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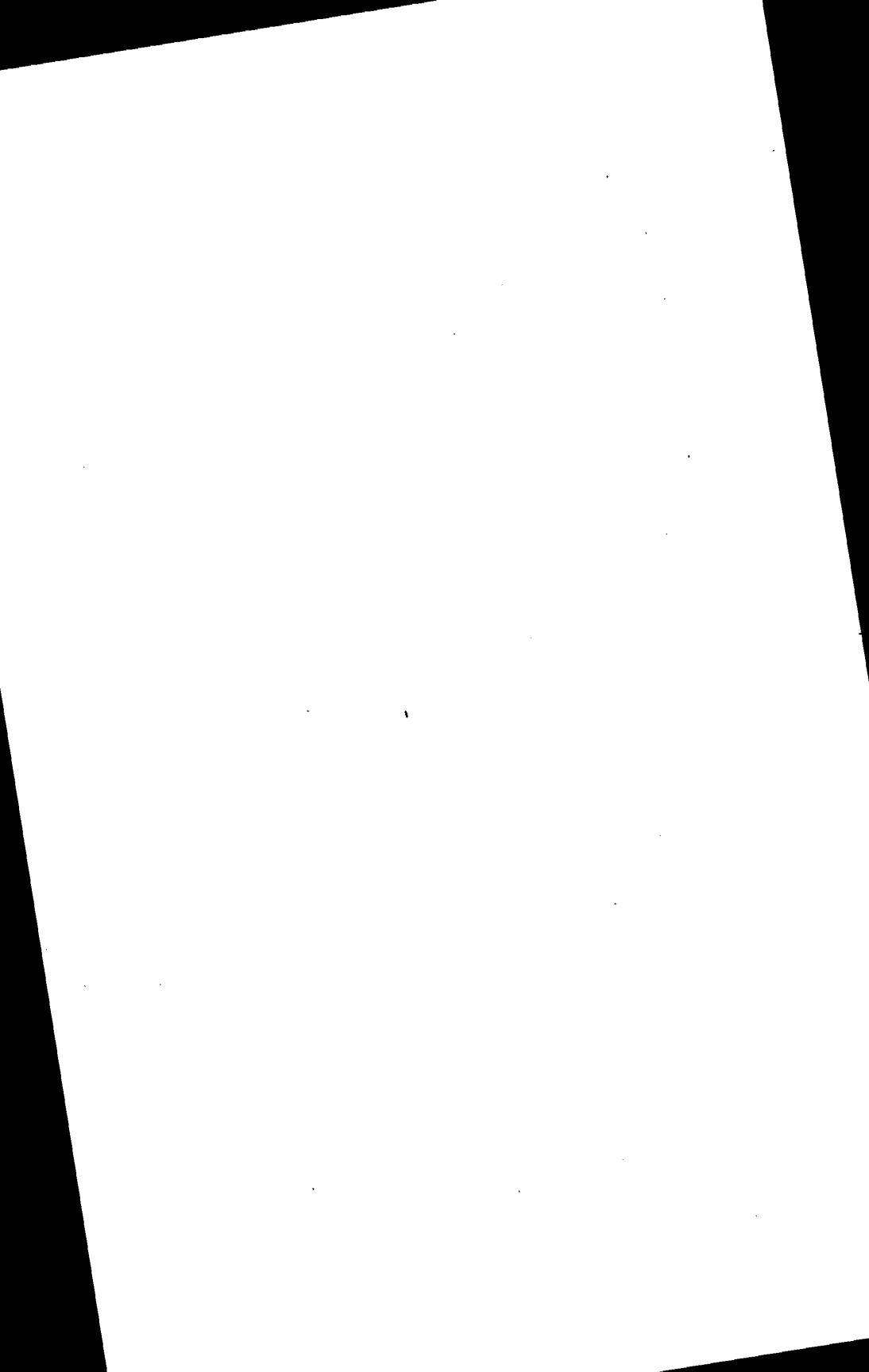
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Part One

The Transportation Industries as a Whole



Chapter 1

The Transportation Industries at the Outbreak of World War II

This study of the service rendered by our transportation facilities seeks to answer several related questions. How much traffic is carried and who carries it? Have the transportation industries grown faster or more slowly than other industries? Do we travel more or less, ship more or fewer goods, than our grandparents?

