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# Railway Traffic Expansion and Use of Resources in World War II

THOR HULTGREN

*OUR ECONOMY IN WAR*

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TRAFFIC BEYOND PRECEDENT, CARRIED WITH ECONOMY

During the business expansion that began in 1938—an expansion influenced greatly by the necessities of war, although it was under way before the outbreak in September 1939—the railroads of the United States have handled an unprecedented cyclical growth of traffic without a proportionate increase in their use of economic resources.

The monthly movement of freight has grown from 23 to 62 billion ton-miles. At the low point in 1938 people traveled 1.70 billion passenger-miles per month; recently about 7.94 billion. Absolutely or percentagewise, in freight or in passenger-traffic, the increase during the current expansion to date has been greater than in the first World War or in any of the five subsequent peace-time expansions (Table 1). Totals are at higher levels than ever before. The most recent

TABLE 1

Ton-miles and Passenger-miles, Seasonally Adjusted
Increase from Trough to Peak

| DATE OF TROUGH | AMOUNT AT TROUGH Billions[a] | DATE OF PEAK | AMOUNT AT PEAK Billions[a] | INCREASE Billions | INCREASE % |
|---|---|---|---|---|---|
| | | A TON-MILES | | | |
| *Dec. 1914* | 21.9 | *Apr. 1918* | 35.8 | 13.9 | 63 |
| *Mar. 1919* | 31.1 | *Feb. 1920* | 39.5 | 8.4 | 27 |
| *July 1921* | 24.6 | *Apr. 1923* | 37.1 | 12.5 | 51 |
| *June 1924* | 30.8 | *July 1926* | 37.9 | 7.1 | 23 |
| *Dec. 1927* | 34.1 | *Aug. 1929* | 37.8 | 3.7 | 11 |
| *July 1932* | 17.1 | *Apr. 1937* | 33.1 | 16.0 | 94 |
| *May 1938* | 22.9 | *July 1943*[c] | 62.5 | 39.6 | 173 |
| | | B PASSENGER-MILES | | | |
| *Dec. 1914* | 2.58 | *May 1918* | 3.82 | 1.24 | 48 |
| *Oct. 1918* | 3.50 | *Aug. 1920* | 4.04 | 0.54 | 15 |
| *Feb. 1922* | 2.83 | *Oct. 1923* | 3.26 | 0.43 | 15 |
| *Apr. 1925* | 2.89 | *Aug. 1925* | 3.06 | 0.17 | 6 |
| *Dec. 1928* | 2.55[b] | *Mar. 1929* | 2.71[b] | 0.16 | 6 |
| *Mar. 1933* | 1.16 | *Mar. 1937* | 2.10 | 0.91 | 76 |
| *Aug. 1938* | 1.70 | *July 1943*[c] | 7.94 | 6.24 | 367 |

[a] Average for trough (or peak) month and preceding and following month, except as noted. 1914-18: revenue ton-miles as estimated by Babson statistical organization from 1914 revenue data, and from 1918 revenue and non-revenue ton miles. 1919-20: revenue and non-revenue ton-miles as reported by the I.C.C. All other expansions: revenue ton-miles as reported by I.C.C. Passnger-miles 1914-18 estimated from monthly passenger revenue and information on fares. Other figures from I.C.C. reports.

[b] Figure for turning month only. Expansion was so brief and small that averaging would wipe out most of it.

[c] Latest date for which 3-month average available. Peak not yet determinable.

three-month average for ton-miles exceeds the highest similarly computed peak (37.9 billion in 1926) by 65 per cent. Travel is substantially above the previous all-time record, 4.04 billion passenger-miles in 1920.[1]

From their respective low points in the second and third quarters of 1938, revenue ton-miles have increased 173 per cent and passenger-miles 367 per cent. In comparison the growth in plant and equipment has been very small, the increase in employment and fuel consumption only moderate.

On December 31, 1937 the book value of the investment of Class I railways in plant and equipment was $25,164,000,000.[2] Between that date and December 31, 1942, the companies made gross capital expenditures of $1,996,000,000,[3] or only 7.9 per cent of the investment at the beginning. The net addition after allowance for depreciation and retirements would be even less.

There are only 6.4 per cent more freight cars and 5.7 per cent more switching locomotives on the railroads than at the trough in 1938; there are fewer freight and passenger locomotives, rail motor cars and passenger cars (Table 2).

[1] All data cited in this report refer to Class I line-haul railways and have been derived from serial publications of the Interstate Commerce Commission, except at noted.

[2] I.C.C.: Statistics of Railways, 1937, p. s-106. Includes investment in properties leased to Class I roads. Revaluation on various bases might reduce the figure somewhat and therefore increase the ratio of new investment since, but not materially in comparison with the growth of traffic.

[3] Totalled from annual data in Julius H. Parmelee: *A Review of Railway Operations in 1942* (published by Association of American Railroads, Bureau of Railway Economics), p. 38.

TABLE 2

Number and Condition of Equipment on Line at Close of Month

| | TOTAL | | | SERVICEABLE | | | % SERVICEABLE IS OF TOTAL | |
|---|---|---|---|---|---|---|---|---|
| KIND OF EQUIPMENT | Month of trough in traffic[a] | August 1943 | % change | Month of trough in traffic[a] | August 1943 | % change | Month of trough in traffic[a] | August 1943 |
| Freight locomotives | 23,978 | 22,031 | —8.1 | 16,809 | 19,354 | 15.1 | 70.1 | 87.8 |
| Freight cars (thous.) | 1,928 | 2,052 | 6.4 | 1,698 | 2,000 | 17.8 | 88.1 | 97.5 |
| Yard locomotives | 12,832 | 13,569 | 5.7 | 10,404 | 12,537 | 20.5 | 81.1 | 92.4 |
| Passenger locomotives | 7,920 | 6,738 | —14.9 | 5,995 | 5,896 | —1.7 | 75.7 | 87.5 |
| Rail motor cars | 3,053 | 2,782 | —8.9 | 2,778 | 2,570 | —7.5 | 91.0 | 92.4 |
| Passenger-train cars[b] | 36,622 | 35,229 | —3.8 | 33,418 | 33,814 | 1.2 | 91.3 | 96.0 |

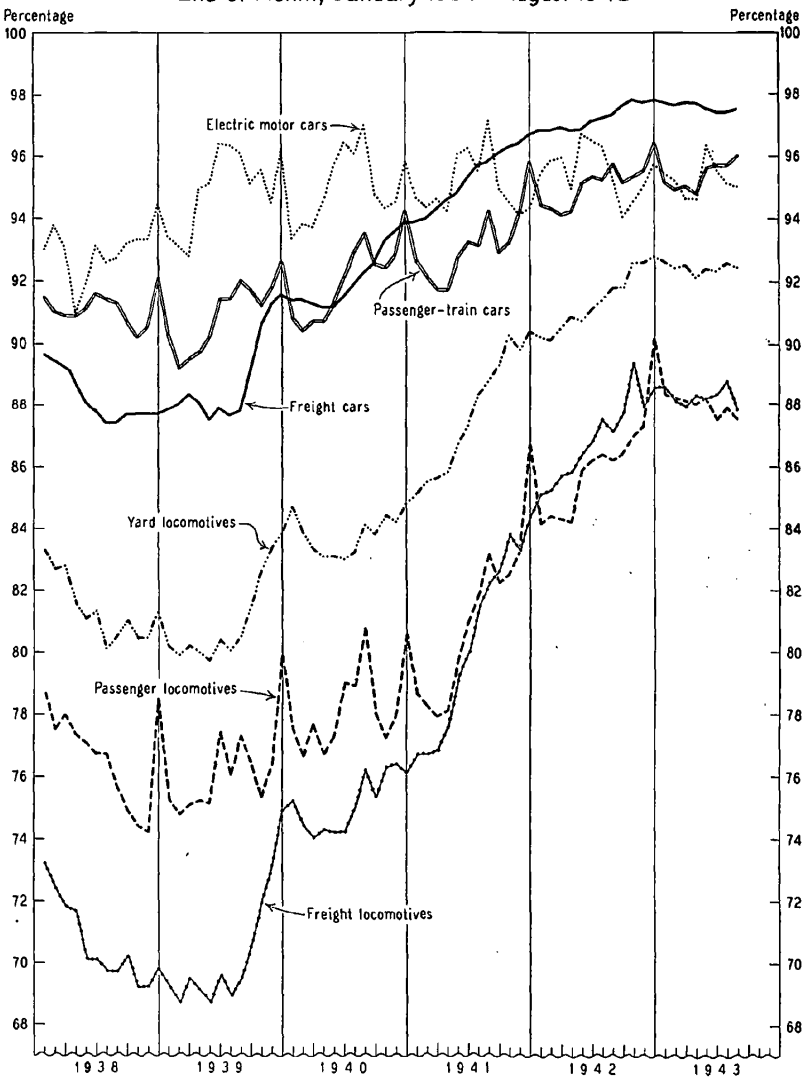
[a] May 1938 for first three and August 1938 for last three items. Yard locomotives are used mostly to switch freight, and rail motor cars to move passengers.

