Volume Title: The Transportation Industries, 1889-1946: A Study of Output, Employment, and Productivity

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Summary

How much transportation service do we use? How much traffic moves and who carries it? How has transportation's place in the American economy altered since 1889? How have the roles of different agencies — railroads, waterways, and highways, not to speak of airways — varied with the passage of time? What can we say about trends in employment and productivity, in technological progress, and the return to human effort? The concern of this book is with such questions.

Sixty years ago commercial transportation produced about a twelfth of the national income; today it produces a fifteenth. In 1889 the transportation agencies employed about one worker in twenty-five; today about one worker in thirty is on the payroll of a commercial carrier. Transportation workers today are more than twice as numerous as in 1889, but percentagewise they constitute a smaller share of the labor force than formerly. The shrinkage is to be explained partly by a rapid expansion of output per worker, but also by the coming of the private automobile and motor truck. Garage and filling-station attendants, and drivers of privately owned trucks, are not counted as transportation workers. If they were included, transportation could probably claim a proportionate share of the labor force as large, or larger, than formerly. But here accurate measurement is impossible, and our main concern is with the industries producing and selling transportation.

Although the share of the transportation industries in the economy declined, traffic expanded vastly. To be sure, total passenger travel and the movement of freight grew much faster than the output of transportation service by commercial agencies. Today in the course of a year the average American travels perhaps twenty times as much as his grandparents did in 1889. The prime condition for such enhanced mobility was of course the coming of the private automobile. Traffic by commercial agencies is no longer a satisfactory measure of total passenger travel. Yet even travel by commercial carriers has increased faster than population.

In a proportionate sense, the impact of the privately owned truck has been less than that of the passenger automobile, and traffic on public carriers is still a better guide to total freight movement than to total passenger travel. Partly for this reason freight traffic on public transportation lines increased faster than passenger traffic. The movement of freight increased faster than commodity output also. In part this rapid growth in our use of commercial transportation facilities reflects a lengthening of the average passenger journey, and the average haul of a freight shipment, consequent upon the denser settlement of the west. Commutation distances, too, have increased as metropolitan areas have expanded.

Combined passenger and freight traffic of all commercial agencies (land, water, and air) grew five times during the half century between 1889 and 1939, and almost doubled once again between 1939 and 1946. But such aggregates conceal the varying fortunes of different agencies, and especially the marked shifts that have occurred from older to newer forms of carriage. Certainly one of the oldest branches — the coastwise shipping trade — is still as lusty as it ever was. And a relative newcomer — the electric railway — is already old: it rose to maturity, decayed, and almost disappeared within our period of study. Yet these are exceptions. For the most part the newer agencies have grown rapidly, and the older ones have expanded only slowly or have actually contracted. By and large the shift has been from rail to highway. Pipelines burgeoned and airlines were established. Where waterways could be adapted to bulk carriage, they expanded; but water transportation in the aggregate only just held its own.

We do not know enough about current and future patterns to assert that the traditional agencies have entirely lost their power of growth. Certainly the expansion of railroad and waterway traffic ended abruptly about 1920, and was not resumed until the outbreak of World War II. Already before World War I signs of change were at hand, for pipelines had branched out to meet the specialized needs of the oil industry. From about 1920, claiming much business that might have moved by rail, but also developing many new customers, highway traffic by truck and busline grew rapidly, and after 1930 airline traffic. To the highways the rail-

roads lost mainly short haul traffic, much of it highly profitable. The airlines claimed long-distance passengers and competed chiefly with the Pullman service. In the case of waterways, continued expansion of bulk freight movements on the Great Lakes, and of tanker shipments in the coastwise trade, was offset during the interwar period by the progressive loss of international traffic (both passenger and freight) to foreign-flag operators.

Many of these trends were sharply reversed, at least for the time being, as a result of World War II. Coastwise shipping was temporarily cut off by the threat of submarine action. Airline traffic, exceptionally, continued to expand despite shortages of equipment. A dearth of rubber and gasoline drove much highway traffic back to the railroads. The transportation industries as a group achieved a partial comeback against the competition of the private automobile and the privately owned truck. Within the group, a reversion to the older forms of carriage gave steam railroads, and waterways as a whole, alltime traffic peaks.

