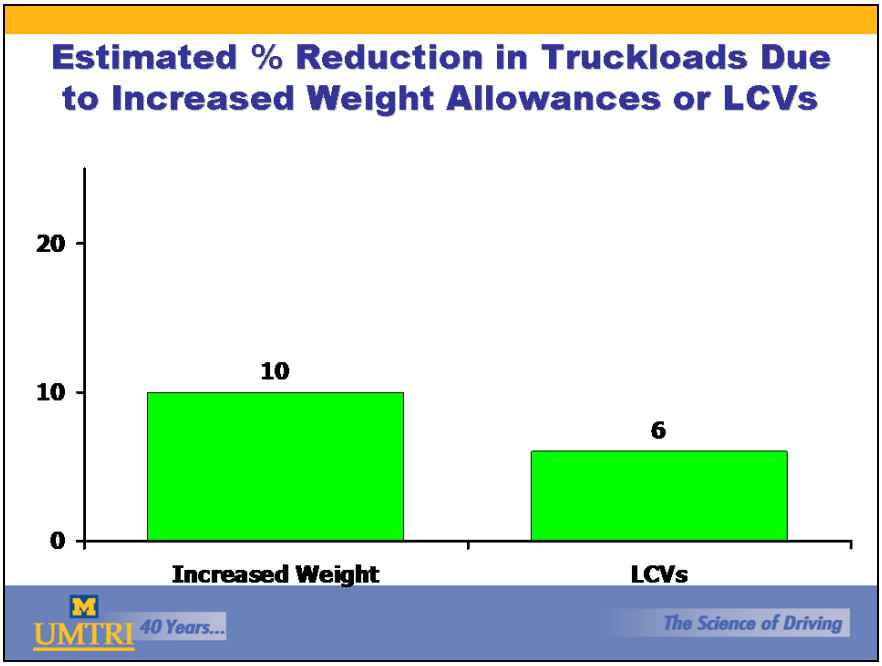
Each company was asked to report the percentage of its shipments/truckloads that weigh out and cube out annually. Figure 2 shows that 56 percent of the companies' shipments weigh out and 34 percent cube out. The 56 percent weigh out may appear to be higher than anticipated. This may be the result of product shipping efficiencies associated with businesses that have private fleets and also by the fact that the study only considered outbound shipments and not return trips.

Figure 2



Finally, the survey respondents were asked to estimate the percent reduction in shipments/truckloads for their company if the 80,000 pound weight regulation was changed to 97,000 pounds, and if their company was allowed to use LCVs on all Interstate highways (though not any other roads). Figure 3 shows the significant percentage of reductions due to these two changes in regulations. It should be noted that these estimates were checked against the detailed data collected from the companies to ensure consistency. If any discrepancies were found, the companies were contacted and the differences were resolved.

Figure 3



3) Companies report significant potential benefits from tractor-trailer weight and length increases.

The interviews with a cross section of NPTC companies revealed that the gains from increases in tractor-trailer weight and length would be primarily from the cost of operations and vehicle miles traveled, though some companies will also gain from customer service, product mix, and reduced time to market. The quantitative analyses of each company's operations bear out these observations.

The major potential operating cost benefit of increased tractor-trailer weight or length would be reduced diesel fuel consumption from needing fewer shipments, either because a trailer that now weighs out could carry more cargo, or a company whose trailers frequently cube out could add a second trailer. The reduction in miles per gallon due to heavier or longer trucks would be greatly offset by the significant improvement in transport efficiency (amount of fuel used per cargo unit transported) and the reduction in total miles driven from making fewer shipments. There are many implications associated with changes to size and weight policy that are difficult to forecast. Therefore, at this time it is not feasible to make estimates of all of the financial impacts, both savings and additional costs that would result from higher weight or nationwide LCV allowances.

The responses of the seven companies are shown in Table 1. As was intended, the participating companies constitute a diverse set, both with regard to scale, distribution networks, and goods being shipped. The ranges of annual data below illustrate the variation in activity levels among those companies. The group's total amounts are shown after the ranges. The data include the results of both the direct questions asked and ratio calculations that were made based on those

data (shown in italics). Because one firm's shipping activity level was extremely high, averages for items that are totals are not meaningful. Medians have been included to help describe these skewed distributions.

Table 1: The Ranges of Aggregated Annual Data from Seven Private Carriers

Category	Range	Median	Total *(or Avg.)*
Shipments:	11,892 – 4.4 million	600,000	7.17 million
Total Miles:	2.3 million – 1.3 billion	86 million	2.02 billion
Avg. Miles/Shipment	*83 miles – 450 miles*	*197 miles*	*(248 miles avg.)*
Total Weight:[6]	596 million lbs. – 24 billion lbs.	21 billion lbs.	82.8 billion lbs
Avg. Weight/Shipment:	*24,000 lbs. – 50,128 lbs.*	*35,000 lbs.*	*(38,806 lbs. avg.)*
Total Volume:[7]	18.6 million cu. ft. – 11.7 billion cu. ft.	1.3 million cu. ft.	16.3 billion cu. ft.
Avg. Volume/Shipment:	*1,300 cu. ft. – 4,212 cu. ft.*	*2,659 cu. ft.*	*(2,659 cu. ft. avg.)*
Total Fuel:	441,000 gals. – 188 million gals.	8.2 million gals.	297 million gals.
Miles per gallon	*5.3 mpg – 7.0 mpg*	*6.07 mpg*	*(6.1 mpg avg.)*
Fuel cost	$1.27 million – $699 million	$26 million	$1.10 billion
Cost/Gal	*$2.88 – $3.80*	*$3.71*	*($3.52 avg.)*
Total shipping expenses:[8]	$13.2 million – $1.8 billion	$485 million	$3.2 billion

Similarly, there was a wide range of potential annual fuel cost savings with either higher weight or LCV allowances. In general, a company using fully enclosed trailers may not be able to utilize all of the potential added cargo weight because its trailers would cube out before reaching that higher weight allowance. In this study, increased weight allowances would not benefit the two companies whose trailers almost always cube out. For another company, a trailer would become totally filled with additional cargo weighing no more than an additional 8,000 lbs.; thus, its 14,000 lb. and 8,000 lb. benefits would be the same. The data ranges and totals for the five applicable firms are shown in Tables 2 and 3.

[6] Not available from two companies, both of which cube out rather than weigh out on at least 90 percent of their shipments. Thus, the average weight per shipment is overstated relative to the entire set of seven firms. The data do include a firm that cubes out 70 percent of the time.

[7] Applicable to the five companies using vans, but not the two using flatbeds.

[8] Includes payments to third party carriers, if applicable.