[b] Does not include cars of Pullman Co.

At that time, to be sure, a considerable percentage of equipment

CHART 1

Percentage of Railway Equipment Serviceable
End of Month, January 1938–August 1943




was not in usable condition. Partly by retiring old and buying new rolling stock, partly by repairs, the railroad companies have increased the percentage of all equipment that is serviceable (Chart 1). For example, the ratio of serviceable to total freight locomotives rose from 70 to 88 per cent. The aggregate supply of serviceable freight and yard equipment has been augmented; and serviceable passenger equipment has not been reduced as much as the total. But the maxi-

mum increase in serviceable equipment of any kind has been only 20 per cent.

In other expansions for which there are monthly data, beginning with 1921-23, the supply of equipment has commonly declined for some months after traffic began to grow, and at times has declined even throughout an expansion in traffic. In the present instance the serviceable and the total supply of every kind of equipment declined for a year or more after the trough in the kind of traffic it is used to handle (Table 3).

TABLE 3

Equipment Supply: Low Points, 1938-1943

| KIND OF EQUIPMENT | MONTH IN WHICH TOTAL NUMBER[a] WAS LOWEST | MONTH IN WHICH NUMBER SERVICEABLE[a] WAS LOWEST |
|---|---|---|
| Freight locomotives | June 1941 | July 1939 |
| Freight locomotives[b] | June 1941 | Aug. 1939 |
| Freight cars | July 1940 | July 1939 |
| Freight cars[b] | Aug. 1940 | Aug. 1939 |
| Yard locomotives | Aug. 1940 | July 1939 |
| Passenger locomotives | Nov. 1942[c] | Oct. 1940 |
| Rail motor cars | June 1943[c] | Sept. 1942[c] |
| Passenger-train cars | Sept. 1941 | Mar. 1941 |

[a] End of month, not seasonally adjusted, except as noted.

[b] Number at beginning and end of month averaged, then seasonally adjusted.

[c] Tentative.

The railroads have increased the number of workers in their labor force by only 50 per cent since the trough in freight traffic (Table 4). A longer work week has been a factor in this conservative use of manpower. Data on working time are available only for employees

TABLE 4

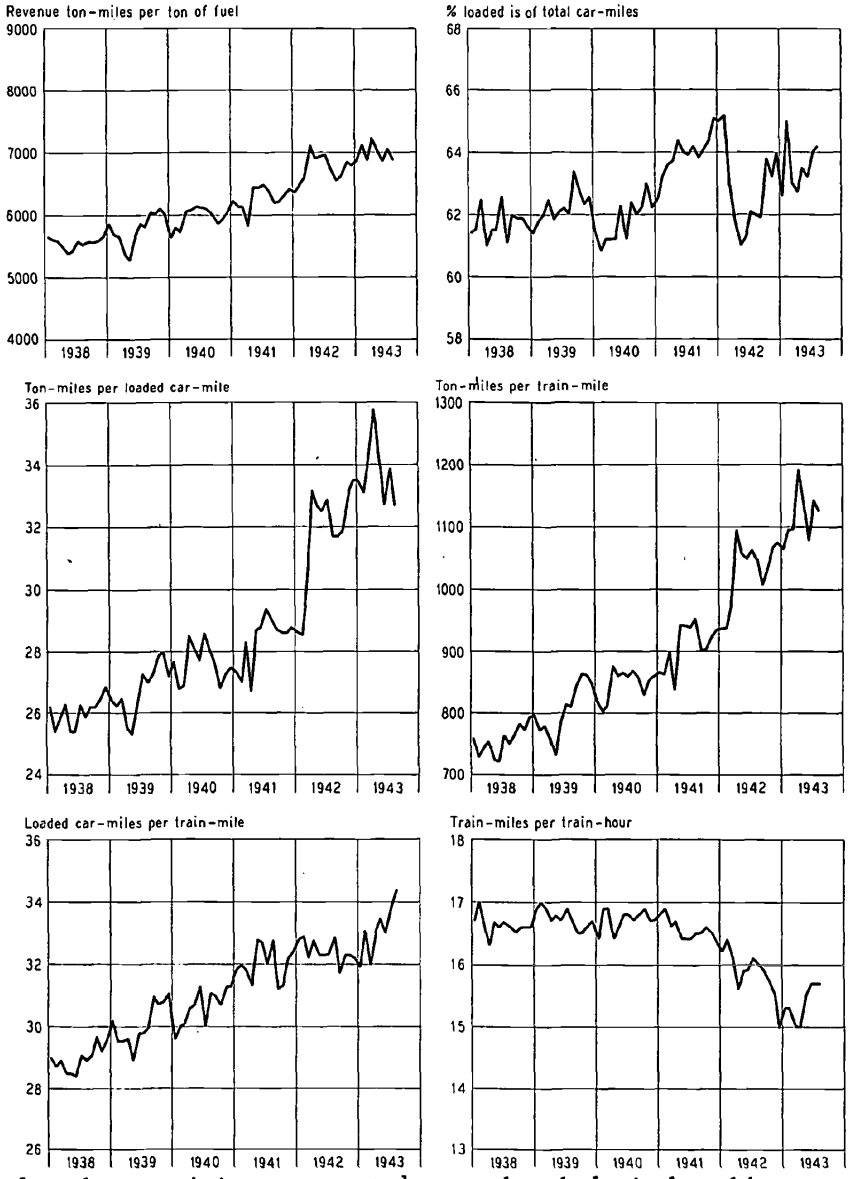
Railway Labor Statistics, Seasonally Adjusted

Averages for three months ending June 30, 1938 and August 31, 1943

| | *April May June 1938* | *June July August 1943* | % INCREASE |
|---|---|---|---|
| All employees: number (thous.) | 903 | 1,359 | 50 |
| All employees for whom hours worked are reported: | | | |
| Number (thous.) | 830 | 1,265 | 52 |
| Total hours worked (mill.) | 159.9 | 283.4 | 77 |
| Hours worked per employee | 192.6 | 224.2 | 16 |