Other questions concern the shifting status of the various forms of transportation. How have their roles changed with the passage of time? How has the rise of the private automobile and the motor truck affected the use of older transportation agencies?

Still other matters include the draft made by transportation upon the labor force. How many persons are engaged in producing transportation? To what extent can labor savings be imputed to technological advance? Has output per worker increased more or less rapidly in transportation than in, say, manufacturing or agriculture?

To answer these questions we need measures of output and employment. In the case of steam railroads and electric railways much work has already been done;¹ the intention of the present study is to explore also areas that have been too much neglected — waterways, highways, airlines, and pipelines. Our desire has been both to construct as comprehensive indexes as possible for transportation as a whole, and also to establish a firm basis for comparisons between types of transportation. Because many new indexes of output and employment are offered, much space is necessarily devoted to technical details connected with the appraisal and use of data.

¹ See, for instance, Witt Bowden, 'Productivity, Hours, and Compensation of Railroad Labor', *Monthly Labor Review*, Dec. 1933; Edwin Frickey, *Production in the United States, 1860-1914* (Harvard University Press, 1947), Ch. V-VII.

By all odds the most striking feature of transportation history during the past half century has been the shift from older to newer agencies — especially from steam railroads to highway transportation. As a concomitant change, the production of transportation services by specialized producers, e.g., railroad companies, for sale to the public at large has given place to the production of such services by their immediate users, as when private automobiles carry their owners or trucks their owners' goods. This circumstance makes for a certain vagueness in the concept of transportation output if every kind of transportation is to be included; and a still greater vagueness in the concept of employment.² Undoubtedly for many purposes, for instance to appraise the shift from commercial to private traffic, we must concern ourselves with private as well as commercial transportation. Yet to construct indexes of private automobile travel, or to estimate employment in private trucking, is a manifest impossibility for lack of data. Hence the major statistical results are defective as a measure of total transportation.

In fact the transportation industries of this book — the industries whose aggregate output and employment we estimate — owe their definition largely to statistical accident. Roughly they comprise agencies engaged in furnishing service *for sale to others*. If a mining concern operates a private railroad, or a baking firm delivers crackers in its own vehicles, such transportation is regarded as part of the output of the primary industry — mining or baking. The large amounts of transportation produced by final consumers for their own immediate consumption, as in the operation of private passenger cars, we rate a household function falling outside the scope of industrial activity. Most transportation is sold at published (and often publicly regulated) common-carrier rates. However, considerable amounts of freight move over highways and waterways on a contract basis, and sometimes the transportation is performed by a wholly-owned subsidiary of the customer. It is a question, for

² The vagueness of output may be illustrated by asking whether the driver of a private automobile always furnishes himself, as well as his passengers, with transportation service. The vagueness of employment is shown by asking in what sense the driver of a private automobile is 'employed' in producing transportation; and whether or not garage mechanics (who roughly correspond to railroad shopmen) are engaged in producing transportation.

example, whether consistency would be better served by including the tanker-owning affiliates of the oil companies in the transportation or in the petroleum industry. In practically all such cases the boundary is drawn for the investigator by statistical limitations.³

The transportation industries are confined to enterprises actually producing transportation service. Businesses manufacturing transportation equipment or operating garages or filling stations are therefore excluded. However, when railroad companies, for instance, operate their own repair shops, their employment is included in the industry total. We regard the Railway Express Agency and the Pullman Company as engaged in providing transportation. On the other hand, warehousing and storage, frequently considered a transportation industry, must be excluded if only for lack of data. In addition to strictly domestic activities, waterway and airline traffic between the United States and noncontiguous territories, and American-flag traffic with foreign countries, are included.