Table 2: Estimated Change Associated with 14,000 lb. Weight Increase Option

Category	Range	Median	Total *(or Avg.)*
Additional weight/load	7,000 lbs. – 14,000 lbs.	10,000 lbs.	*(10,600 lbs. avg.)*
Total miles reduction	652,000 – 28.9 million	8.5 million	63.9 million
Miles per gallon reduction	0.20 mpg – 0.40 mpg	0.25 mpg	*(0.26 mpg avg.)*
Fuel quantity reduction:	136,000 gals. – 5.03 million gals.	1.6 million gals.	10.8 million gals.
Percentage fuel reduction.	*1.4% – 32.9%*	*23%*	*19.0% / 3.6%*
Fuel cost savings	*$393,000 – $19.1 million*	*$6.1 million*	*$40.3 million*

Table 3: Estimated Change Associated with 8,000 lb. Weight Increase Option

Category	Range	Median	Total *(or Avg.)*
Additional weight/load	4,000 lbs. – 8,000 lbs.	*8,000 lbs.*	*(7,000 lbs. avg.)*
Total miles reduction	353,000 – 22.9 million	4.9 million	50.3 million
Miles per gallon reduction	0.11 mpg – 0.30 mpg	0.19 mpg	*(0.19 mpg avg.)*
Fuel quantity reduction:	79,000 gals. – 3.04 million gals.	917,000 gals.	7.5 million gals.
Percentage fuel redn.	*1.4% – 18.8%*	*13%*	*11.0% / 2.5%*
Fuel cost savings	*$229,000 – $11.6 million*	*$3.5 million*	*$27.8 million*

In considering the impact of LCVs, the analysis assumed that LCVs could only operate on mature divided highways, including the Interstate system, and that the vehicles would need to be converted to standard tractor-trailers for any journey outside of this network. Respondents were asked to provide information about using double 53-ft. trailers, but not triple 28-ft. trailers, with a maximum GVW of 130,000 lbs. For the two respondents that now almost always cube out, and a third one that cubes out about half the time, there would be a significant use of LCVs if they were permitted nationwide. A fourth firm that often cubes out would not use LCVs because of delivery logistics. For the three firms that could benefit, the estimated impacts using double 53-ft. trailers are shown in Table 4.

Table 4: Estimated Change Associated with LCV Option

Category	Range	Median	Total *(or Avg.)*
Additional volume	2,000 cu. ft. – 4,212 cu. ft.	3,800 cu. ft.	*(3,337 cu. ft. avg.)*
Total miles reduction	25.0 million – 75.2 million	47.8 million	148 million
Miles per gallon reduction	0.70 mpg – 1.00 mpg	0.83 mpg	*(0.84 mpg avg.)*
Fuel quantity reduction:	3.6 million gals. – 14.5 million gals.	5.7 million gals.	23.8 million gals.
Percentage fuel redn.	*19.4% – 43.5%*	*41.6%*	*34.9% / 8.0%*
Fuel cost savings	*$11.3 million – $55.2 million*	*$21.6 million*	*$88.2 million*

Please note that there are two percentages in the percentage fuel reduction line in Tables 2, 3 and 4. The first percentage is the unweighted average of the percentage reductions of those companies that would benefit from that change. For example, for the five companies that would save fuel with a 14,000 lb. additional weight allowance, the individual fuel savings were estimated to be 23.1, 6.7, 30.9, 32.9 and 1.4 percent of the recent annual amount. The average of those five percentages is 19.0 percent. If the five companies' 10.8 million total gallons of fuel reduction are divided by the 297 million gallons of recent total fuel consumption of all seven companies, then the reduction is 3.6 percent.

The reason that this 3.6 percent fuel reduction is not proportionately higher than the 2.5 percent for an 8,000 lb. increase is because one company's number of shipments was more than 1.5 times the sum of the other six fleets'. This huge company with only a 1.4 percent fuel saving is the one alluded to earlier that would cube out by the time 8,000 more pounds were added, and thus would have the same benefits at 14,000 added pounds as 8,000. In addition, this lowest-impact company's total recent fuel consumption was more than double the sum of the consumption of the other four companies' that would benefit from the increased weight allowances, and was 63 percent of the 297 million total for all seven companies. Because of this extremely high scale of one firm, the percentage of fuel reductions for this sample of seven companies likely understates what the percentage reduction would be across all private fleets.

As shown in the tables above, the net benefit in fuel consumption and emissions reduction attributed to the three options are 3.6 percent for the 14,000 lb cargo increase, 2.5 percent for the 8,000 lb cargo increase and 8.0 percent for the LCV option. Because the potential 14,000 lb. or 8,000 lb. cargo weight increases (to total GVWs of 97,000 lbs. or 91,000 lbs.) are mutually exclusive, their potential benefits are not additive. However, the benefits of either of the weight increase possibilities could be in conjunction with the benefits of LCVs' being allowed on the Interstate system. If both the 14,000 lb. cargo weight increase and LCVs usage were allowed, then the estimated combined annual benefits of the seven companies would be diesel fuel savings of 34.6 million gallons; that is 11.7 percent of their recent year's 297 million gallons of total fuel consumption under the current regulations. If both the 8,000 lb. increase and LCVs

usage were allowed, the estimated combined fuel savings would be 31.3 million gallons, which is 10.5 percent of their recent 297 million gallons of fuel consumption.

Despite these significant savings, there are a few caveats that must be considered. A cost increase would be the additional training needed for LCV drivers, who will need to develop expertise on the additional ramifications of operating vehicle combinations with more than one trailer. Presumably, special vehicle permit fees would constitute an additional cost. However, everyone interviewed said that both the training costs and fee increases, based on current permit fee structures, would be insignificant relative to the substantial fuel cost savings and the reduced number of drivers needed.

Increasing the weight carried by current two-axle trailers would require the addition of a third axle. This transition would require a significant cash investment. The variety of possible changes needed for various trailers makes it impractical to estimate the cost per retrofit; and in some instances, a retrofit might not be feasible. Even if there were an estimate per retrofit, there could not be an estimated total cost for the companies in this study. That is because all of them use third party carriers for 10 to 90 percent of their shipments. Those third party carriers that choose to make the third-axle investment will then recover at least a portion of it by the efficiency gains from increased cargo and/or by increasing their rates. (Any unrecovered portion will likely benefit the third party carrier's customers.) In addition, a company might already own some three-axle trailers. Also, a company might change the mix of its own shipments versus those by third parties, depending on the degree of third parties' axle additions and the company's need to replace its own trailer fleet in the next few years.

For those companies that add LCVs, there may be some minor modifications needed for each pair of existing trailers; but the cost is not likely to be significant. Also, there might be a need for investment in areas near Interstate exits ("drop yards") where the double trailers could be broken down to single units for use on the undivided highway system and local roads and streets. Interviewees who mentioned this understandably indicated that it as an investment amount that cannot be estimated at this time.[9]

In addition to these nonquantifiable financial impacts, each of the following was mentioned by at least one interviewee:

- reduced administrative cost (because of fewer shipments and drivers),
- potential need for fewer tractors and (non-LCV) trailers given fewer required shipments,
- potential increased tire/trailer wear-and-tear resulting in shorter life, and
- LCV-related redesign of existing receiving structures/processes (in addition to drop yards).