CHART 2

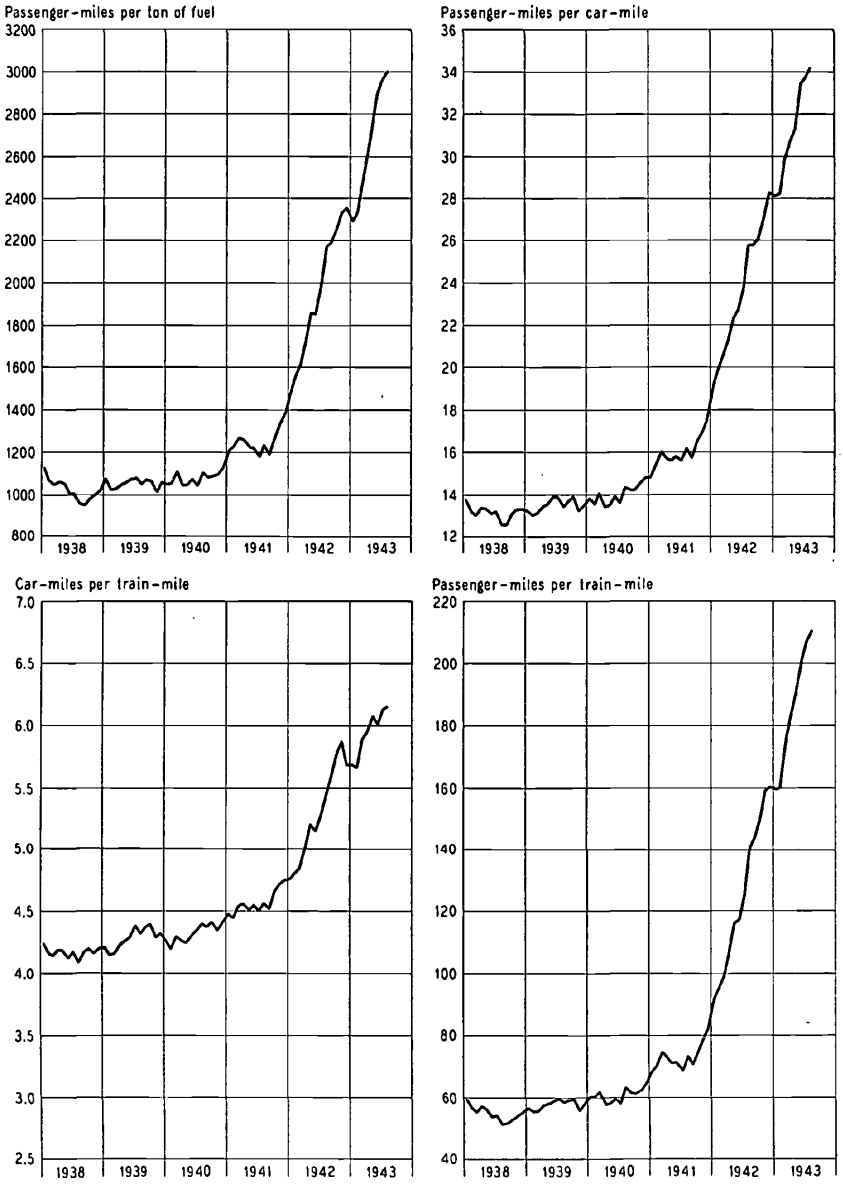
Freight Service Operating Averages, Seasonally Adjusted
January 1938 - August 1943




for whom statistics are reported on an hourly basis, but this group included 89 per cent of all workers at the beginning of the expansion. The number of persons in it has increased 52 per cent, or somewhat more than the total number of employees. The aggregate number of

CHART 3

Passenger Service Operating Averages, Seasonally Adjusted
January 1938 - August 1943




hours they worked (including overtime) increased 77 per cent. Time worked per employee increased about 16 per cent. But even the increase in aggregate hours worked has been far from proportionate to the growth of traffic.

The only commodity for which there are current statistics of consumption by railroads is fuel. The amount of coal or its equivalent consumed by freight locomotives has not risen in proportion to ton-miles, nor the consumption by passenger locomotives in proportion to passenger-miles. In other words, the productivity of fuel has risen with expansion of traffic (Charts 2, 3).[4]

That output should grow faster than input accords with previous experience. In earlier cyclical expansions also, traffic increased more rapidly than investment, employment, or consumption of fuel; and it tended to decline more rapidly in contractions. But the present expansion provides the most striking example on record of the general relationship.

GROWTH AND COMPOSITION OF TRAFFIC

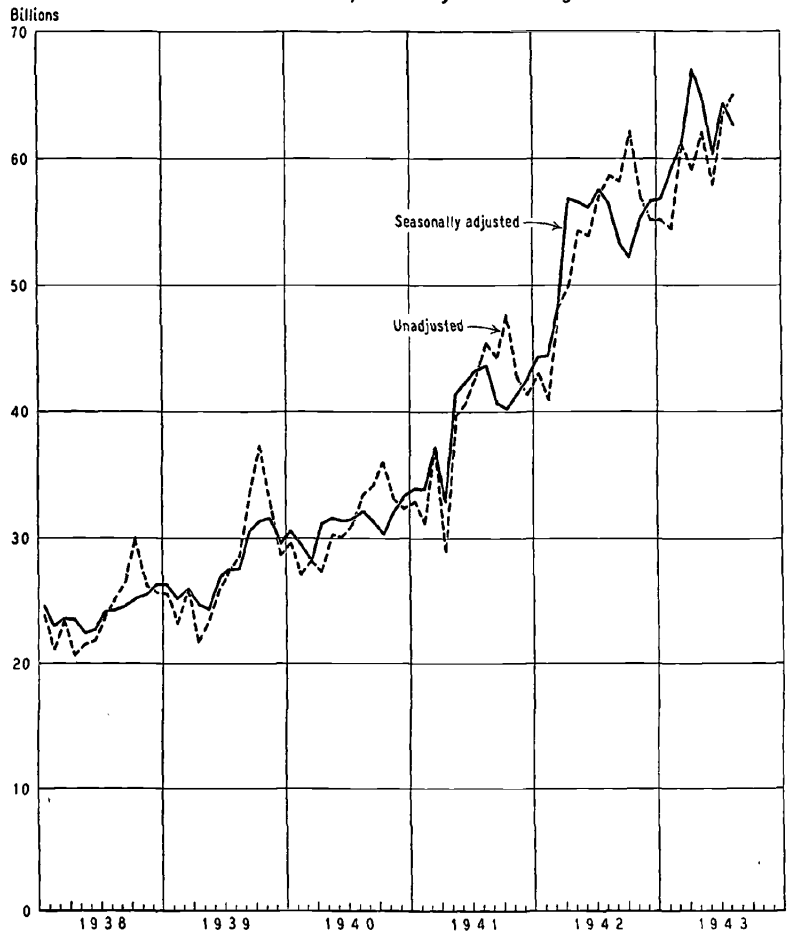
Not only the general expansion of defense and war activity but individual chapters in the history of the war seem to have their analogues in the curve of freight traffic (Chart 4). It rose sharply from May to October 1939, suggesting that a preliminary flurry of foreign orders for goods in anticipation of the outbreak of hostilities may have occurred. During the relatively quiescent warfare in the winter of 1939-40 the curve remains flat. The revelatory events in the summer of 1940 no doubt accelerated the British war effort and the placement of orders here. The United States government also increased its defensive measures. After the spring of 1941 the lease-lend policy added to the flow of goods. Eventually, of course, the entry of the United States provided an additional stimulus to the production and shipment of war commodities. In general, freight traffic has increased much more rapidly since about October 1940 than before.

Entry of the United States brought one special but very important consequence for the railroads. In ordinary times the petroleum refineries along the East Coast are supplied with crude oil from the Gulf Coast by tank vessels. A large amount of refined products is brought to the East by the same route. In the autumn of 1941 diversion of tankers to trans-oceanic service had threatened to interfere with this movement, and some oil for the East was diverted to the railroads. The weekly rail traffic reached an average of 141,000 barrels per day in October, but then declined rapidly. After the United States became a belligerent in December, however, a submarine cam-

[4] Other fuels and electricity are included in the figures at their coal equivalent as estimated by the railroads in preparing reports to the I.C.C.

CHART 4

Revenue Ton-miles, January 1938 - August 1943




paign made coastwise shipments extremely hazardous; furthermore, the diversion of tankers to other uses was accelerated. After a few weeks of hesitation the rail movement into the East began to increase rapidly, reaching a level of over 800,000 barrels per day during part of the following summer. This traffic accounts for a large portion of the sharp extra-seasonal rise early in 1942.[5]

The disturbance of the normal currents in the flow of oil may be illustrated by comparing rail traffic in the third quarter of 1941 and

[5] 800,000 barrels per day is 24,000,000 per month, or, at a weight of about 0.15 ton per barrel, 3,600,000 tons. The average length of haul by rail may well have been at least 1,000 miles, and the total ton-miles therefore at least 3.6 billion. Traffic of all kinds in April 1942 and in each of the following four months exceeded that in November by about 15 billion ton-miles.

in the third quarter of 1942 (Table 5). Ordinarily the railroads carry little crude; it moves by pipeline or pipe and tanker to the refineries. Between the two quarters tonnage of crude oil originated by the railroads more than tripled as eastern refineries found their ordinary supply routes cut off and turned to overland shipment. Under ordinary conditions the tonnage of refined products terminating in the southwestern producing areas is about half the amount originating there; after rail termination most of this goes on by tanker to the East, although some may be consumed locally. In 1942, however, the tonnage terminating in the Southwest fell to 14 per cent of that originated in the case of gasoline, kerosene, etc., and 5 per cent in the case of fuel and other residual oil. Usually the tonnage of refined products terminating in the East is about the same as the tonnage originating there, indicating that it consists mostly of traffic sent out from the local coast refineries. But in 1942 tonnage of light products originating in this area was only 22 per cent, and of heavy products 6 per cent of tonnage terminating there. The rest of the supply delivered by rail came overland from outside refineries.

