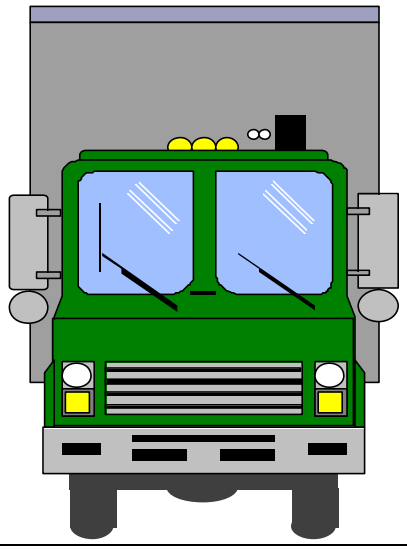
CHAPTER XII

Shipper Costs



Introduction

Shippers strive to minimize transportation and inventory costs. In the event of a change in truck size and weight (TS&W) regulations the array of available transportation options changes, potentially changing the transportation and inventory costs presented to shippers.

Basic Principles

A change in TS&W regulations may alter a shipper's logistics costs. "Logistics" is defined as that set of activities involving the movement and placement of goods to meet supply and demand. These costs include transportation, inventory, product packaging, plant location, and loading dock labor. Of all of these factors, a shipper's total logistics expense is most directly impacted by transportation and inventory costs.

Transportation Cost

Transportation cost is the cost of moving a shipment from its origin to its destination. This chapter focuses on the change in costs for rail and truck shippers. In 1994, rail shippers paid $31 billion in transportation expenses (Railroad Facts, 1997) and shippers using heavy commercial trucks paid $216 billion [see Chapter IV, Intermodal Transportation and Inventory Cost (ITIC) Model]. Truck transportation costs exclude those for light commercial trucks, such as two-axle single unit trucks (SUT), that account for over 50 percent of total truck vehicle-miles-traveled (VMT), because these vehicles are not affected by the study scenarios. Figure XII-1 summarizes relationships between transportation costs and changes in truck size and weight limits.

Inventory Costs

Changes in truck size and weight limits also affect inventory costs as described in Figure XII-2. Inventory costs include warehousing, depreciation, taxes, obsolescence, insurance, ordering and interest expenses. Total national inventory carrying cost was estimated to be $272 billion in 1994 (Cass Logistics). This is calculated as a percent of the 1994 value of inventory as reported by the Census Bureau. However, this estimate includes more than the inventory costs represented in the ITIC Model. The ITIC Model only includes the ordering, interest, holding (or warehousing), and insurance costs. Costs such as depreciation, taxes, and obsolescence are not directly affected by changes in TS&W and are not included in the

Figure XII-1. Transportation Costs and Changes in Truck Sizes and Weights

Changes in truck size and weight (TS&W) regulations impact truck shipper transportation cost. If TS&W regulations become more restrictive, then the payload-per-truck decreases and the transportation cost per-ton-mile increases. On the other hand, if TS&W regulations become more permissive then the payload-per-truck will increase and the transportation cost per-ton-mile decreases. Changes in TS&W regulations impact rail shipper transportation cost because some will divert their freight to the new truck configuration(s) or obtain reduced rates from the railroads as the railroads compete with lower truck rates.

Figure XII-2. Inventory Costs and Changes in Truck Sizes and Weights

Inventory costs respond to changes in payloads caused by changes in truck size and weight limits. In a simple example, if a shipper changes from using a single 53-foot trailer to twin 53-foot trailers (as occurs in the Longer Combination Vehicles Nationwide Scenario), then the payload per delivery would double as would the inventory cost. On the other hand, if a shipper changes from using rail boxcars to a new truck configuration then the payload per delivery would decrease as would the inventory cost.

model.

Relationship Between Transportation and Inventory Costs

Relationships between transportation and inventory costs vary for different commodities. For example, a pound of coal is cheap; it is ordered in large quantities, order processing is relatively inexpensive, and it is usually stored in open mounds. These inexpensive transportation and inventory costs result in shippers preferring railroads for large bulk shipments of coal.

Alternatively, the attributes of computer chips lead a shipper to prefer using either truck or air for small shipments because a pound of computer chips is expensive, the annual volume is relatively small, order processing is expensive due to strict specifications, storage is costly since it must be secure, and the shelf life is short due to the speed of innovation.

Many commodities are somewhere between the two extremes of coal and computer chips. For example, paper products are characterized by broad variations in prices, annual volumes, and storage requirements. With such a range of commodity attributes, it is understandable why paper products travel in a variety of modes and truck configurations. The important commodity attributes are price, annual volume, order cost, and inventory carrying cost. In general, as price or carrying cost increases, the optimal size of the shipment decreases. On the other hand, when annual volume or order cost increases, the optimal size of the shipment increases.