The draft made upon the labor force by the transportation industries reflects these changes. In 1889 fewer than a million persons were employed in producing transportation services, and four out of five of these worked on the nation's railroads. By 1920 total employment had risen to more than 2½ million, and the proportion of those who worked for the railroads had not greatly changed. In 1946 not quite 2½ million persons were employed in transportation, and only about half of them were railroad workers. Today highway transportation employs as many workers as did the railroads in 1889, and airline employment is now as large as was waterway at the beginning of our period.

Practically throughout the six decades traffic rose more rapidly than employment. As a result, per worker output of transportation service in 1939 was three times, in 1946 four times, the 1889 level. Over the half century 1889-1939 productivity in the transportation industries measured in this fashion increased at an average annual rate of 2.2 percent. For a major and well-established sector of the economy, this is a rather rapid increase. Over a like period the annual gain in output per worker in manufacturing was 1.8 percent; in agriculture, and also in mining (excluding oil and gas

wells), the annual increase was 1.6 percent. Because in many cases hours of work were cut, such figures understate the rise in output per manhour. They indicate genuine increases in the return from human effort in the industry concerned. Occasionally advances in productivity recorded for a single industry may be offset in the economy as a whole by increased consumption of fuel or materials, or greater use of equipment produced elsewhere. But such qualifications are usually minor. On the other hand observed increments in output per worker or output per manhour need not, and usually do not, denote greater efficiency of individuals working under comparable conditions. Predominantly they reflect changes in technology or increased capital per worker; occasionally a more generous bounty of nature.

Among individual transportation industries the change in output per worker varied greatly. The newer industries showed the sharpest gains in productivity. Airline employment rose steeply, pipeline employment moderately, but in each case the growth of traffic was far more rapid than the growth in employment, so that output per worker shot up, multiplying three to four times within two decades. (For other new industries, buslines and trucking, we lack data.) The older industries, electric railways, steam railroads, and waterways, showed steady but much more moderate increases in output per worker. These results conform to Solomon Fabricant's earlier finding for manufacturing industries: among the young, large increases both in output and in productivity are common; among the more mature, the growth of output is retarded or ceases altogether, while productivity changes are quite moderate.

For railroads and for waterways we can measure not only the input of labor but also the volume of equipment in use. In the former case, the number of locomotives and cars increased and later declined, as did railroad employment. The railroads owned just about as many locomotives and cars in 1939 or 1946 as in 1903. But technology did not stand still. The tractive power of locomotives and the capacity of freight (if not of passenger) cars rose steadily: on the average, the capacity of equipment about doubled. (Passenger equipment became more comfortable, thus rendering better service, but this we leave out of account.) Roughly

speaking, the same amount of labor is needed to operate a large piece of equipment as a small. The doubling of equipment capacity per worker therefore contributed to the rise in output per worker. Labor productivity so measured rose more than threefold, and output per manhour still faster. Thus the increase in the capacity of equipment is not in itself sufficient to explain the rise in labor productivity, although we can see that the former made a substantial contribution to the latter. To be sure, more powerful locomotives could pull heavier trains with a train crew scarcely larger than before; but there were many other ways of saving labor, as in train dispatching and the maintenance of way. In the case of waterways the boost given to labor productivity by more capacious equipment seems to have been confined to the coastwise tanker trade and to bulk carriage on the Great Lakes.

The indexes of output, employment, and output per worker which furnish these results are shown in the charts and tables. The indexes were computed from traffic data (mainly passenger-miles and ton-miles) and number of workers or manhours. The basic material is printed in the Appendices and, except for waterways, traffic and employment data are here collected from many different primary sources. In the case of waterway traffic, no previous measures were available; here the data for passenger-miles and ton-miles were compiled for this study, and are now offered for the first time.