Relative Role of Highway Transport in the U. S. Economy

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•AS a researcher for a national transportation policy organization, I have a somewhat different approach to transportation statistics than most persons who develop and analyze such statistics. My approach does not develop data that will enable individual carriers to make detailed market analyses or provide information largely for use at the operational level by carriers and shippers.

The primary purpose of the statistical work conducted by the Transportation Association of America (TAA) is to define the role of the overall transportation function in the nation's economy and to compare the relative roles of the various modes, including highway carriers. Development of such information over an extended period of years enables us to determine basic trends in the transport field. Such information is necessary for the study of national transport policy issues and it assists directly in the policy decision-making process.

MEASURING TRANSPORT'S ROLE IN THE U. S. ECONOMY

Before discussing the relative role of highway transport in the U. S. economy, it is necessary to refer to TAA's statistical estimation of the relative role of transportation as a whole in the nation's economy. In this instance, transportation is considered as a function, as opposed to an industry, and it encompasses not only for-hire carriage, but also private freight and passenger carriage, including the family automobile.

The gross national product is used as a common measure of the U. S. economy, although it is intended to be used for analyzing broad economic trends, rather than for showing absolute values. The objective is to determine with reasonable accuracy the portion of the GNP that can be attributed to transportation of one kind or another, and then to determine highway transport's share.

The usual way that economists look at the construction of the GNP is by the so-called value added, or input, approach. This involves the determination, for each industry classification, of the sum of compensation of employees' and proprietors' income, rental income, corporate profits, and inventory valuation adjustment, plus net interest. The total of these values represents national income, to which are added indirect business taxes and capital consumption allowances to equal the GNP.

It would be virtually impossible to attempt to find transportation's share of the GNP by this approach. Although the value added figures can be obtained for the regulated for-hire transport industry, its share of total transportation outlays is actually dwarfed by the value added that can be attributed to private carriage by manufacturing firms.

For example, the petroleum industry operates many tankers, private pipelines, barges, tank trucks, and even business aircraft which, combined, undoubtedly represent a sizable share of the national income value for that industry, but which cannot be determined without extensive and costly analysis. Add to this other heavy private transportation users such as the steel, retail food, and construction industries, and it is easy to see why this approach cannot be applied.

The expenditure, or output, method of constructing the GNP involves the addition of personal consumption expenditures, government purchases of goods and services, gross

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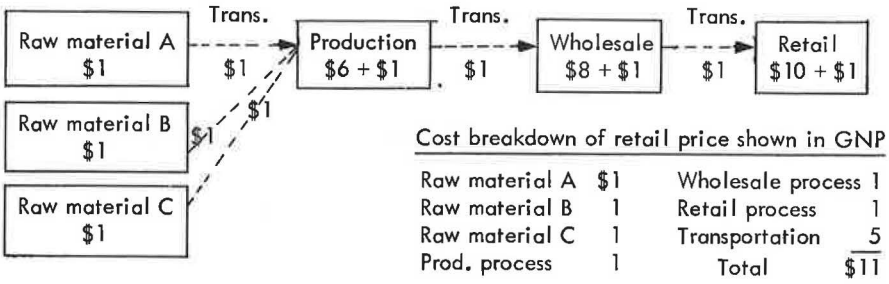

Figure 1. Simplified diagram.

private domestic investment, and net exports of goods and services. By using this practical method, it is possible to determine and, where necessary, estimate the transportation outlays involved in these components of the GNP. As care must be taken, in making comparisons with GNP, not to include so-called intermediate values of products sold at retail, it was necessary to insure that the inclusion of all transport costs was appropriate. Using a simplified diagram (Fig. 1), we concluded that each stage of transportation represented an unduplicated cost directly included in the final retail prices used in computing GNP. For purposes of this analysis, we can assume that the processing cost, including profit, at each stage of total product flow is $1.00 and that each separate transportation movement costs $1.00.