To judge by the usual tests the transportation industries have occupied for some decades a relatively declining segment of the national economy. For instance, income originating in transportation as a percentage of total national income may be roughly estimated as follows:⁴

1889	1929	1939	1949
8.6	7.5	6.3	5.5

³ The statistics for railroads, electric railways, and buslines follow our definition rather closely in that they measure transportation for sale. We try to derive figures for the trucking industry that segregate for-hire trucking, and so conform to the definition. Although interstate petroleum and gasoline pipelines are common carriers, many are owned directly or indirectly by the companies whose oil they carry. The statistics for oil pipelines cover all trunk-line activity and therefore go beyond our definition. For waterways also, data cover all reported freight movements and no segregation of commercial (common-carrier and contract) from private (or 'captive') traffic is possible. By contrast airline statistics are available only for common carriers; since they omit contract traffic, they are less inclusive than they should be to accord with the definition. Natural gas pipelines are not common carriers and practically all are owned by the companies whose gas they transport. They are not considered in this study.

⁴ Figures for 1929, 1939, and 1949 are Department of Commerce estimates (*Survey of Current Business*, July 1947, Supplement, and July 1950). Extrapolation for 1889 uses R. F. Martin's data (*National Income in the United States, 1799-1938*, National Industrial Conference Board, 1939, Tables 1 and 16).

The percentage of the labor force engaged in transportation also declined over the period. For example, the employment figures in Table 11 below represent about 3.9 percent of the labor force in 1890 but only 3.1 percent in 1940.⁵ To what extent does this decline reflect slower growth of transportation than of other products, or more rapid rise in output per worker in producing transportation? Or may it simply be attributed to the shift from commercial to noncommercial transportation — from the railroad to the private automobile and the privately owned truck?

To answer these questions we shall measure the output of transportation service from 1889 to 1946 of the industries which fall within the definition of commercial transportation, and shall evaluate roughly the amount of private transportation falling outside the definition. For the industries within the definition, we seek indexes of employment comparable with those of output, in order to assess the trend in output per worker.

Better figures are available for 1939 or 1940 than for any other recent years. For this reason the following introductory survey sketches the industries as they stood at the outbreak of World War II.

RELATIVE SIZE OF THE INDUSTRIES

In 1940 the transportation industries employed about 2 million, or slightly less than 5 percent of all persons at work. Railroads employ more than half of all transportation workers, while another one-fifth is engaged in trucking (Table 1). Neither street railways and buslines nor waterways employed as many as 10 percent of all transportation workers, while employment by pipelines and airlines was relatively negligible.

⁵ For figures on the labor force, see Daniel Carson, 'Changes in the Industrial Composition of Manpower since the Civil War', *Studies in Income and Wealth, Volume Eleven* (NBER, 1949). The employment percentages quoted are smaller than the national income percentages just given. The reason is partly that employment in transportation is here compared with the total labor force (including persons out of work); and partly that the employment totals of Table 11 are incomplete in that they exclude the Pullman and Express companies, longshoremen, taxicabs, warehousing and storage, and services incidental to transportation. If proper adjustment could be made for these factors, the employment percentages would be closer to the national income percentages, and the former would still decline.

Table 1

THE TRANSPORTATION INDUSTRIES, 1939-1940^a
Census Definition

	<i>Employment, 1940 Population Census^b</i>		<i>Income Originating, 1939, Department of Commerce^c</i>	
	(th.)	%	(\$ mil.)	%
<i>Industries considered here</i>	1,987	91.3	3,260	95.1
Railroads	1,135	52.1	2,091	61.0
Street railways and buslines	203	9.3	433	12.6
Trucking service	428	19.6	441	12.9
Petroleum and gasoline pipelines	18	0.8	43	1.3
Water transportation	181	8.3	218	6.4
Air transportation	23	1.1	34	1.0
<i>Industries not considered here</i>	190	8.7	169 ^d	4.9 ^d
Taxicab service	84	3.9	n.a.	n.a.
Warehousing and storage	61	2.8	n.a.	n.a.
Services incidental to transportation	29	1.3	n.a.	n.a.
Not specified	16	0.7	n.a.	n.a.
TOTAL TRANSPORTATION, CENSUS DEFINITION	2,178	100.0	3,429	100.0

n.a.: not available.