Analytical Approach

Transportation and inventory impacts are derived from the ITIC Model (see Chapter IV). For a given change in TS&W limits, the model predicts whether changes in transportation and inventory costs will cause a given shipment to be transported by an alternative mode or truck configuration. If the total cost is lower for a proposed truck configuration, relative to the current configuration, the shipment will divert. If a shipment diverts, the shipper's transportation and inventory costs change. The transportation and inventory costs savings do not include payment for any of the impact costs estimated in Chapter V-Chapter XI. In practice, if infrastructure costs associated with truck size and weight changed significantly, transportation agencies might change user fee rates to reflect those changes.

Shipper costs for truck transportation are computed by multiplying the VMT predicted by the ITIC Model

by the transportation cost-per-mile for each configuration and weight group.

Rail shipper transportation cost is computed using the revenues reported in the Surface Transportation Board's (STB) Carload Waybill. As discussed in Chapter XI, these revenues were adjusted by the STB to reflect rail contract moves as appropriate. As indicated in Chapter IV, the ITIC Model allows a railroad to discount its price down to variable cost before the freight is shifted from rail to truck. Therefore, in addition to the savings to rail shippers that move to new truck configurations, there are rate reductions for some rail shippers.

As noted above, changes in inventory costs (both positive and negative) would be expected to mitigate changes in transportation cost. Inventory costs vary markedly among industries and across firms within each industry. While key inventory costs are included in the shipment-by-shipment analysis in the ITIC Model, aggregate changes in inventory costs associated with the various illustrative scenarios could not be estimated. An important element on the future TS&W research agenda is improvement of inventory cost data and relationships between inventory costs and transportation decisions.

Assessment of Scenario Impacts

Uniformity Scenario

The Uniformity Scenario would cause payloads carried by some existing truck configurations to decrease since the weight limits in States that have grandfathered weights currently exceeding the Federal limits would be decreased. As Table XII-1 shows, the transportation cost for shippers using trucks increases $6,430 million per year. The impact on rail shippers was not estimated but is believed to be small because most of the potentially affected freight travels relatively short distances.

North American Trade Scenario

44,000-Pound Tridem Axle

This scenario would increase the payload weight for the four-axle SUT and the six-axle tractor semitrailer in addition to increasing the payload weight and cubic capacity for the eight-axle double-trailer combination.

As Table XII-1 shows, shippers who use these trucks experience significant transportation savings. Truck shippers who change to the newly allowed configurations and gross vehicle weights (GVWs) would save $10,922 million per year. Rail shippers who change from rail to truck would save $870 million per year. Rail shippers, who continue to use rail, obtain a $836 million discount due to competitive rate reductions.

51,000-Pound Tridem axle

This scenario would increase the payload weight for the

Table XII-1. Annual Transportation Cost Savings for Truck Shipments

	Scenarios					
		North American Trade				
	Uniformity	44,000-pound Tridem Axle	51,000-pound Tridem Axle	LCVs Nationwide	H.R.511	Triples Nationwide
Truck-to-Truck						
Dollars (millions)	$ (6,430)	$ 10,922	$ 13,277	$ 26,660	$ (22)	$ 19,820
Percent Change	-3.0	5.0	6.1	12.3	0.0	9.2
Rail-to-Truck						
Dollars (millions)	n/a	$ 870	$ 1,233	$ 782	n/a	$ 1,122
Percent Change	n/a	2.6	3.7	2.4	n/a	3.0
Rail Discount						

four-axle SUT and the six-axle tractor semitrailer in addition to increasing the payload weight and cubic capacity for the eight-axle double trailer combination.

As Table XII-1 shows, shippers who use these trucks experience significant transportation savings. Truck shippers who change to the newly allowed configurations and GVWs would save $13,277 million per year. Rail shippers who change from rail to truck would save $1,233 million per year. Rail shippers that continue to use rail would realize a $2,909 million discount due to competitive rate reductions.

Longer Combination Vehicles Nationwide Scenario

This scenario allows several new configurations at heavier weights and larger sizes than exist in the current fleet. As Table XII-1 shows, shippers who use these trucks experience significant transportation savings. Truck shippers who change to the newly allowed configurations would save $26,660 million per year. Rail shippers who change from rail to truck save $782 million per year. Rail shippers who continue to use the railroad obtain a $1,098 million discount due to competitive rate reductions.

H.R. 551 Scenario

The H.R. 551 Scenario would decrease the cubic capacity for the existing five- and six-axle tractor semi-trailers. As Table XII-1 shows, the transportation costs for shippers using trucks increases $22 million. For this scenario the impact on rail shippers was not estimated but is predicted to be small because only cube limited freight, which typically does not travel by rail, is affected.

Triples Nationwide Scenario

This scenario allows triple-trailer combinations to operate nationwide with higher payloads and more cubic capacity than a five-axle tractor semitrailer. Table XII-1 shows an annual transportation cost savings of $19,820 million for truck shippers who divert to the triple-trailer combination and $1,122 million for rail shippers that divert to the triple-trailer combination. Rail shippers that continue to use the railroad obtain a $644 million discount due to competitive rate reductions.