Although the foregoing figures are oversimplified and could be subject to refinement, they appear basically sound and thus make it statistically valid to compare total transport costs with the GNP. Therefore, we can use transport operating revenues of for-hire carriers and estimated operating costs of private carriers as a means of tabulating transport's share of the GNP.

ROLE OF TRANSPORT IN THE U. S. ECONOMY

Detailed explanations of how these transport revenues and costs are derived are obtainable from many sources, with a fair amount of estimating to help fil the statistical gaps.

Using 1965 figures, TAA developed an estimated national freight bill of $62.6 billion and a passenger bill of $78.1 billion. After several adjustments were made to eliminate duplications such as the freight costs for new automobiles and to add government expenditures for transport facilities not covered by direct user outlays, the total transportation bill amounted to $140.5 billion, or 20 percent of the GNP of $681 billion for 1965. This approximately 20 percent share of GNP for transportation remained relatively stable throughout the 1958-1965 period, despite some rather sizable changes within the various modes of transport.

HIGHWAY PASSENGER SHARE OF GNP

Auto outlay figures in the officially reported personal consumption expenditures can be used to estimate highway transport's share of the GNP. However, these figures represent personal auto outlays only, and do not include the costs of automobiles used by business. The latter must be taken into account because they are part of the cost to business of providing goods to the consuming public. To make this adjustment, it is necessary to increase the reported auto expenditure figures by approximately 18 percent.

A similar problem arises for for-hire highway passenger transport, and the reported personal consumption figures have to be "blown up" about 5 percent for local bus and 29 percent for taxi outlays. In the case of intercity bus lines this problem is avoided by using revenues reported by the carriers themselves.

These highway passenger expenditures yield the following estimates for 1965.

Auto	$67,787 million
Local bus[a]	1,345 million
Taxi	855 million
School bus	643 million
Intercity bus	700 million
Total	$71,330 million

[a]Includes transit, but not broken down.

The national passenger bill was previously estimated at $78.1 billion; the highway share of this amounts to 91.3 percent, which in turn is 10.5 percent of the 1965 GNP of $681 billion.

HIGHWAY FREIGHT SHARE OF GNP

With regard to highway freight transport cost, there is a large information gap. Operating revenues of ICC-regulated trucking companies are reported, although comparable data for non-ICC-regulated intercity and local trucking are not obtainable. However, some basic figures are available from which estimates can be made for these areas.

The only figures available for intercity trucking are estimated ton-miles of non-ICC-regulated intercity carriers, i.e., those not subject to ICC economic regulation. Carriers in this category include private, exempt for-hire, and regulated intrastate carriers. Collectively, they account for a little more than 64 percent of total intercity truck ton-miles.

As there are no available accurate cost figures for the millions of trucks of various sizes and weights constituting this 3-part segment of intercity trucking, the only recourse is to use a broad average cost figure. Such a figure for ICC-regulated trucks is obtainable, although the average revenue per ton-mile, rather than the average cost per ton-mile, must be used because we are interested in the total transport cost to the final consumer of the goods hauled by truck.

The question can be raised whether the cost of regulated trucking service to users is more than private and exempt trucking service. As to the actual comparative level of average costs, we assumed that the non-ICC carriers' transport costs were $0.01 a ton-mile lower than the ICC carriers' average revenue per ton-mile. This was reasonable because of the probable higher costs of ICC-regulated carriers that are the result of rate regulation, the need for more extensive terminal facilities, and common carrier obligations such as performing marginal services. However, we assumed that the annual changes in average costs of the two groups vary in the same proportion, because both categories are subject to union wage demands and changes in the price of equipment and gasoline.