^a Differences of classification impair the comparability of the two percentage distributions, and probably cause the income figures slightly to overstate the coverage of our treatment in this book. Thus the Department of Commerce includes taxicabs, and warehousing and storage (neither of which is treated here), with street railways and buslines, and trucking service, respectively. On the other hand it excludes stevedoring and the operation of piers and docks from water transportation, regarding them as 'services allied to transportation'.

^b *Sixteenth Census, Population*, Vol. III, Part I, Table 74.

^c *Survey of Current Business*, July 1947, National Income Supplement, Table 13.

^d 'Services allied to transportation'.

Immediately before World War II income originating in the transportation industries exceeded \$3 billion (Table 1). In 1939 it represented about 6 percent of national income. So judged, transportation was three times the size of mining, but only half as large as retail and wholesale distribution, or a quarter the size of manufacturing.

For warehousing and storage (whose status as a transportation industry is anyhow in doubt) and for taxicabs, scarcity of data

precludes any further mention.⁶ If these, and other unspecified services incidental to transportation, are excluded there remain the major transportation industries — steam railroads, electric railways, buslines, trucking, pipelines, waterways, and airlines — which in 1940 accounted for not quite 2 million workers, or roughly 91 percent of all transportation employment (Table 1). It is with these major branches of transportation that the book is concerned.⁷

THE MAJOR INDUSTRIES

Some leading statistics for these major industries for the year 1939 will now be reviewed (Table 2). Transportation consists in the movement of persons and property, respectively represented by passengers carried⁸ and ton-miles of freight. The most significant way to combine the two kinds of traffic is by means of revenue data,⁹ and accordingly passenger, freight, and total transportation revenues are also shown. For some agencies traffic and revenue statistics were readily available; for others they had to be estimated by methods described below.

Of the nearly \$7 billion of transportation sold by the industries in 1939, \$1.5 billion, or between a fourth and a fifth, was passenger and the remainder freight. From this we might conclude that the community consumes between three and four times as much freight as passenger transportation. And so far as services rendered commercially by the transportation industries are concerned, such a conclusion would be justified. Yet it is easy to demonstrate that, as

⁶ For taxicabs some estimates are available for very recent years. The Cab Research Bureau, for example, puts taxicab passengers at slightly under a billion in 1941 (Automobile Manufacturers Association, *Automobile Facts and Figures*, 1944 ed., p. 27).

⁷ We are in fact concerned with rather less than 91 percent (in terms of employment) of the entire field. Coverage of railroads and electric railways is believed to be substantially complete, but statistical ignorance prevents any adequate discussion of school, charter, and sight-seeing buses; local for-hire trucking; gathering (as distinct from trunk line) activity of pipeline companies; lightering, stevedoring, and similar port activities; and chartered air traffic.

⁸ Passengers carried appear in Table 2 rather than passenger-miles because satisfactory estimates for the latter could not be derived for all industries in the table: see, however, Table 3.

⁹ Although sanctified by custom, the use of unit revenues for weighting output indexes (as in Chapter 2) perhaps requires explicit justification. An attempt to rationalize the practice, with special reference to measurement of the output of public utilities, is made in Appendix A.

a measure of what we spend respectively for traveling and for shipping goods, the picture is grossly distorted. For if our standpoint is travel and freight movement in general, account must be taken of the minor industries not considered here; and especially of the large amounts of transportation produced outside the trans-

Table 2

THE TRANSPORTATION INDUSTRIES,
LEADING STATISTICS, 1939^a

	<i>Passenger Transportation</i>		<i>Freight Transportation</i>		<i>Total Transportation Revenue</i>	
	Revenue passengers carried (mil.)	Passenger revenue (\$ mil.)	Revenue ton-miles (bil.)	Freight revenue (\$ mil.)	(\$ mil.)	%
Railways	7,412	905	336	3,317	4,222	63.9
Steam railroads	454	418	335	3,297	3,715	56.2
Electric railways, urban and interurban	6,958	487	1	20	507	7.7
Highways	3,686	463	22	887	1,350	20.4
Buses, city and intercity	3,686	463	....	....	463	7.0
Intercity trucking, for-hire	....	....	22	887	887	13.4
Oil pipelines	....	....	49	188	188	2.8
Waterways	259	83	410	710	793	12.0
Airlines	2	40	^b	20	60	0.9
TOTAL	11,359	1,491	817	5,122	6,613	100.0

^a Sources of data or derivation of estimates will be found in individual Appendices.