TABLE 5

Petroleum Traffic Originated and Terminated by Railroads
Third Quarter, 1941 and 1942

| | CRUDE PETROLEUM | | GASOLINE & OTHER LIGHT PRODUCTS | | FUEL OIL & OTHER HEAVY PRODUCTS | |
|---|---|---|---|---|---|---|
| | *1941* | *1942* | *1941* | *1942* | *1941* | *1942* |
| 4 Southwestern States[a] | | | | | | |
| Orig. (thous. tons) | 376 | 3,705 | 3,162 | 4,119 | 682 | 2,349 |
| Term. (thous. tons) | 652 | 227 | 1,515 | 576 | 339 | 127 |
| % term. is of orig. | 173 | 6 | 48 | 14 | 50 | 5 |
| 18 Eastern States[b] | | | | | | |
| Orig. (thous. tons) | 4 | 15 | 2,175 | 754 | 976 | 207 |
| Term. (thous. tons) | 280 | 4,674 | 2,089 | 3,382 | 988 | 3,425 |
| % orig. is of term. | 1 | [c] | 104 | 22 | 99 | 6 |
| United States | | | | | | |
| Orig. (thous. tons) | 2,056 | 6,542 | 9,830 | 7,236 | 3,234 | 4,724 |
| % of 1941 | 100 | 318 | 100 | 74 | 100 | 146 |

[a] Texas, Oklahoma, Louisiana, and Kansas, the principal southwestern producers.

[b] New England and New York, Pennsylvania, New Jersey, Delaware, Maryland, Washington, D. C., Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida.

[c] Less than 0.5 per cent.

The submarine campaign interfered with the coastwise movement of coal also. Ordinarily coal from the southern Appalachian fields destined for New England moves by rail to the ports at Hampton

Roads, Virginia, and is carried thence by ocean. Between the third quarter of 1941 and the third quarter of 1942, the tonnage of coal terminated in Virginia by the railroads fell 45 per cent. At the same time the overland all-rail movement from the southern fields to northern destinations rose. In this case, unlike that of petroleum, the elimination of water movement presumably did not appreciably affect the total rail tonnage originated, but it did lengthen the average rail haul and add to ton-miles.

War in the Far East has enhanced the importance of traffic moving to the three Pacific Coast states. In the first quarter of 1941 tonnage terminated there was 4.46 per cent of all tonnage terminated, in the first quarter of 1942, 5.69 per cent, and in the first quarter of 1943, 6.20 per cent. From the 1941 to the 1943 quarter, all tonnage terminated increased 32 per cent; tonnage terminated in California, Oregon and Washington 83 per cent. Much of this traffic must move across a large portion of the continent. The increase in westbound ton-mileage may therefore differ even more strikingly from the general increase in ton-miles. Directional data on ton-miles are not available, but figures for car-miles on the Union Pacific are suggestive: in the three months ending August 31, 1943 westbound loaded car-miles were 215 per cent greater than in the corresponding period of 1938; the increase in eastbound movement was only 64 per cent.

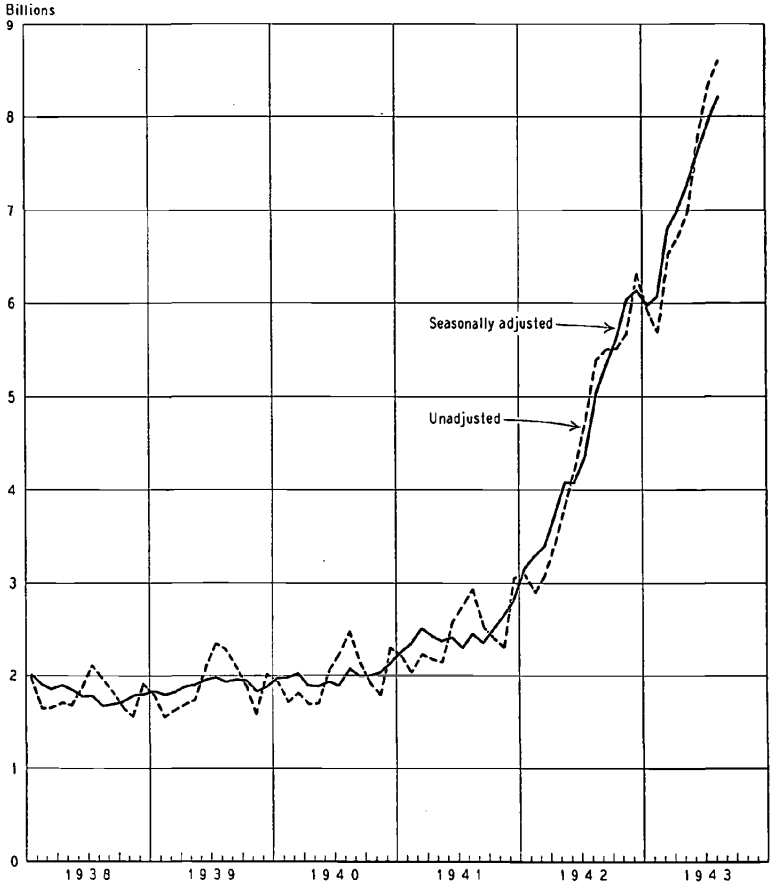
In the course of an expansion, traffic composed of durable goods usually increases faster than other traffic; the ratio of durable tonnage to total tonnage originated rises. Until recently at least, it did so in the present expansion. Of the originated tonnage 25.39 per cent was durable goods in 1938, 29.42 per cent in 1939, 31.42 per cent in 1940, 34.48 per cent in 1941. It is hard to say what happened in 1942 (and complete 1943 figures are not yet available). For military reasons the tonnage of metallic ores (except iron) and the metals produced from them, all of which we have classified in previous years as durables traffic, is no longer shown separately in the basic statistics, although it is still included in total tonnage. In computing the ratio for 1942 we are therefore obliged to regard these articles as other than durable. When the 1941 ratio is recomputed on the same basis, it shows a drop from 33.77 per cent in 1941 to 33.46 per cent in 1942. In 1941 the tonnage of the secret commodities was only 0.71 per cent of the total freight tonnage. But this kind of traffic may have increased rapidly. In view of the smallness of the drop in the percentage of durable to total, computed with these items omitted

from the durables group, it would quite possibly show a rise if they could be included. But apparently the rise would not be as rapid as in preceding years.

Ordinarily there is some tendency for the average distance over which a ton of freight moves to shorten during an expansion of traffic. In the first three and a half years of the present expansion there was little net change. In 1942, however, largely because of the overland oil movement and the westbound transcontinental traffic, the average haul lengthened rapidly. The seasonally adjusted figure is 393 miles for the second quarter of 1938, 389 for the fourth quarter of 1941, and 471 for the first quarter of 1943.

CHART 5

Passenger-miles, January 1938-August 1943




From 1938 to 1940 passenger traffic rose only slightly (Chart 5). A rather sharp rise in the winter of 1940-41 apparently reflects the

movement to camp of men drafted under the Selective Service Act passed in September. The number of officers and men in the regular army increased by 37,900 in December, 111,800 in January, 168,200 in February, 207,000 in March, and at an irregularly declining rate thereafter until September.[6] 207,000 members of the armed forces on duty traveled on trains in January, 232,800 in February and 327,200 in March; the number declined irregularly thereafter.[7] Movement of the armed forces, on military account and on furlough, accounts for most of the enormously rapid growth in passenger traffic since late 1941. Doubtless there has also been a large increase in civilian travel connected with the war. Gasoline rationing and other measures restricting automobile transport must have diverted civilian travel to the railroads during part of the period.

CARLOADS AND TRAINLOADS

During an expansion of traffic the average number of tons or passengers carried in a car or a train usually increases. The change in load contributes to the economy in the use of equipment and other resources.

In the present instance the number of ton-miles per loaded car-mile has risen from 25.7 at the 1938 trough to 33.1 at the most recent date for which information is available, or 29 per cent (Table 8).