For local trucking, the task is even more difficult because there are no overall average cost figures available. The TAA approach is to start with urban truck vehicle-mile figures reported by the U. S. Bureau of Public Roads. We then take figures reported by the General Services Administration of average cost, excluding driver costs, per vehicle-mile of GSA trucks, applying weight factors to the different size trucks in line with the relative number of total trucks in the U. S. For instance, we used a weight factor of 8 for trucks of one ton or less and a factor of 3 for 1 to $2\frac{1}{2}$-ton trucks. To obtain an estimate for driver costs per vehicle-mile, we used a figure of $0.15 for the base year 1958; this figure was justified by an ICC study indicating that in that year drivers' wages averaged more than $0.15 per mi on extremely short-haul traffic. To keep the $0.15 per veh-mi driver costs from rapidly becoming outdated, it was adjusted each year in proportion to the percentage of change in union drivers' wages as reported by the Department of Labor.

The final highway freight figure covers the movement of small packages and mail by intercity bus companies, which can be estimated from figures reported to the ICC.

These highway freight expenditures were used to make the following estimates for the year 1965.

Intercity truck	
ICC regulated	$ 9,994 million
Non-ICC regulated	15,872 million
Local truck	19,889 million
Bus	68 million
Total	$45,823 million

The estimated national freight bill was $62.6 billion, so the highway share of this amounts to 73.2 percent, which in turn is 6.7 percent of the 1965 GNP of $681 billion.

TOTAL HIGHWAY TRANSPORT SHARE OF GNP

These highway passenger and freight estimates, when combined, show that, from a monetary standpoint, highway transportation clearly dominates the U. S. transport scene.

Passenger Expenditures		Freight Expenditures	
Auto	$67,787 million	Intercity truck	
Local bus	1,345 million	ICC regulated	$ 9,994 million
Taxi	855 million	Non-ICC regulated	15,872 million
School bus	643 million	Local truck	19,889 million
Intercity bus	700 million	Bus	68 million
Total	$71,330 million	Total	$45,823 million
	Grand total	$117,153 million	

Inasmuch as TAA estimates that $140.5 billion was spent during 1964 for all types of for-hire and private transportation, the $117 billion attributed to highway transportation amounts to 83.4 percent, or more than four-fifths of the total transportation bill. The $117 billion highway transportation bill alone accounted for 17.2 percent of the $681 billion GNP for 1965.

HIGHWAY INTERCITY FREIGHT TON-MILE SHARE

Inasmuch as trucks, in general, haul relatively high-value commodities at much higher average rates than bulk carriers such as railroads, pipelines, and water carriers, the use of money values as a means of measuring the relative role of highway freight could be challenged as overstating the importance of this mode. The most commonly used measure for making modal comparisons is ton-miles, which reflects both weight of the commodity and the distance it travels. These figures are obtainable from the ICC, although the Commission's basic tables do not include domestic deep-sea ton-miles, and therefore overstate the relative share of the other modes. The basic ICC ton-mile tables for 1964 (the only complete figures available) give the following breakdown.

Mode	Ton-Miles (billions)	Percent
Rail	666	43.3
Truck	350	22.8
Oil pipeline	269	17.5
Water	250	16.3
Air	1.5	0.1
Total	1,536.5	100.0

The trucks' share is nearly 23 percent. However, a more accurate breakdown can be obtained by incorporating the ton-miles of off-shore domestic water carriers (1964) not included in the foregoing table, as follows.

Mode	Ton-Miles (billions)	Percent
Rail	666	37.5
Truck	350	19.7
Oil pipeline	269	15.2
Water	487	27.5
Air	1.5	0.1
Total	1,773.5	100.0

Although the resulting reduction in the highway share from 22.8 percent to 19.7 percent is not too great, there is a sharp contrast in the use of money values vs ton-miles for measuring the relative size of modes of transport. This can be shown by using the intercity portion of TAA's estimated national freight bill for 1964, which amounts to $35.2 billion after eliminating local and international freight outlays, and comparing it with intercity highway freight outlays of $23.3 billion. This shows highway's share as 66.2 percent.

HIGHWAY INTERCITY PASSENGER-MILE SHARE

The use of a monetary vs passenger-mile measure for comparing highway transportation's role with that of other modes will not show such large differences in the intercity passenger field, because the automobile dominates this field, regardless of the measure selected. For example, the auto alone accounted for 89.6 percent of total intercity passenger-miles, with the bus lines accounting for another 2.5 percent, to make highway's share 92.1 percent.