^b Less than 0.5.

portation industries. Local for-hire trucking, and the operation of trucks owned by those whose merchandise they deliver, might well add \$2 billion to the freight total; and passenger revenues would have to be boosted perhaps \$8 or \$10 billion to include the imputed value of services of private passenger cars.¹⁰ With revisions of this

¹⁰ Private intercity trucking accounted for slightly more ton-miles than for-hire in 1939 (Table 4). In addition to about 1 million trucks engaged in intercity operations, about 3.5 million were in local service or on farms (Appendix Table F-1). Therefore \$2 billion, or twice the revenues from for-hire intercity trucking, would appear to be a conservative imputation for the value of the remainder. As for private passenger cars, if the 500 billion passenger-miles mentioned in Table 3 is valued at the average revenue per passenger-mile for all steam railroads (1.84 cents) the product is about \$9 billion.

Table 3
PASSENGER TRAFFIC, 1939*

	Revenue Passengers Carried (mil.)	Revenue Passenger- miles (bil.)	Average Journey (miles)	Passenger Revenue ^a (\$ mil.)	Revenue per Passenger (\$)	Revenue per Passenger- mile (cents)	% Distribution, Passenger Revenue
<i>The transportation industries</i>							
Steam railroads	454	22.7	50	418	0.92	1.84	28.0
Electric railways ^b	6,958	n.a.	n.a.	487	0.07	n.a.	32.7
Interurban	114	n.a.	n.a.	15	0.13	n.a.	1.0
Urban	6,844	n.a.	n.a.	472	0.07	n.a.	31.7
Buslines	3,686	n.a.	n.a.	463	0.13	n.a.	31.1
Intercity	313	9.6	31	245	0.78	2.6	16.4
City	3,373	n.a.	n.a.	218	0.06	n.a.	14.6
Waterways ^c	259	n.a.	n.a.	83	n.a.	n.a.	5.6
Coastwise	17.7	n.a.	n.a.	4.7	0.27	n.a.	0.3
Intercoastal	0.009	0.050	5,900	1.6	182	3.1	0.1
Great Lakes (domestic only)	5.35			9.6	1.8	n.a.	0.6
Inland	12.7	1.5	n.a.	8.5	0.67	n.a.	0.6
Noncontiguous	0.131	0.218	1,660	10 ^d	n.a.	n.a.	0.7
International, American-flag vessels	0.384	0.927	2,410	41.8	109	4.51	2.8
Ferries	223	n.a.	n.a.	7	0.03	n.a.	0.5
Airlines	1.83	0.755	413	39.8	22	5.3	2.7
Domestic	1.70	0.683	401	34.8	20	5.10	2.3
International	0.129	0.072	557	5.0	39	6.9	0.3
TOTAL	11,359	...	...	1,491	...	...	100.0
<i>Comparative figures for other agencies</i>							
Automobile travel	n.a.	500 ^e	n.a.	...	...	...	...
Waterways — international, foreign-flag vessels	0.745	2,314	3,110	93.9	126	4.06	...

order, the national consumption (in value terms) of passenger would exceed that of freight transportation.

For total transportation revenue, the distribution between industries in Table 2 is not unlike those in Table 1. In 1939 railroads accounted for over half, and if electric railways are included nearly two-thirds, of the \$7 billion total. Remaining revenues were divided among intercity trucking, waterways, buses, oil pipelines, and airlines, in that order.

PASSENGER TRAFFIC

Trucks and pipelines transport no passengers. For the other industries a more detailed analysis of passenger traffic for 1939 is given in Table 3. More or less reliable records are available for the

Notes to Table 3

n.a.: not available.

^a Except as otherwise noted, sources of data and derivation of estimates are given in the Appendices.

^b Includes trolleybuses.