Finally, the issue of third party carriers also affects the potential gains from increases in tractor-trailer weight and length. For those companies that have relatively low use of third party carriers, the total fuel and driver cost savings will directly benefit the company itself. For those

[9] Some companies now allowed to use LCVs in certain states have found ways to subdivide LCVs and remove them separately near an exit without investing in their own area to do so.

that use third party carriers extensively, although not quantifiable at this point, these carriers' ability to haul heavier loads or use LCVs will reduce their expenses. In such a competitive market, this in turn will result in lower total payments to the third party carriers. In either instance, the manufacturers' customers (other manufacturers, distributors and retailers) will be aware of these savings, and competition will result in a reduction of the price (on a constant-dollar basis) of the goods sold to those customers. These customers may also benefit from cost reduction on the shipments they control as well. Thus, it is not fair for someone to ask, "Why should I care about those manufacturers' having higher profits?" (a question less likely to be asked in today's economy). Both the manufacturers that are users of raw materials like flour, and the end users of any product delivered by highway carriers, will benefit.

4. Increasing the weight or length of vehicles also provides benefits for the environment and national fuel supply through reduced energy consumption.

Three impacts of fewer shipments on the overall economy and the environment are less traffic congestion, less fuel consumption and fewer emissions, particularly carbon dioxide (CO_2), resulting from fewer truck trips, less congestion and fewer hours of idling.[10] Although it is not feasible to associate a dollar amount with any of these benefits, the data gathered do illustrate the potential for reduced emissions. For the five companies that could benefit from additional cargo weight of 14,000 lbs., their total annual fuel reduction is estimated at 10.8 million gallons, which would result in a reduction of 240 million lbs. (120,000 tons) of CO_2.[11] With an 8,000 lb. increase, the estimated fuel reduction of 7.5 million gallons would result in a CO_2 reduction of 167 million lbs. (83,000 tons); and for the three companies that would benefit from LCVs and would consume 23.8 million fewer gallons, it would be 528 million lbs. (264,000 tons).

As noted above, for all seven companies combined, the potential total annual fuel savings are estimated to be either 34.6 million gallons of diesel fuel with a 14,000 lb. cargo weight increase and LCVs usage, or 31.3 million gallons with an 8,000 lb. increase and LCVs usage. Associated with these savings would be respectively either 768 million lbs. (384,000 tons) of reduced CO_2 emissions, or 695 million lbs. (347,000 tons) of reduced CO_2 emissions.

In 2005, there were 8.5 million heavy trucks registered in the U.S.[12,13] These trucks traveled over 222 billion miles that year, consumed 33.5 billion gallons of diesel fuel, and emitted almost 744 billion lbs. (372 million tons) of CO_2 to the atmosphere. This was approximately 19 percent of the CO_2 emissions from all transportation sources in that year.[14] Class 8 trucks consumed approximately 75 percent of the total fuel consumed by all trucks. If a 14,000 lb. additional cargo weight allowance (97,000 lb GVW) and Interstate usage of LCVs were permitted, and the fuel consumption and emissions reduction benefits estimated for this study's subset of vehicle

[10] There are several emissions other than carbon dioxide, but it is the one that is untreatable.

[11] The relationship of gallons of diesel fuel to CO_2 emissions is based on the EPA's ratio of 22.2 lbs. of emission per gallon of fuel.

[12] M.J. Bradley & Associates. "Setting the Stage for Regulation of Heavy-Duty Vehicle Fuel Economy & GHG Emissions: Issues and Opportunities." Submitted to International Council on Clean Transportation, February 2009.

[13] Davis, S. and Diegel, S. U.S. Department of Energy, Energy Efficiency and Renewable Energy, Transportation Energy Data Book, Edition 26, 2007.

[14] U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2006.

fleets were representative of the national class 8 truck fleet (which is unknown), then the national annual diesel fuel reduction would be nearly 3 billion gallons and the amount of CO_2 produced would be reduced by over 65.3 billion lbs. (32.6 million tons). If only an 8,000 lb. cargo increase were allowed (91,000 lb GVW) along with LCVs, then the national annual diesel fuel reduction would be 2.6 billion gallons and amount of CO_2 produced would be reduced by 58.6 billion lbs. (29.3 million tons).

Finally, one issue that can affect the implementation of increases in tractor-trailer weight and length is the U.S. bridge formula, which practically limits the 6-axle tractor semi-trailer GVW to approximately 91,000 lbs. The current administration's focus on improving the U.S. infrastructure offers an opportunity to strengthen the nation's bridges, thus making much-needed infrastructure improvements while at the same time allowing the nation to take advantage of increases in tractor-trailer weight and length. Nevertheless, by simply modifying existing size and weight regulations, the nation will accrue substantial financial benefits as well as the added effect of reducing the U.S. dependence on foreign oil and reducing CO_2 emissions dramatically. Investing in infrastructure improvements will provide substantially more benefits. The magnitude of these benefits far exceeds the anticipated benefits associated with improvements in engine and aerodynamic technology.

Conclusion

This study provides a perspective on a cross section of businesses operating private fleets in terms of the benefits that would likely occur from productivity increases associated with changes in federal size and weight limits. The results presented in this report were from the analysis of a small sample of private fleets that were selected to represent a diverse set of transport operations The selection process was purposeful and not random in order to ensure that the cases studies were as representative as possible of the scope of private fleet operations. Nevertheless, the limited number of companies studied means that the results of the study are not necessarily representative of the broader number of private fleets. Therefore, the results may underestimate or overestimate the potential benefits. In addition, private fleet operations are different from those of the third party fleets, which imposes further limitations on the interpretation of the results, particularly with respect to the national fleet.

The study produced the following key findings:

1. Increases in weight and length would have a direct beneficial effect on the challenges facing American businesses

2. Increasing the weight or length of vehicles also provides benefits for the environment and national fuel supply through reduced energy consumption.

3. Large numbers of companies can benefit from increased tractor-trailer weight and length.

4. Companies reported significant potential benefits from tractor-trailer weight and length increases.

Not all seven of the companies examined by this study would benefit from each possible regulation change. Five would benefit from increased weight allowances and three from nationwide use of LCVs. Of the companies that would benefit, the average fuel and emissions

saving would be 19 percent for the 14,000 lb payload increase, 11 percent for the 8,000 lb increase and 34.9 percent for the LCV option. However comparing the fuel savings benefits with the aggregate 297 million gallons of diesel fuel consumption of all seven companies, the mean value of diesel fuel saved by increased vehicle weight is 3.6 percent for a cargo payload increase of 14,000 lbs., and 2.5 percent for a cargo weight increase of 8,000 lbs. The mean amount of fuel saved from LCV operations, assuming the LCV configuration consists of two 53-ft. trailers, is estimated to be 8.0 percent.