Although TAA's estimated auto expenditure figure is not broken down into intercity and local, the former can be assumed to be 50 percent, in line with the U. S. Bureau of Public Road's breakdown for rural vs urban auto vehicle-miles in 1964. Thus, we can use $30.2 billion for intercity auto expenditures, plus $671 million for intercity bus outlays, for a total of $30.9 billion for intercity highway passenger transport in 1964. This represents 86.8 percent of a total intercity passenger bill of $35.6 billion.

COMBINATION WEIGHT-DISTANCE-VALUE MEASUREMENT

Although it may not be strictly valid from a statistical standpoint, it should be interesting to see how the various modes of intercity transport compare when all three factors of load (tons/passengers), distance, and monetary value are combined. Table 1 gives a breakdown of intercity freight transportation for 1964.

TABLE 1

RELATIVE ROLE OF INTERCITY FREIGHT MODES GIVING EQUAL WEIGHT TO TON-MILES AND COST OF TRANSPORT

Mode	Ton-Miles (billions)	(a) Percent	Cost (billions)	(b) Percent	(a) + (b)	$\frac{(a)+(b)}{2}$
Rail	666	37.5	$ 9.1	25.9	63.4	31.7
Water	487	27.5	1.4	4.0	31.5	15.8
Highway	350	19.7	23.3	66.2	85.9	42.9
Pipeline	269	15.2	1.0	2.8	18.0	9.0
Air	1.5	0.1	0.4	1.1	1.2	0.6
Total	1,773.5	100.0	$35.2	100.0	200.0	100.0

TABLE 2

RELATIVE ROLE OF INTERCITY PASSENGER MODES GIVING EQUAL WEIGHT TO PASSENGER-MILES AND COST OF TRANSPORT

Mode	Passenger-Miles (billions)	(a) Percent	Cost (billions)	(b) Percent	(a) + (b)	$\frac{(a) + (b)}{2}$
Auto	802.0	89.6	$30.2	84.8	174.4	87.2
Bus	22.7	2.5	0.7	2.0	4.5	2.2
Air	49.5	5.5	4.1	11.5	17.0	8.5
Rail	18.4	2.1	0.5	1.4	3.5	1.8
Water	2.8	0.3	0.1	0.3	0.6	0.3
Total	895.4	100.0	$35.6	100.0	200.0	100.0

There is a problem, in making such a comparison, of how much weight to give to the ton-mile vs the cost factors. Although transport statisticians may argue about their relative merits, each is given equal weight for the sake of simplicity. The result is the column at the right (Table 1), which shows the relative share of highway intercity freight transportation as nearly 43 percent. This lies halfway between its 20 percent share of total intercity ton-miles and 66 percent share of total intercity freight outlays.

Table 2 gives a breakdown for intercity passenger transportation for 1964.

It is clear that regardless of the measure used, highway transportation, because of the automobile, dominates the intercity passenger field.

CONCLUSION

In summarizing, we can first estimate that transportation's share of GNP is approximately 20 percent, with highway transportation accounting for about 83 percent of this figure. In other words, highway transportation's share of the GNP is more than 17 percent.

In terms of monetary values, highway transportation also dominates both the freight and passenger fields, accounting for more than 73 and 91 percent, respectively, of the total outlays in each category.

In terms of intercity ton-miles only, highway transportation's share of the total traffic drops to approximately 20 percent, although it collects over 67 percent of the money spent for such transportation. On a basis of equal weight given to ton-miles vs expenditures, highway transportation accounts for about 43 percent of the total.

In terms of intercity passenger-miles, regardless of how relative values are measured, highway transportation dominates the scene, with only air transportation taking any sizable share.

Any way these figures are adjusted, the conclusion remains that this country is very dependent on highway transportation for a large portion of its overall economic activity.