^c Coastwise covers traffic along the Atlantic and Gulf coasts, and along the Pacific coast. Intercoastal means from the Atlantic and Gulf coasts to the Pacific coast and vice versa. Great Lakes domestic traffic moves between some U. S. port on the Lakes and some other U. S. port. Inland means traffic on rivers, canals, and lakes other than the Great Lakes. Noncontiguous covers movement between the Continental United States and Puerto Rico, Alaska, Hawaii, Guam and Samoa. International traffic includes all movement between U. S. and foreign ports, whether ocean-borne or Lakewise, together with ocean cruises. For sources of data, see notes to Table 30.

^d Revenue data for all electric railways from American Transit Association, 'Transit Fact Book' (annual); for interurban lines from ICC, 'Statistics of Electric Railways' (annual); and for urban lines by difference. For buslines, National Association of Motor Bus Operators, *Bus Facts* (annual). For waterways see Table 30 and Chapter 7. For domestic airlines, Civil Aeronautics Administration, *Statistical Handbook of Civil Aviation*, 1948 issue. For international airlines, revenue per passenger-mile earned by Pan American Airways was used.

^e Assumes revenue per passenger-mile same as for American-flag vessels in international trade.

^f Surveys have indicated annual mileage per passenger car is in the region of 8,000 (*Automobile Facts*, 1941 ed., p. 57); in 1939 about 26 million passenger cars were registered. Average loading is thought to fall between two and three persons. See also estimate by H. E. Hale (495 billion passenger-miles) in *Petroleum Facts and Figures, 1947*, American Petroleum Institute, p. 153. Again, the Interstate Commerce Commission puts total *intercity* highway traffic (including buses) at 246 billion passenger-miles in 1939 (*55th Annual Report*, 1941, p. 9), or say 236 billion for private passenger cars; this might imply a somewhat lower total than 500 billion for all private automobile passenger-miles.

number of passengers carried, and we can make estimates to fill the gaps in passenger revenue, so that these columns are complete. However, the first set of figures — number of passengers — gives equal weight to a New York City subway commuter and a trans-continental traveler; consequently it lacks homogeneity. The distribution of passenger revenue more accurately reflects the amount of transportation service supplied. Of the total, steam railroads, electric railways, and buses each show just under a third, the small remainder being divided unequally between waterways and airlines. The average revenue per passenger differs, of course, very greatly among the several industries, and confirms the irrelevance of the passenger count.

The much more interesting figures for passenger-miles are officially available only for steam railroads and airlines. For intercity buses and for several types of waterway, estimates are shown whose construction is described later in the volume. Satisfactory figures for passenger-miles — or of their correlative, average length of journey — could unfortunately not be derived for the remaining types of transportation. The agencies for which we do not have data are all more or less local in character, and obviously would bulk much smaller judged by passenger-miles than judged by the number of their passengers. For the industries where estimates are shown we may say that — in terms of passenger-miles — intercity buses carried nearly half as much traffic as steam railroads, and that (as might be expected) waterways and airlines were negligible in comparison. As a study of the unit cost to the passenger of different types of travel, the column showing computed revenue per passenger-mile is worth attention: in 1939 the figures ranged from under 2 cents for railroads to 7 cents for American-flag airlines between the United States and foreign countries.¹¹

As already explained, the intention is to confine the scope of this book to the industries listed. In passing, however, some further comparisons are illuminating. The moment we allow for automobile travel, it becomes obvious that in passenger-mile terms the output of the transportation industries represents a relatively small

¹¹ The dispersion has narrowed somewhat since 1939, partly through a decline in international airline fares, and partly through a rise in railroad fares.

fraction of total transportation service, as the following calculation will show. The partial estimates in Table 3 amount to 36 billion passenger-miles. The two principal gaps in the table are urban electric railways and city buses which together carry about 10 billion passengers. The average journey for such local transportation can scarcely exceed 10 miles. If, then, we add 100 billion passenger-miles to the 36 billion just mentioned, total travel on the facilities of the transportation industries would still be only a quarter of the 500 billion passenger-miles inserted at the foot of Table 3 to represent automobile travel.