In large part the rise in the average load is a result of changes in the composition of traffic. Some commodities shipped in carload lots are loaded to higher average weights per car than others. Shipments of the more heavily loaded commodities fall off more rapidly in contraction and multiply more rapidly in expansion than those of the more lightly loaded articles. Carload traffic as a whole increases faster than less-than-carload traffic, which is very lightly loaded. If the 1942 average loads for individual commodities had prevailed in 1938, in conjunction with the 1938 traffic composition, the average load for all carload traffic would have been 38.40 tons. The same average loads, in conjunction with the 1942 composition, resulted in an average of 40.14 tons for all carload traffic in 1942. Carload tonnage as a whole was 85 per cent higher in 1942 than in 1938; l.c.l. tonnage, only 22 per cent higher.

The changes in the composition of traffic, however, were not the only reason for the improvement in loading. Average loads for most

[6] Computed from data in the *Annual Report, 1941,* of the Secretary of War, facing p. 104.

[7] Association of American Railroads, Car Service Division, *Annual Report, 1941.*

individual commodities were heavier in 1942 than in 1938. The 1938 composition, in association with the 1938 individual loads, resulted in an average for all carload traffic of 35.78 tons. As just noted, the same composition, if it had been associated with the 1942 individual loads, would have produced an average of 38.40 tons.

Two orders of the Office of Defense Transportation have contributed to the general improvement in loading. Effective May 1, 1942 the railroads were directed to place at least 6 tons in each car used for less than carload freight. On July 1 the minimum rose to 8, and on September 1 to 10 tons. (Exceptions were allowed under certain circumstances).[8] Quarterly figures on the number of l.c.l. tons originated (published by the I.C.C.) and on the number of merchandise (l.c.l.) cars loaded (published by the Association of American Railroads) give some indication of what has been accomplished in this respect. A large amount of l.c.l. freight is transferred from one car to another in transit, some of it more than once. The A.A.R. figures pertain to all l.c.l. cars including those loaded in whole or in part with freight that started its journey in other cars. Tons loaded therefore exceed tons originated and the ratio of tons originated to cars loaded understates the average amount of merchandise placed in a car at its initial loading point. Nevertheless the trend in the ratio is illuminating. It rose considerably in 1941, indicating that the railroads were making some progress in this respect before the order (Table 6). But much sharper rises occurred in the last three quarters of 1942 and the first quarter of 1943.

In an order effective November 1, 1942, ODT turned its attention to carload traffic.[9] Generally speaking, the order required that all cars to be used for carload shipments should be loaded to capacity. Several definitions of capacity were provided, suitable to different circumstances. The order was not to be interpreted in such a way as to require unsafe loading or inefficient "stowage practices". To give more precision to the latter proviso, a series of specific minimum loading requirements were prescribed for numerous specific kinds of traffic; this list has been extended from time to time.

Even though railway operating departments are called upon to handle more heavily loaded cars as traffic expands, they usually succeed in handling more loaded cars per train. Around May 1938 there were 28.5 loaded car-miles per train-mile, around July 1943, 33.7. Since cars are more heavily loaded and there are more of them per

[8] *General Order O.D.T. No. 1,* issued March 23, 1942; amended April 30 and May 15.
[9] *General Order O.D.T. No. 18* (Revised), issued October 13, 1942.

TABLE 6

Less than Carload Freight, by Quarters, 1938-1943

| | FIRST QUARTER | SECOND QUARTER | THIRD QUARTER | FOURTH QUARTER |
|---|---|---|---|---|
| | TONS ORIGINATED (THOUSANDS) | | | |
| *1938* | 3,360 | 3,525 | 3,750 | 3,763 |
| *1939* | 3,384 | 3,655 | 3,954 | 3,971 |
| *1940* | 3,308 | 3,546 | 3,754 | 4,084 |
| *1941* | 3,786 | 4,612 | 4,924 | 4,768 |
| *1942* | 4,428 | 4,412 | 4,244 | 4,492 |
| *1943* | 4,407 | | | |
| | CARS LOADED (THOUSANDS) | | | |
| *1938* | 1,908 | 1,913 | 1,919 | 1,942 |
| *1939* | 1,907 | 1,973 | 1,978 | 1,973 |
| *1940* | 1,866 | 1,917 | 1,931 | 1,966 |
| *1941* | 1,964 | 2,080 | 2,006 | 1,991 |
| *1942* | 1,892 | 1,395 | 1,142 | 1,156 |
| *1943* | 1,205 | | | |
| | TONS ORIGINATED PER CAR LOADED | | | |
| *1938* | 1.76 | 1.84 | 1.95 | 1.94 |
| *1939* | 1.77 | 1.85 | 2.00 | 2.01 |
| *1940* | 1.77 | 1.85 | 1.94 | 2.08 |
| *1941* | 1.93 | 2.22 | 2.45 | 2.39 |
| *1942* | 2.34 | 3.16 | 3.72 | 3.89 |
| *1943* | 3.66 | | | |

train the average trainload rises even more rapidly than the other two ratios. At the trough there were 733 ton-miles, in the vicinity of last July 1,116 ton-miles per train-mile. Ton-miles per car-mile increased 29 per cent, loaded car-miles per train-mile 18 per cent, and ton-miles per train-mile 52 per cent. A gain of 173 per cent in revenue ton-miles was handled with an increase of only 106 per cent in loaded car-miles and only 75 per cent in train-miles.

Chart 2 indicates that the improvement in ton-miles per car-mile and in car-miles and ton-miles per train-mile has at times halted for periods of several months. But the growth of traffic itself has also been irregular. The variations in the chart may reflect either failure of increments in traffic to produce their usual effect or absence of such increments. The relation between increments in traffic and the per car-mile and per train-mile ratios is approached more directly in Charts 6, 7, and 8.

Although these ratios have improved in past expansions, no earlier expansion affords any clue as to how they might behave when traffic rises above 39 billion ton-miles per month (Table 1). In the present instance, however, additional traffic has been associated with higher loading per car in the range of variation from 39 to 68 billion ton-

CHART 6

Net Ton-miles per Car-mile

Relation to Total Revenue Ton-miles, May 1938-August 1943

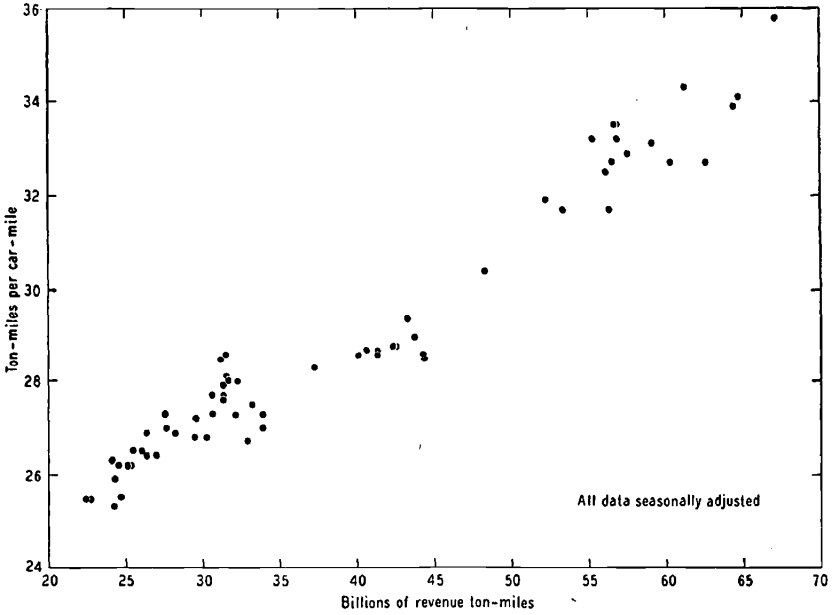
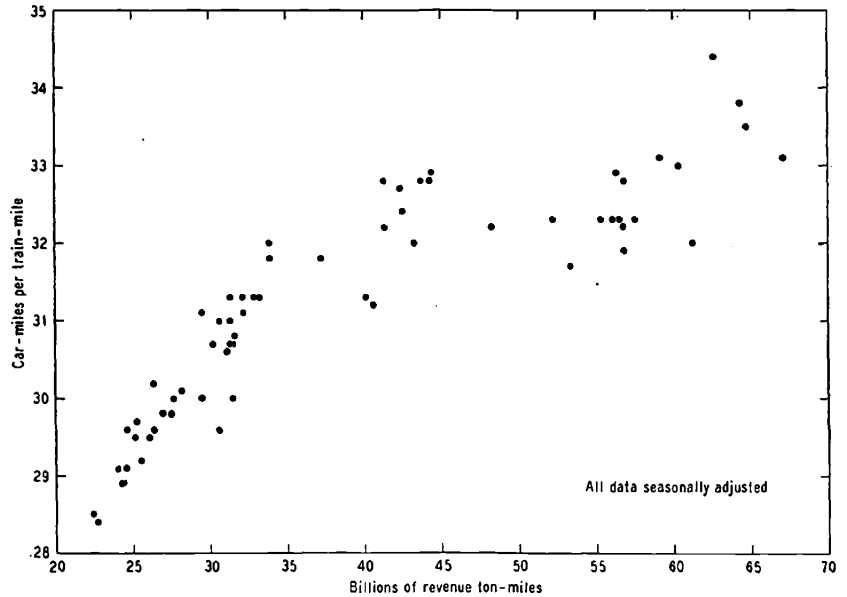