Of the three scenarios evaluated, the LCV option has the greatest projected influence on fuel consumption and emissions reduction. The benefits projected for the 91,000 lb and 97,000 lb options are similar, separated only by 1.1 percent. However as mentioned previously, one very large company could not benefit significantly from the 97,000 lb option because of cube out limitations at 91,000 lb GVW, therefore the general benefits of the 97,000 lb option may be underestimated.

Assuming a 14,000 lb. cargo weight increase and the use of 53-ft. twin-trailer LCVs on the Interstate system, if the fuel consumption and emissions reduction benefits related to this study's subset of vehicle fleets were representative of the national class 8 truck fleet (which is unknown), then the national diesel fuel reduction would be nearly 3 billion gallons and the amount of CO_2 emissions would be reduced by over 65.3 billion lbs. (32.6 million tons) annually. However if only an 8,000 lb. cargo increase were allowed (91,000 lb. GVW) along with LCVs, then the national annual diesel fuel reduction would be 2.6 billion gallons and amount of CO_2 produced would be reduced by 58.6 billion lbs. (29.3 million tons).

Appendix A

NPTC Survey: Company Demographics

Figure A1

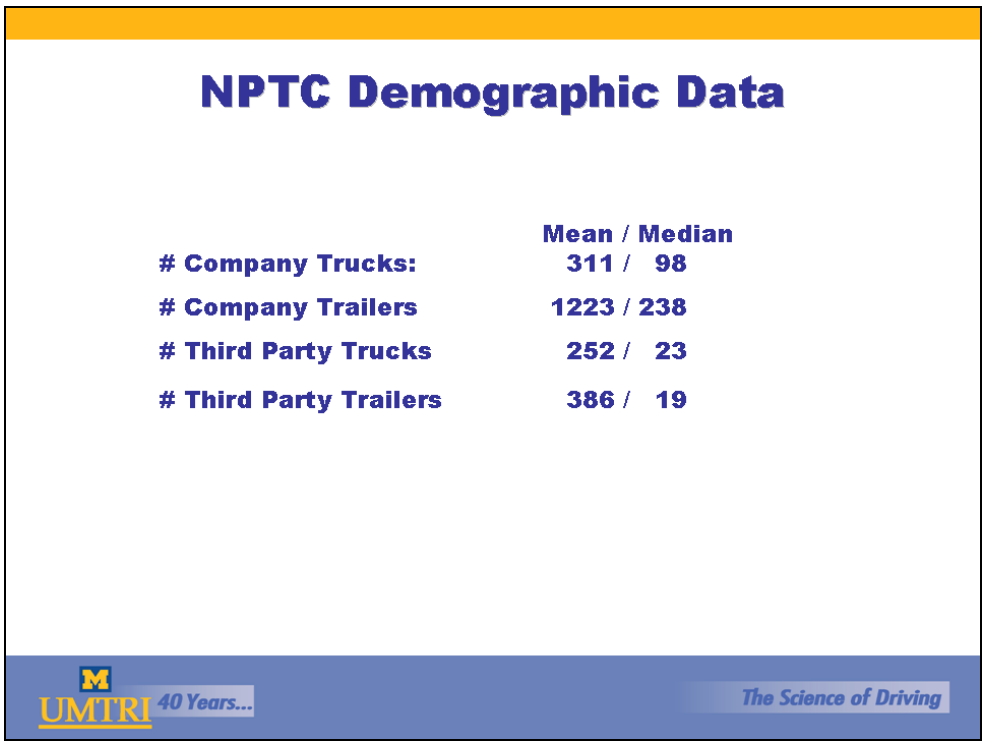


Figure A2

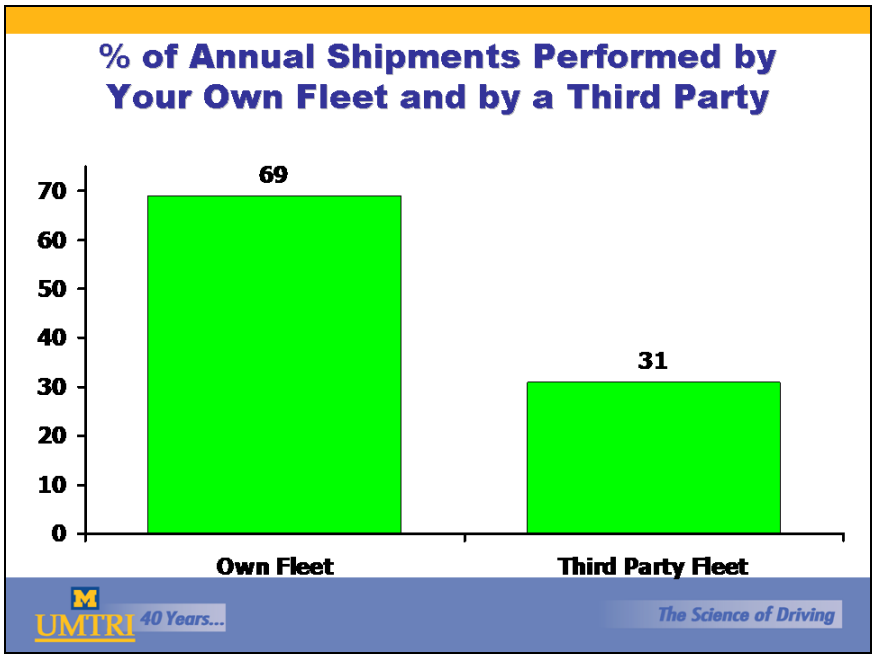


Figure A3

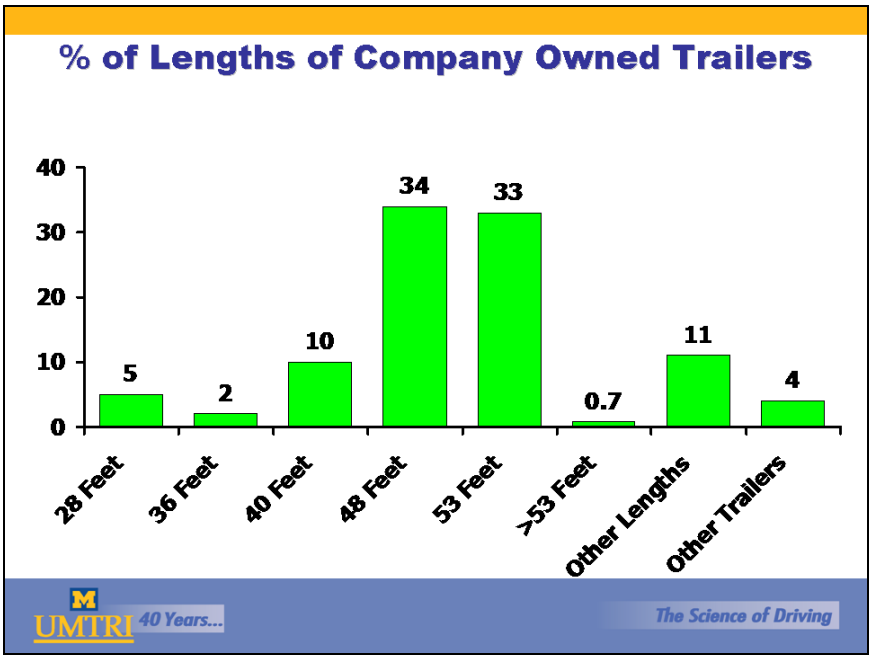


Figure A4

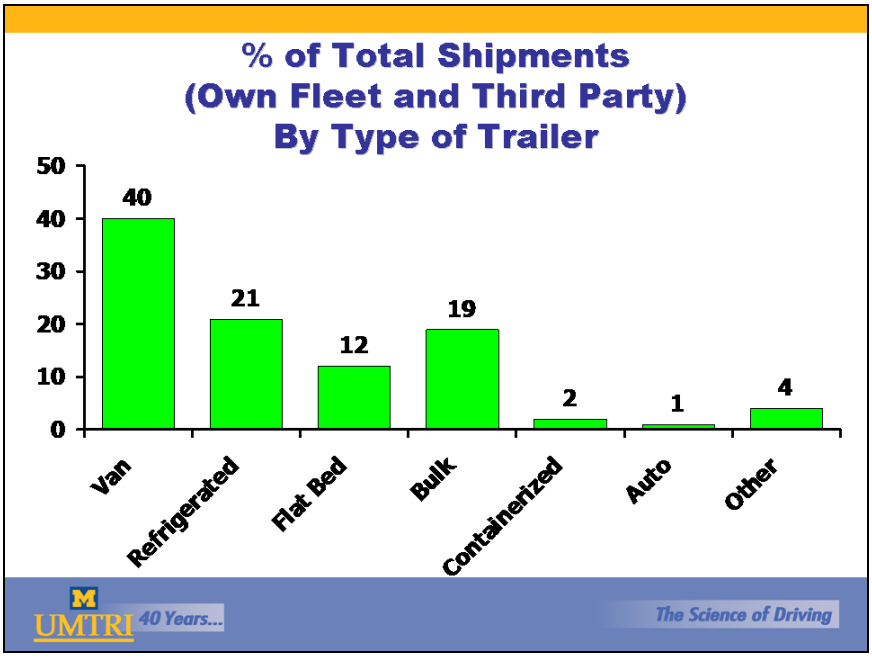


Figure A5

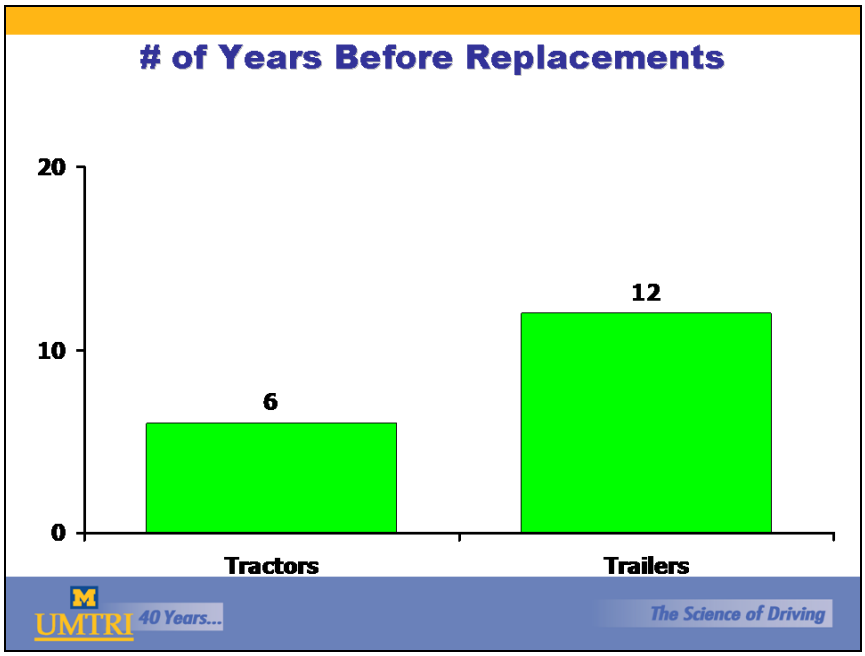
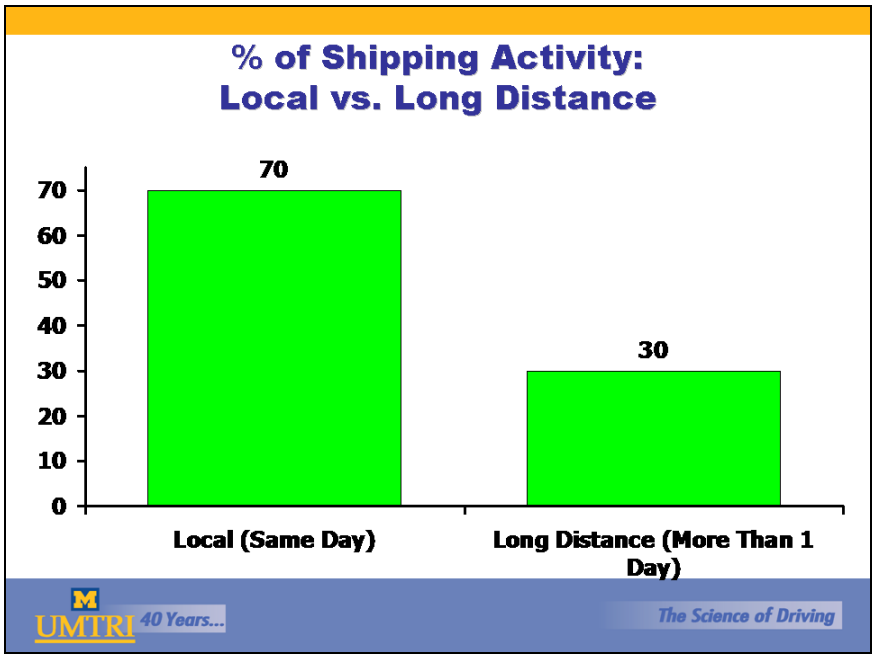


Figure A6



Appendix B

Web Survey of NPTC Member Companies

The Potential Benefits of Large Trucks Survey

The University of Michigan
Transportation Research Institute
2901 Baxter Road
Ann Arbor, MI 48109-2150
Phone: 734-936-2704

WELCOME!

The National Private Truck Council (NPTC) has contracted with the University of Michigan Transportation Research Institute to research the potential benefits of higher productivity vehicles (defined as larger and/or heavier vehicles) for member companies. In order to better understand the businesses represented by the NPTC, we are asking that you complete the following 5 to 10-minute questionnaire about your company's fleet. **For this request, we are asking only for your best estimates, not the exact numbers.**

Confidentiality

The information you share with us will be kept confidential, and only project research staff here at UMTRI will see your individual responses.