Another comparison may be made between international waterway traffic in the American and foreign industries respectively. Traffic in American-flag vessels between United States and foreign ports, or on cruises from United States ports, totaled just under a billion passenger-miles in 1939, but similar travel in foreign-flag vessels came to over two billion.¹² Of total waterborne passenger traffic between the United States and foreign countries, somewhat less than a third was carried in American-flag vessels in 1939. Average revenue per passenger-mile was somewhat lower for foreign than for United States vessels.

FREIGHT TRAFFIC

Buses and urban electric railways do not transport significant amounts of freight. For all industries except these, freight traffic for 1939 is surveyed in Table 4.¹³ The data here are more comprehensive than those for passenger traffic in Table 3, for we have been able to approximate a complete distribution, not only of revenue and shipments, but also of ton-miles. Ton-mile data come from official sources except for waterways, where original

¹² Note that the distinction is based upon the flag of the vessel, not upon the domicile or citizenship of its owners: in the case of passenger traffic the latter criterion would probably yield almost the same result. Note also that the distinction between American and foreign is not founded on the residence or citizenship of the passengers: the figures show the output of overseas transportation by the American industry, not the use made of such transportation by Americans. Figures that would enable a classification of passenger-miles by the nationality of the traveler do not appear to exist.

¹³ Besides buslines and urban electric railways, Table 4 omits noncontiguous and international air traffic, the freight component of which is small and unrecorded.

estimates compiled at the National Bureau are now offered (see Appendix H). Revenue figures are somewhat less reliable, depending in some instances (e.g., trucking) upon sophisticated guesswork.

In terms of revenue and freight shipped, steam railroads were still in 1939 the most important freight-carrying agency. When measured in ton-miles, however, waterways accounted for just half the total, compared with but two-fifths for steam railroads. Yet owing to the cheapness of water transportation, the share of waterways in revenue was only about 14 percent — less than a quarter of railroad revenues. The share in revenue of for-hire inter-city trucking is somewhat uncertain, although undoubtedly it greatly exceeds trucking's share in ton-miles. The contributions of oil pipelines to the total are quite modest; and the shares of interurban electric railways and domestic airlines relatively insignificant — as might be expected.

Of course the distribution of ton-miles among agencies gives in a sense an exaggerated prominence to water transportation, for waterways often represent 'the longest way round'. The circuitous character of waterway (and even to some extent of rail) movements is reflected in the accompanying random comparisons of air, rail and water distances.

DISTANCES BETWEEN SELECTED POINTS^a
(statute miles)

	<i>By air</i>	<i>By rail</i>	<i>By water</i>
Duluth and Cleveland	630	910	830
Chicago and Buffalo	470	530	860
St. Louis and New Orleans	610	700	1,080
New York and New Orleans	1,180	1,380	1,980
New York and San Francisco	2,580	3,400	6,100

^a For air, great-circle distances between airports (U. S. Civil Aeronautics Board). Rail distances from the *Official Guide*. Waterway distances from the *World Almanac* and map measurements.

For the same reason the figures for revenue per ton-mile (Table 4) give at best but a rough indication of the relative cost to shippers of moving freight by different transportation agencies. The revenue quotients, that is to say, are calculated from the

Table 4 FREIGHT TRAFFIC, 1939^a

	Revenue Freight Shipped (mil. s.t.)	Revenue Ton-miles (bil.)	Average Haul (miles)	Freight Revenue ^d (\$ mil.)	Revenue per Ton-mile (cents)	% Distribution Ton-miles Revenue
<i>The transportation industries</i>						
Steam railroads	955	335	351	3,297	0.983	41.0
Electric railroads, interurban ^b	n.a.	0.7	n.a.	20	3	0.1
Intercity trucking, commercial	187	22	n.a.	887	4	2.7
Oil pipelines	622	49.3	264	188	0.38	6.0
Waterways ^c	141	410	660	710	0.17	50.2
Coastwise	174	1,230	1,230	225	0.13	21.3
Intercoastal	8.37	51.9	6,200	82	0.157	6.4
Great Lakes (domestic only)	113	69.0	609	74	0.107	8.4
Inland	329	19.9	61	82	0.4	2.4
Noncontiguous International, American-flag vessels	6.13	15.7	2,560	80	0.5	1.9
Airlines, domestic	23.0	79.5	3,460	167	0.200	9.7
TOTAL	n.a.	0.0119	n.a.	20.4	172	0.4
<i>Comparative figures for other agencies</i>						
Intercity trucking, private	n.a.	27	n.a.	...	...	...
Water transportation — international, foreign-flag vessels	80.7	360	4,460	575	0.160	100.0

n.a.: not available.