CHART 7

Loaded Car-miles per Train-mile

Relation to Total Revenue Ton-miles, May 1938-August 1943

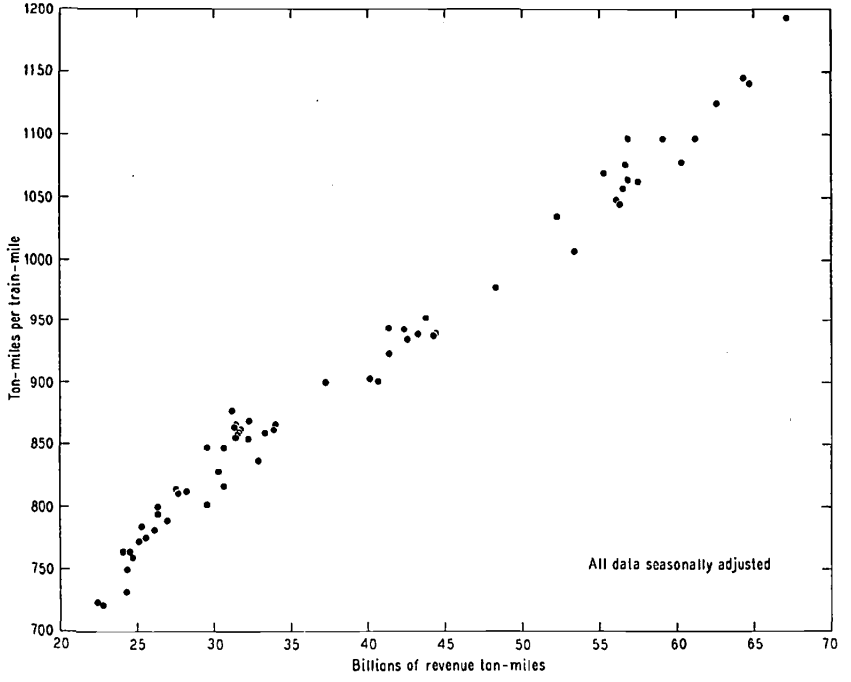


miles quite as clearly as in the range below 39 billions (Chart 6). Apparently a limit to the number of loaded cars per train is reached in the vicinity of 42 billion ton-miles. Beyond that point, although two or three of the very largest traffic volumes are associated with extremely high averages, the ratio shows no consistent tendency to rise (Chart 7). Even before that limit the gain from additional increments of traffic seems to diminish.

Nevertheless the average trainload improves with successive increments of traffic in the new higher as well as in the lower range of variation (Chart 8). But the rate of improvement is slower in the higher range. In large part this results from the failure of the number of cars per train to grow beyond a certain point, for the average trainload is the product of the average carload and the number of cars per train.

CHART 8

Net Ton-miles per Train-mile
Relation to Total Revenue Ton-miles, May 1938-August 1943




On each chart there are 17 dots for quantities of traffic higher than 50 billion ton-miles; 16 pertain to months later than April, 1942. Their vertical position is therefore affected by the successively higher

minimum requirements imposed by the l.c.l. order. Ten pertain to months later than October and are affected by the l.c.l. order. The ODT requirements helped to maintain the improvement shown in this part of the range on Charts 6 and 8.

During a cyclical rise in passenger traffic the average number of travelers in a car usually rises. From the 1938 low point in travel to the summer months of 1943, passenger-miles per car-mile[10] increased from 12.7 to 33.8, or 166 per cent. Operating officials have thought it desirable to run some extra cars, but not a proportionately greater number.

To a considerable extent additional cars are usually handled by lengthening trains rather than by running additional trains. In the present case the number of passenger car-miles per train-mile has increased 47 per cent.

Thus a growth of 366 per cent in passenger-miles has been handled with an increase of only 75 per cent in car-miles and only 19 per cent in train-miles (Table 7).

TABLE 7

Passenger Service Statistics, Seasonally Adjusted

Averages for trough quarter, 1938,
and three months ending August 31, 1943

| | *July August September 1938* | *June July August 1943* | % INCREASE |
|---|---|---|---|
| Passenger-miles (mill.) | 1,704 | 7,939 | 366 |
| Passenger car-miles (mill.) | 134.5 | 235.2 | 75 |
| Passenger train-miles (mill.) | 32.5 | 38.6 | 19 |
| Passenger-miles per car-mile | 12.7 | 33.8 | 166 |
| Passenger car-miles per train-mile | 4.14 | 6.10 | 47 |
| Passenger-miles per train-mile | 52.5 | 205.8 | 292 |

Effective October 4, 1942, ODT prohibited the operation of any regularly scheduled trains which were not scheduled during the week ended September 24, and the running of extra sections or special trains.[11]

[10] Car-mile figures cited in this paper pertain to coaches and sleeping and parlor cars only. They do not include dining, lounge or baggage cars, mail or express cars.

[11] *General Order O.D.T. No. 24,* issued September 30, 1942. The order does not apply to military or other governmental movements; and other, minor exceptions have been authorized by the order or amendments or general and special permits.

A comparison of Charts 3 and 5 is sufficient to indicate that even at the unprecedented level of traffic recently attained, increments in traffic continue to bring with them increases in the number of passengers per car, in the number of cars per train, and consequently in the number of passengers per train.

Looking to the future, a further rise in passenger-miles per car-mile and hence per train-mile is possible. On a country-wide average, equipment is still not fully utilized. The highest recorded number of Pullman passenger-miles per car-mile is 23, in August 1943.[12] The average capacity of a sleeping car is 25 passengers.[13] But this figure is based on counting each berth as having a capacity of one passenger. In military movements two soldiers usually sleep in one lower berth;[14] civilians can sometimes arrange to do likewise. The highest record in coach travel was reached in June, 1943—44 coach passenger-miles per car-mile.[15] The weighted average seating capacity of coaches was about 74. In addition, standees can be carried, as they often are. On the more congested runs, of course, Pullman reservations are sold out well in advance, and the number of passengers per coach greatly exceeds 44. Nevertheless the averages show that there is still much relatively empty equipment. Some of it can be diverted to the more heavily traveled routes. Although the Pullman averages indicate a closer approach to capacity, would-be Pullman passengers can travel in coaches if necessary. A further increase in passengers per car, of course, can probably be achieved, although only at the cost of still more discomfort to travelers, inevitable under war conditions.

### FACTORS IN ECONOMY OF EQUIPMENT

Since there has been a great rise in traffic, relatively little increase in some types of serviceable equipment, and an actual decrease in the others, obviously the amount of traffic handled per serviceable propulsion unit or car has greatly increased. Such an increase depends in part on the amount of time equipment spends in trains and in part on the amount of traffic handled per hour of train service. Performance of equipment per hour in train service in turn depends

[12] This includes passengers transported free by the railroads but charged for Pullman accomodations. The passenger-mile figure used in the calculation is from the *Survey of Current Business*.

[13] For parlor cars the figure is 32, but most of the travel is in sleepers.

[14] Office of War Information: Press release 1607, April 25, 1943, p. 4.

[15] When figures for months later than July (coach travel) and August (Pullman travel) become available, they may surpass these records.

partly on passenger-miles or ton-miles per car-mile and on car-miles per train-mile and partly on the speed of trains.

As already noted, ton-miles per car-mile have increased 29 per cent, loaded car-miles per train-mile 18 per cent, and ton-miles per train-mile therefore 52 per cent (Table 8). But the effect of this improvement has been diminished by the change in train-miles per train-hour.