Your participation is important! We need to understand the types of companies that are part of the NPTC in order to better understand the potential benefits of larger trucks on NPTC member fleets.

Filling out the Survey

Basic Navigation Instructions

You must complete the survey in one sitting, which should take about 5 minutes. You will not be able to save your answers and come back later. Use the tab key or cursor to navigate between the questions. The "Reset" button clears all answers on that page. Do NOT use your browser's "back" button; this will cause your survey responses to be lost.

Feedback

If you complete the online survey and provide your mailing address, we will send you a report on the results of the survey when it is published.

Thank You!

If you have any questions, please contact Tom Moore at (703)-838-8898 or tmoore@nptc.org <mailto:moore@nptc.org> or Bruce Belzowski at 734-936-2704 or bbl@umich.edu <mailto:bbl@umich.edu> . Thank you in advance for your help.

Introduction

- **For this study, we are interested only in tractor-trailer combinations, which exclude straight trucks.**

- **We also define a shipment as moving from Point A to Point B, rather than Point A to Point B and back to Point A.**

1. Approximately how many tractors and trailers are in your company's private and/or dedicated fleet and if applicable, the fleets of 3rd party vehicle units used to support your business?

	Tractors	Trailers
Your Company's Private / Dedicated Fleet	_____	_____
Third Party Fleets	_____	_____

2. Approximately what percentage of your fleet's trailers fit the following dimensions?

Your Private/Dedicated Trailers (%)))))

28 Feet	_____
48 Feet	_____
53 Feet	_____
>53 Feet	_____
Other Dimensions	_____
Other Dimensions	_____
Total	_____

Your Third Party Carriers (%)

28 Feet	_____
48 Feet	_____
53 Feet	_____
>53 Feet	_____
Other Dimensions	_____
Other Dimensions	_____
Total	_____

If you entered something for "Other Dimensions," what is the length of these trailers?

Other (1) _____

Other (2) _____

3. Approximately how often (in years) do you replace/refurbish your tractors or trailers?

Tractors _____

Trailers _____

4. Does your company use Longer Combination Vehicles (LCVs)?

YES ❑

NO ❑

IF YES, about what percentage of your annual shipments (Point A to Point B) are with LCVs? _____

5. Approximately what percentage of your annual shipments (Point A to Point B) are done by your own private/dedicated fleet versus third party fleets?

Your own Private/Dedicated Fleet _____

Third Party Fleets _____

Total _____

6. Approximately what percentage of your total annual shipping activity is done locally/regionally (within the same day) and long distance (more than one day)?

Locally/regionally shipping activity (within one day)	_____
Long distance shipping activity (more than one day)	_____
Other shipping activity	_____
Total	_____

If you entered something for "Other shipping activity," please list the type of shipping activity.

Other Shipping Activity _____

7. Approximately what percentage of your total company shipments (both own fleet and third-party fleets combined) would be described as delivered by each of the following types of trailers?

Van Trailer	_____
Refrigerated Trailer	_____
Flatbed Trailer	_____
Bulk Trailer (including Tanker Trailer)	_____
Containerized Trailer	_____
Auto Carrier Trailer	_____
Other Type of Trailer	_____
Total	_____

If you entered something for "Other Type of Trailer," please list the type of trailer.

Other Type of Trailer _____

8. Approximately what percentage of your company's total annual shipments "Weigh Out" (reach the trailer weight limit) versus "Cube Out" (reach the trailer size limit)?

Weigh Out (reach the trailer weight limit) _____

Cube Out (reach the trailer size limit) _____

9. Approximately what percentage reduction in shipments, if any, do you think your company would experience if the gross vehicle weight restriction of 80,000 lbs was changed to 97,000 lbs.?

Percentage Reduction _____

10. Approximately what percentage reduction in truckloads, if any, do you think your company would experience if your company was allowed to use Longer Combination Vehicles (LCVs) on all federal interstate highways (though not on any other roads)?

Percentage Reduction _____

11. Does your company record the following annual shipping information for all company shipments?

	Yes	*No*
Number of Shipments/Loads	❑	❑
Number of Pallets	❑	❑
Shipping Weight	❑	❑
Shipping Cubic Feet	❑	❑
Shipping Cost for Your Private/Dedicated Fleet	❑	❑
Shipping Cost for Your Third Party Fleet(s)	❑	❑

12. Do you foresee a significant change in your transportation practices in the next year? If yes, what change do you foresee?

_____
_____
_____
_____
_____
_____

Demographic Information

Thanks for your participation in the survey. Your responses will be held in the strictest confidence. Please fill in the blanks below if you wish to receive the report with the results of this survey.

Name _____

Company Name _____

Phone Number _____

Email Address _____

Appendix C

Case Study Telephone Interview

First of all, we'd like to thank you for agreeing to be interviewed. The University of Michigan Transportation Research Institute is researching the opportunities and challenges concerning the potential benefits of implementing changes in U.S. regulations of larger trucks. Companies have designed their distribution around current regulations, but we are interested in finding out the benefits companies may gain from changes in either weight or length increases of trailers. We are interviewing people like yourself because we think now is an opportune time to find out the details of what companies such as yours will gain from these changes in the current environment and in the long term.

To gather the necessary information, we are performing case studies of eight companies from the NPTC. This interview represents the first source of information, and a second interview focusing on specific company data on numbers of shipments and pallets, as well as weight, cubic feet, and costs will complete the data collection.

As is the case in all of our research, we are <u>not</u> interested in making negative comparisons across companies. Our goal is to provide analysis of the changing needs of the heavy truck industry that will aid the industry as it faces the challenges of the coming decade.

The information you share will be kept confidential, and only project research staff will see your identifiable responses. We will not quote you without your permission. We will send you a report describing these interviews and analyzing the challenges, opportunities, and trends they reveal. We believe that this report will assist you in evaluating and benchmarking your company's own decision processes and outcomes, and contribute to their improvement.

For this interview we will focus on your company's current distribution profile, your company's current distribution system design and the changes and improvements your company may gain from increases of trailer weight or length.

- For the purposes of this interview, we use 97,000 pounds as the increased weight for trailers, and the increase in trailer length is defined for Longer Combination Vehicles (LCVs) as some double or triple combination of trailers.
- For this study, we define a shipment as moving from Point A to Point B, rather than Point A to Point B to Point A.
- Because our current economic downturn is predicted to decrease deliveries for 2008 and 2009, we ask that you base your shipping estimates on a "normal or average" year such as 2007.

Any questions? All right, let's begin.