^a Except as noted, sources of data and derivation of estimates are given in the Appendices.^b Revenue of interurban railroads is believed to have been of the order of 3 cents per ton-mile; whence the number of ton-miles is obtained by division into total revenue.^c The various waterways are defined in note c to Table 3. For sources of data, see notes to Table 30.^d For interurban electric railroads from ICC, 'Statistics of ElectricRailways' (annual). For commercial intercity trucking, revenue is derived from revenue per ton-mile; the latter is the average for carriers reporting to the ICC ('Statistics of class I Motor Carriers', annual). For pipelines, data come in the same manner from carriers reporting to the ICC ('Statistics of Oil Pipe Line Companies', annual). For waterways, see Table 30 and Chapter 7. For airlines, see Civil Aeronautics Administration, *Statistical Handbook of Civil Aviation*, 1948 issue.^e Less than 0.05.

ton-mile totals shown, and the latter measure the actual distance covered; not the distance as the crow flies. In judging the reported revenue per ton-mile we should remember also that the dispersion is sometimes to be explained by differences in the kind of freight moved. For instance, coastwise and Great Lakes traffic moves more cheaply than other forms of waterway freight because of the prevalence of bulk shipment in these two cases — of petroleum in the former and of iron ore in the latter. Also, a partial explanation of the high revenue per ton-mile earned by trucks, and of the very high revenue associated with airline freight transportation, lies in the large amount of package freight they carry.¹⁴

Yet when these qualifications are made, the dispersion in revenue per ton-mile plainly reflects an analogous dispersion (which we cannot determine statistically) in the charges for carrying identical commodities between identical pairs of points. Put otherwise, the dispersion actually shown in Table 4 reflects many factors besides differences in the roundaboutness of the route or the composition of the traffic. We may feel sure, for instance, that average per ton-mile revenue for waterways is a mere fraction of that for railroads partly because water transportation moves slowly; just as airlines can charge high rates because they furnish speedy movement. We should notice also that the incidence of cost of maintaining right of way, and of taxes and subsidies, differs sharply from one agency to another: these differences too must influence revenue per ton-mile.

As with passenger traffic, comparison can usefully be made with certain activities that lie outside the scope of this book. Thus the study of highway traffic leads naturally to estimates of freight carried in private intercity trucking, i.e., in vehicles owned by those whose commodities are transported, as well as in the commercial or for-hire intercity trucking industry. The 22 billion ton-

¹⁴ Revenue per ton-mile for airlines and, say, steam railroads, are not strictly comparable. Thus mail and express — the chief classes of property transported by the airlines — are not included in the rail data. The inclusion of mail and express with railroad freight traffic would slightly raise revenue per ton-mile on the railroads, and to that extent diminish the disparity between the rail and airline figures.

miles for the for-hire trucking industry compares with 27 billion for private intercity trucking (see Appendix F). Since local trucking can to only a slight extent be upon a for-hire basis, and since farmers do their own trucking, it is a safe conclusion that in terms of ton-miles the trucking industry (i.e., for-hire or commercial trucking as considered in this book) represents far less than half total truck transportation.

Another comparison of the same order relates the part of total waterway freight between American and foreign ports that is carried by the American industry to the part carried by foreign-flag vessels. Of a total of 440 billion ton-miles, about 80 billion were performed in 1939 by the American industry and 360 billion by foreigners. Of total freight traffic between American and foreign ports, the share carried by American vessels in that year was about 18 percent, or distinctly less than the 29 percent reported as the domestic share of water-borne international passenger traffic (Table 3).