TABLE 8

Freight Service Statistics, Seasonally Adjusted

Averages for trough quarter, 1938, and three months ending August 31, 1943

| | | DERIVATION[a] | *April May June* 1938 | *June July August* 1943 | % CHANGE |
|---|---|---|---|---|---|
| 1 | Serviceable locomotives | | 17,060 | 19,594 | 15 |
| 2 | Serviceable cars (thous.) | | 1,714 | 2,000 | 17 |
| 3 | Revenue ton-miles (bill.) | | 22.9 | 62.5 | 173 |
| 4 | Net ton-miles (bill.)[b] | | 25.0 | 66.1 | 164 |
| 5 | Loaded car-miles (mill.) | | 970 | 1,996 | 106 |
| 6 | Train-miles (mill.) | | 34.4 | 60.1 | 75 |
| 7 | Train-hours (thous.) | | 2,076 | 3,824 | 84 |
| 8 | Loaded car-hours (mill.) | 5÷17 | 58.8 | 127.1 | 116 |
| 9 | Net ton-miles per loaded car-mile | 4÷5 | 25.7 | 33.1 | 29 |
| 10 | Loaded car-miles per train-mile | 5÷6 | 28.5 | 33.7 | 18 |
| 11 | Net ton-miles per train-mile | 4÷6 | 733 | 1,116 | 52 |
| 12 | Train-miles per train-hour | 6÷7 | 16.5 | 15.7 | —5 |
| 13 | Net ton-miles per train hour | 11×12 | 12,094 | 17,521 | 45 |
| 14 | Train-hours per serviceable locomotive | 7÷1 | 121.7 | 195.2 | 60 |
| 15 | Revenue ton-miles per serv. loc. (thous.) | 3÷1 | 1,342 | 3,191 | 138 |
| 16 | Net ton-miles per loaded car-mile | 9 | 25.7 | 33.1 | 29 |
| 17 | Car-miles per loaded car-hour | [c] | 16.5 | 15.7 | —5 |
| 18 | Net ton-miles per loaded car-hour | 16×17 | 424 | 519 | 22 |
| 19 | Loaded car-hours per serviceable car | 8÷2 | 34.3 | 63.6 | 85 |
| 20 | Revenue ton-miles per serviceable car | 3÷2 | 13,360 | 31,160 | 133 |

[a] Applies strictly only to underlying figures for individual months. Because of rounding of decimals and simple averaging of ratios for individual months, figures in following columns may differ slightly from those which would be indicated by these formulae.

[b] Revenue ton-miles plus movement of railroad companies' own materials in freight trains. Ratios shown below on this basis are not conveniently available on basis of revenue ton-miles only.

[c] Line 17 assumed to be same as line 12. Not strictly true but percentage change probably not seriously affected.

During a cylical expansion of freight traffic the speed of freight trains has usually declined, remained stationary, or risen less rapidly than during a contraction. Until the first few months of 1941 the average speed prevailing at the beginning of the current expansion was maintained. Since then there has been an appreciable decline in

miles per hour (Chart 2). Congestion of lines, and more time spent at way stations in picking up cars and l.c.l. shipments or dropping them from trains, have been making themselves felt.

Because train-miles per hour tend to decline during an expansion, the change in ton-miles per train-hour is not as favorable as that in ton-miles per train-mile. Nevertheless the increase in train-load is likely to more than offset the falling speed. In the present expansion the net result of a 52 per cent increase in ton-miles per train-mile and a 5 per cent decrease in train-miles per train-hour has been a 45 per cent increase in ton-miles per train-hour. This means that a locomotive, on the average, handles 45 per cent more traffic during an hour's work than at the 1938 trough.

Not only are locomotives accomplishing more during each hour at work but they are working more hours. Train-hours per serviceable locomotive have risen from 122 per month at the trough to 195 per month. A 45 per cent improvement in hourly performance has been accompanied by a 60 per cent improvement in the time a locomotive spends with a train behind it.[16] The combined effect of the two factors has been a 138 per cent gain in the revenue ton-miles of movement performed per serviceable locomotive.

The serviceable life of a freight car is similarly divided into the time it spends under load in freight trains and the time it spends otherwise. We estimate the loaded hours in trains per serviceable freight car as 34.3 per month at the trough and 63.6 in the recent period, an advance of 85 per cent. Ton-miles per car-hour have risen 22 per cent.

In World War I, the number of hours freight cars could spend in useful movement was reduced because traffic for which no warehouse or vessel space was available arrived at the ports in great quantities, and consequently cars were used merely as places of storage. To avoid this danger in the present war, ODT requires consignors to obtain permits, certifying that shipping or storage space will be available, from appropriate government authorities before shipments to the ports for export may be accepted by carriers.[17]

[16] The absolute number of locomotive miles is somewhat greater than the number of train-miles, chiefly because some locomotives are assigned to help others handle some trains. But the ratio between the two figures is practically constant.

[17] The system was initiated by Instruction O.D.T. No. 1, effective June 1, 1942, and revised in General Order O.D.T. No. 16, effective August 1, 1942 as to private freight and July 10, 1942 in other respects. The regulations have been relaxed from time to time in special cases. The order has been amended to prevent shipments of government freight to commercial warehouses in port areas except on prior permit, effective January 10, 1944.

ODT has also established a system of telegraphic control of freight movement designed to avoid another danger to the mobility of equipment. When one route is likely to become congested a central control office instructs the railroads concerned to dispatch traffic by other routes.

Freight cars spend part of their remaining time in trains but moving, empty, to places where loads are available. Ordinarily the ratio of loaded to total movement rises during an expansion of traffic. The change results largely from the milder cyclical amplitude of petroleum and perishable traffic. Commodities of this kind are shipped in special types of cars for which a return load often cannot be found. The more rapid increase in freight carried in other types of cars causes the empty movement to become relatively less important. The tendency was observable in this expansion up to February, 1942 (Chart 2).[18] During the next three months, the diversion of oil to the railroads caused a sharp drop in the ratio of loaded movement, from 65.2 in February to 61.0 in May. Thereafter the growth of other traffic once more gained over that of the commodities requiring specialized equipment. The ratio again rose, although not to its former level.

In passenger as in freight service an increase in the number of hours equipment is used in trains, as well as the load factors previously reviewed, have contributed to the increase in traffic handled per unit of serviceable equipment. The gain in this respect may be illustrated by comparison of June, July and August 1938 with the corresponding months of 1943 (Table 9).[19] The number of train-hours per serviceable motive power unit has increased 24 per cent. Although motive power hours substantially exceed train-hours at all times, the percentage increase in motive power hours in train service per serviceable power unit has probably been about the same as in train-hours per unit. Apparently more hours in service have been far less important than better performance per hour in accounting for the improvement in performance per serviceable unit. The same is true of cars. During the five years, we estimate, hours in train

[18] Unusual efforts to find return loads for refrigerator cars have been a contributing factor. OWI Release 1607, p. 12.

[19] Because the original data do not go back far enough so that seasonally adjusted figures based upon them would be of much value to us in an analysis of cycles, we have not prepared such figures for train-hours or train-miles per train-hour in passenger service. Hence the table is based on unadjusted data for comparable months; almost all of the expansion of travel, however, occurred in the interval of 5 years covered by the table.

service per serviceable car increased 71 per cent; passenger-miles per hour of car movement 143 per cent. Passenger-miles per serviceable car increased 317 per cent.