Introduction

1. **What are the three most important logistics challenges facing the trucking industry in the next five years?**

2. **How do you think increasing trailer weight or length (LCVs) will help overcome any of these challenges?**

Current Distribution Profile

3. **Do the following percentages still represent the annual percent of your shipments performed by your own private fleet and those performed by your third party carrier?**

   (Enter the %'s from the interviewee's survey, if not correct, please enter the correct percentages.)

   Your own private fleet:
   Your third party carrier:

4. **Do your private and third party carriers deliver to multiple destinations or to just a single destination per shipment?**

5. **Approximately, what percent of your shipments is less than full truckloads?**

6. **Do the following percentages from our survey still represent the total annual shipments (for both you and your third party carriers combined) by the following trailer types?**

   (Enter the %'s from the interviewee's survey, if not correct, please enter the correct percentages.)

   Van: YES
   Refrigerator:
   Flatbed:
   Bulk (including Tanker Trailer):
   Containerized:
   Auto Carrier:
   Other:

7. **Does your company use Longer Combination Vehicles (LCVs)?**

   IF NO:

   7A. If laws were changed to allow LCVs to travel, for example, on all interstates or all interstates and state divided highways, would you

company use them? Why or why not? If yes, what type of trailer combinations would your company probably use?

(CONTINUE TO Q.8)

IF YES:

7B. Does the following percentage from our survey still represent your company's approximate annual shipments (from Point A to Point B) using LCVs?

(Enter the %'s from the interviewee's survey, if not correct, please enter the correct percentages.)

7C. Are your current transportation tasks better suited for triples (3, 28 ft. trailers) or (2, 53 ft. trailers) or (some other combination)? If some other, what is it? Would your company use existing trailers or purchase trailers to meet the maximum length allowed?

7D. If the LCVs you've mentioned were permitted to operate <u>on the interstate system only</u>, what effect, if any, would it have on

Your company's customer service?

Your company's time to market?

Your company's cost of operation?

Your company's vehicle miles traveled?

Your company's design of its distribution system, such as where would you use LCVs?

Is there some other effect LCVs used on interstates only would have on your company?

7E. If the LCVs you've mentioned were permitted to operate <u>on the interstate system *and* state divided highways</u>, what effect, if any, would it have on

Your company's customer service?

Your company's time to market?

Your company's cost of operation?

Your company's vehicle miles traveled?

Your company's design of its distribution system, such as where would you use LCVs?

Is there some other effect LCVs used on interstates and state divided highways would have on your company?

8. **Do the following percentages still represent approximately how often your company's total annual shipments "Weigh Out" (reach the trailer weight limit) versus "Cube Out (reach the trailer size limit)"?**

   (Enter %'s from interviewee's survey, if not correct, please enter the correct percentages.)

   Weigh Out:
   Cube Out:

Distribution System Design

In this section, we're interested in finding out about your company's current distribution system design in order to compare it to a future design based on increases in trailer weight or length (LCVs).

9. **Some organizations**

- **have one type of product that is always shipped the same way**
- **have one type of product that is shipped in different ways**
- **have a variety of products that are all shipped in the same way**
- **have a variety of products that are shipped in different ways**

Which description best describes your company?

If the company ships products in the same way:

10. **Can you tell us, in general, how your company organizes its shipping; that is, how are products moved from their initial point in your system such as a factory to their final delivery point, such as a store, warehouse, or job site?**

If the company ships products in different ways:

11. **Because your company ships products in different ways, can you tell us, in general, the two major ways your company organizes its shipping; that is, how are products moved from their initial point in your system, such as a factory, to their final delivery point, such as a store, warehouse, or job site?**

Respondents should describe one or two distribution systems. These systems can include factories, warehouses, hubs/central or regional distribution centers, and other logistics elements. Interviewers can try to draw a picture or list the elements in the order they are presented. Interviewers should review the elements with the respondent.

12. **Has this system been consistent over the last 5 years or has it changed significantly? If it has changed, in what way has it changed?**

13. **Does your company ship products differently depending on what part of the US they originate or where they are being shipped to? Does the design change based on local rules such as limits or use of LCVs?**

14. **Would you consider your system highly centralized or are more de-centralized?**

After reviewing all the links:

15. **Considering all the links we've just reviewed, where will be the most gain for your company based on weight and length increases? What form will the gain take?**

- improved customer service
- improved product mixing,
- reduced product shelf life
- reduced time to market/delivery time,
- reduced cost of operation
- reduced vehicle miles traveled
- another metric.

Where will the second largest gain occur? What form will the gain take?

- improved customer service,
- improved product mixing,
- reduced product shelf life
- reduced time to market/delivery time,
- reduced cost of operation,
- reduced vehicle miles traveled,
- another metric.

16. **Given all the links and potential gains we've discussed:**

    a. **Approximately what percentage reduction in shipments/truckloads, if any, do you think your company would experience if the gross vehicle weight restriction of 80,000 lbs was changed to 97,000 lbs.? How about 91,000 lbs.?**

    See survey response.

    b. **Approximately what percentage reduction in shipments/truckloads, if any, do you think your company would experience if it was allowed to use Longer Combination Vehicles (LCVs) on all federal interstate highways (though not on any other roads)?**

    See survey response

    c. **Approximately what percentage reduction in shipments/truckloads, if any, do you think your company would experience if it was allowed to use Longer Combination Vehicles (LCVs) on all federal interstate highways and state divided highways?**

See survey response.

17. Do the kinds of goods your company transports affect the potential gains from increased trailer weight or length?

18. Would increased trailer length or weight harm your shipping system in any way? Are there any drawbacks to increasing these weights or lengths in terms of:

- improved customer service,
- improved product mixing,
- reduced product shelf life
- reduced time to market/delivery time,
- reduced cost of operation,
- reduced vehicle miles traveled,
- another metric.

19. What policy or procedural changes, if any, will your company need to make to leverage the advantages of increased trailer weight and length (LCVs)?

20. How long do you think it will take to enact these changes once the laws are changed?

21. How, if at all, would a permit fee for the use of increased trailer weight or length (LCVs) change any of your previous answers?

Third Party Carriers

This section looks at your company's relationship with its third party carriers in relation to increases in trailer weight and length.

22. Is your third party carrier dedicated to your operation or do they mix freight from other sources?

23. Do you have control over the trailer configurations your third party carrier uses? Are there limits on equipment based on who owns it and who drives it?

24. Would the introduction of LCVs or heavier trailers change your use of your third party carriers? If so, in what way?

Will it change your overall shipping/logistics design? If so, in what way?

Will the third party carriers have to upgrade their units and re-train drivers, especially for LCVs?

25. Where do the benefits of LCVs and heavier trailers used by the third party carriers end up? Do you have to negotiate with them on the savings?

Conclusion

26. **Is there anything else about these new regulations and your company's use of them that we need to know in order to better understand their potential benefits?**

27. **Would you be interested in reviewing the transcript we will compile of this interview?**

Appendix D

Larger Cargos Data Questionnaire

The University of Michigan Transportation Research Institute is conducting an NPTC-funded research project concerning the benefits of implementing potential increases in U.S. regulations of truck weights and lengths. We are preparing eight "case studies" for firms with a range of types of goods and shipment volumes. We are grateful for your very important assistance providing information specific to your firm.

Objective: We need your help in estimating the favorable impact on your firm if (1) the amount of cargo that could be carried were increased nationwide by 14,000 lbs., (2) if it were increased by only 8,000 lbs., and (3) if double or triple trailers were allowed nationwide. The 14,000 lb. cargo increase is based on a total tractor-trailer weight limit increase from 80,000 lbs. to 97,000 lbs., with the assumption that as much as 3,000 lbs. would be required for an additional trailer axle. Similarly, the 8,000 lbs. cargo increase is based on an increase from 80,000 lbs. to 91,000 lbs. (related to bridge weight limits). Double or triple trailers are often called "LCVs," the acronym for longer combination vehicles. We are assuming that double 53 ft. or triple 28 ft. trailers might be allowed.

In particular, knowing that these changes should lower the number of shipments that are now weight- or volume-constrained ("weigh-outs" or "cube-outs"), we want to estimate how many fewer truckloads would result from each of these three theoretical regulation changes. These changes will then be used to estimate what economic savings would be associated with the reduced number of shipments.

You will be contacted by Prof. James (Jim) Reece to see if any of the questions need explanation or clarification. After the data is collected or estimated, you will send it to Jim, who then may contact you again for any clarifications he may need. This questionnaire is in Word format so that it is easy for you to enter the data for each question along with any helpful related explanations: that is how you will fill in the "invisible blanks" with as much space as you need. (If you prefer, fill in the data manually and mail the completed questionnaire to us.)

Note: If possible, historical data should be from calendar 2007 or FY2008 (e.g., ending June 30, 2007). Either one will be referred to as "last year." (We would prefer not to use calendar 2008 data because, given the poor state of the economy, they may not be as representative of a "typical" year.) We realize that some of the data requested may not apply to your shipments, e.g., the use of pallets for all goods or volume in cu. ft. of shipments by flatbeds; and perhaps some are not available, e.g., the year's total fuel costs. In such instances, please respond "NA" and make a brief comment indicating why that is the case.

Last Year's Shipping Operations Data Needed. If feasible, include both your company's own and third-party shipments (if applicable) of your goods. What was last year's:

1. Total number of shipments/loads?
2. Total miles traveled?
3. Total weight of cargo, including pallets (if applicable)?
4. Total cargo volume (cu. ft.)?
5. Total number of pallets (if all cargo in a load is palletized)?
6. Total number of gallons of fuel consumed?
7. Total cost of that fuel?
8. Total annual shipping expenses? If feasible, please subdivide these expenses between:
    a. Company operations expenses. In turn, if feasible, please subdivide these among:
        i. Cash expenditures
        ii. Noncash expenses (depreciation)
        iii. Costs that are variable with respect to the number of miles
        iv. Costs that are fixed (e.g., license fees)
    b. Fees paid to third-party shippers (if applicable)

Regulation-Change Impact Estimates Needed. So that our reported estimates have maximum credibility, it is extremely important that these possible impacts be based on the most in-depth analysis that is feasible, and that they not just be "mental estimates" or "guesses." For example, responding to question 1.a. might need to involve one of your engineers.

1. If the maximum possible cargo weight were increased by 14,000 lbs., what is your estimate of:
    a. The additional amount of cargo weight per load, recognizing that it may be less than 14,000 lbs.? For some firms, that may first require an estimate of the increased number of pallets per load. The focus should be on those shipments that now are "weigh-out" limited; otherwise the additional weight allowance would have no impact.

        Note: If you did not answer both last year's data questions 1 and 3 on total loads and total cargo weight, then you will need to estimate the reduced number of shipments; otherwise we cannot calculate the potential savings if heavier load weights were allowed.

    b. Please describe the methodology you used in arriving at the additional weight per load or reduced number of shipments estimate. It is important for us to know how this methodology differs among the eight companies, in part as evidence that no "rough rule" was used.

c. The reduction in the total of all shipments' miles? (A reply is not necessary if the average miles per shipment that we can calculate from last year's data would not have been significantly different with this increased weight allowance.)

d. The reduction in miles per gallon with this additional amount of cargo weight?

e. The reduction in the total number of gallons consumed, given the combination of fewer shipment miles on the one hand and lower mpg on the other? (We will use the average cost per gallon based on your last year's responses.)

2. This is a repetition of the four questions above assuming that the maximum possible cargo weight increase was 8,000 lbs. rather than 14,000 lbs. If you have a basis for believing that these responses will be 8/14 of the ones above, please state that and continue on to the next question. Otherwise, please calculate new responses.

   What is your estimate of:

   a. The additional amount of cargo weight per load (or reduced number of shipments), recognizing that it may be less than 8,000 lbs.? (If for any reason you did not use the same methodology as above, please describe the alternative approach.)

   b. The reduction in the total of all shipments' miles?

   c. The reduction in miles per gallon with this additional amount of cargo weight?

   d. The reduction in the total number of gallons consumed, given the combination of fewer shipment miles on the one hand and lower mpg on the other?

3. If double 53 ft. or triple 28 ft. trailers (LCVs) were allowed nationwide with a maximum GVW of 130,000 lbs., what is your estimate of:

   a. The additional cargo volume per load (cu. ft.), recognizing that it may not use up all of the LCV's volume? For some firms, that may first require an estimate of the increased number of pallets per load. The focus should be on those shipments that now are "cube-outs" with the current single trailer volume; otherwise the increased volume of an LCV would have no impact.

      Note: If you did not answer both last year's data questions 1 and 4 on total loads and total cu. ft. of cargo, then estimate the percentage increase of the additional cargo volume.

   b. Please describe the methodology you used in arriving at the additional volume or percentage increase estimate.

   c. The GVW of a fully loaded vehicle using double 53-ft. trailers?

   d. The reduction in the total of all shipments' miles?

   e. The reduction in miles per gallon with this additional amount of trailer and cargo weight?

f. The reduction in the total number of gallons consumed, given the combination of fewer shipment miles on the one hand and lower mpg on the other? (We will use the average cost per gallon based on your last year's responses.)

4. What, if any, economic impacts other than a reduction in the number of shipments, total mileage, and mpg might occur with:

   a. Increased weight allowance of 14,000 lbs.?

   b. Increased weight allowance of 8,000 lbs.?

   c. Increased mass and volume resulting from using LCVs?

If you wish to make any comments related to the inquiries above before you are interviewed by phone, please feel free to do so now.

You will be contacted by Prof. James (Jim) Reece a second time to confirm receipt of your responses and to ask any additional questions your responses may have motivated. You may contact him at jsreece@umich.edu or 734-995-1829.

Thank you very much in advance for your participation in this important private trucking company potential benefits study.

10 Jan. 09