TABLE 9

Passenger Service Statistics

Averages for three months ending August 31, 1938 and 1943

| | | DERIVATION[a] | *1938* | *1943* | % CHANGE |
|---|---|---|---|---|---|
| 1 | Serviceable locomotives & rail motor cars | | 8,928 | 8,472 | —5 |
| 2 | Serviceable passenger carrying cars | b | 23,354 | 23,322 | 0 |
| 3 | Passenger-miles (mill.) | | 1,982 | 8,255 | 316 |
| 4 | Passenger carrying car-miles (mill.) | | 140.9 | 241.8 | 72 |
| 5 | Train-hours (thous.) | | 955 | 1,124 | 18 |
| 6 | Passenger carrying car-hours (thous.) | 4÷10 | 4,059 | 6,948 | 71 |
| 7 | Passenger-miles per passenger carrying car-mile | 3÷4 | 14.1 | 34.2 | 143 |
| 8 | Passenger carrying car-miles per train-mile | | 4.25 | 6.18 | 45 |
| 9 | Passenger-miles per train-mile | | 59.7 | 210.0 | 252 |
| 10 | Train-miles per train-hour | | 34.7 | 34.8 | 0 |
| 11 | Passenger-miles per train-hour | 9×10 | 2,071 | 7,310 | 253 |
| 12 | Train-hours per serviceable locomotive & rail motor car (thous.) | 5÷1 | 107.0 | 132.7 | 24 |
| 13 | Passenger-miles per serviceable locomotive & rail motor car (thous.) | 3÷1 | 222.0 | 974.4 | 339 |
| 14 | Passenger-miles per passenger carrying car-mile | 3÷4 | 14.1 | 34.2 | 143 |
| 15 | Passenger carrying car-miles per passenger carrying car-hour | c | 34.7 | 34.8 | 0 |
| 16 | Passenger-miles per passenger carrying car-hour | 14×15 | 489 | 1,189 | 143 |
| 17 | Passenger carrying car-hours (thous.) | 4÷15 | 4,059 | 6,948 | 71 |
| 18 | Passenger carrying car-hours per serviceable passenger carrying car | 17÷2 | 173.8 | 297.9 | 71 |
| 19 | Passenger-miles per serviceable passenger carrying car (thous.) | 3÷2 | 84.9 | 354.0 | 317 |

[a] See Table 8, note a.

[b] Estimate. Actual averages of serviceable railway-owned passenger *train* cars reduced by ratio of all railway-owned passenger *carrying* cars to all railway-owned passenger *train* cars on December 31, 1937 and 1941 (1942 not available). Resulting figures raised by ratio of all railroad and Pullman owned passenger *carrying* cars to railroad owned passenger cars on same dates.

[c] Assumed to be same as (10).

MANPOWER

The operation of a train for one hour requires the performance of several manhours of work by a train crew. The number of manhours worked by train and engine employees per hour of train operation is fairly constant. It is not much affected by cyclical variations in

total ton-miles performed. Thus from June, July and August 1938 to the corresponding months of 1943, although net ton-miles per train-hour increased 42 per cent, manhours worked by freight train and engine employees per train-hour increased only 10 per cent. Passenger train and engine employees worked only 15 per cent more hours per train-hour in the 1943 period than in the 1938 period. Passenger-miles per train-hour increased 253 per cent between the same dates.

The customary statistical grouping of train and engine service employees includes not only workers on freight and passenger trains but also those who work on switching locomotives or ride cars in yards. Even so, the group currently includes only about 22 per cent of all railroad workers. Both in the train and engine group (VI b) as a whole and in each of the other major statistical groups, the increase in employment and in time paid for has been much less than in traffic (Table 10).[20]

[20] In the other groups, percentage changes in time paid for do not differ greatly from those in time worked. In Group VI b, however, because pay for a minimum amount of work per day worked and sometimes per month is guaranteed, a much larger difference is possible. As business improves, the railroad companies are able to use more of the time they must pay for anyway. Thus time actually worked by Group VI b employees has increased 83 per cent rather than 76 per cent between the periods shown in Table 10.

TABLE 10

Number of Employees, and Time Paid for
Major Statistical Groups of Employees

Percentage change from three months ending August 31, 1938
to same period of 1943

| I.C.C. GROUP | | WORKERS FOR WHOM DAYS WORKED ARE REPORTED | | WORKERS FOR WHOM HOURS WORKED ARE REPORTED | |
|---|---|---|---|---|---|
| | | Number | Days paid for | Number | Hours paid for |
| I | Executives, etc. | 18 | 19 | .. | .. |
| II | Professional, clerical & general | 11 | 13 | 46 | 54 |
| III | Maintenance of way & structures | 22 | 22 | 49 | 76 |
| IV | Maintenance of equipment & stores | 25 | 29 | 67 | 101 |
| V | Station employees, etc. | —8 | —5 | 41 | 52 |
| VIa | Yard employees | 72 | 70 | 35 | 54 |
| VIb | Train & engine employees | .. | .. | 52 | 76 |

The number of employees for whom the number of days, rather than hours worked is reported, and the time worked by them, usually increases less than the number and time for hourly workers. Most

daily workers hold either supervisory posts or jobs, such as crossing watchmen, which are little affected by the volume of traffic. Except in the relatively small group of yard workers, the number of hourly workers has increased more than the number of day workers, and the number of hours paid for more than the number of days paid for.

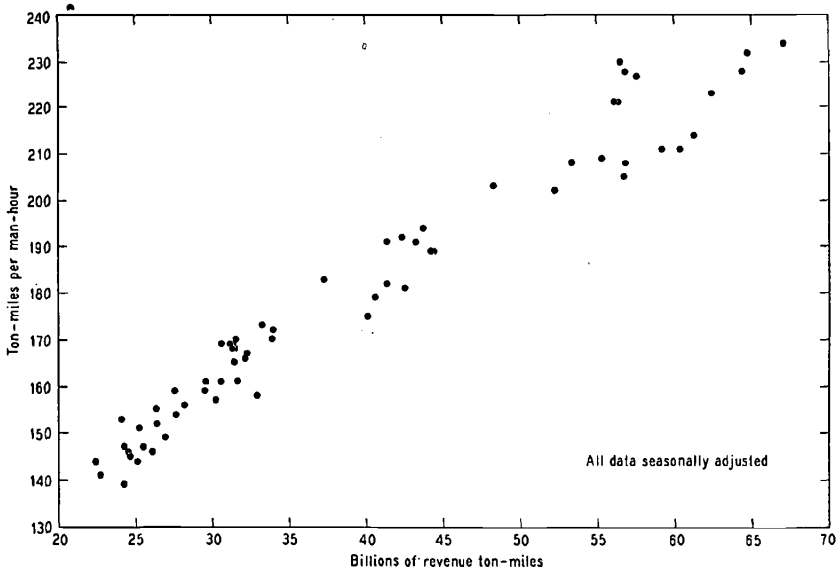
Among hourly workers, the greatest increases in number employed and time worked have been in the train and engine and the two maintenance groups. For such workers as clerks, station employees, switchmen, the increases have been considerably smaller.

In previous cycles output of transportation per man-hour worked by all railway employees has tended to rise in expansion and fall in contraction. Obviously there has been a net rise in productivity during the current expansion. When the new experience with volumes of freight traffic in excess of 39 billion ton-miles per month is considered separately, the same general relationship between productivity and volume is found (Chart 9). Increases in ton-miles per manhour worked by all railway employees reported on an hourly basis are still associated with increases in total ton-miles. This improvement occurred even though the rise in freight traffic was accompanied by a sharp rise in travel.[21]

[21] Similar ratios of ton-miles to manhours, based upon hours worked by all employees

CHART 9

Revenue Ton-miles per Man-hour
Relation to Total Revenue Ton-miles, May 1938-August 1943



In the railroad industry, as in others, lengthening the work week is one possible means of adding to the supply of manpower. How intensively is the industry already utilizing its workers? The best calculation that can be made suggests that a week of more than 48 hours has been reached. During the 12 months ending August 31, 1943, hours worked per employee per weekday ranged from a low point of 8.18 in September to a high point of 8.81 in August (Table 11).

TABLE 11

Hours Worked per Employee per Weekday
September 1942-August 1943

| | ALL EMPLOYEES | TRAIN & ENGINE EMPLOYEES | ALL OTHER EMPLOYEES |
|---|---|---|---|
| *1942* | | | |
| September | 8.18 | 8.36 | 8.12 |
| October | 8.39 | 8.46 | 8.37 |
| November | 8.45 | 8.64 | 8.38 |
| December | 8.22 | 8.44 | 8.16 |
| *1943* | | | |
| January | 8.45 | 8.68 | 8.38 |
| February | 8.54 | 8.72 | 8.48 |
| March | 8.54 | 8.52 | 8.55 |
| April | 8.46 | 8.25 | 8.52 |
| May | 8.51 | 8.38 | 8.60 |
| June | 8.49 | 8.15 | 8.59 |
| July | 8.31 | 8.25 | 8.33 |
| August | 8.81 | 8.73 | 8.83 |

Total manhours worked per month divided by number of employees at middle of month. Resulting figure divided by number of weekdays in month. Total manhours computed as follows: straight time actually worked plus overtime paid for plus (in train and engine service) constructive allowances.

In train and engine service, the distance traveled by some trains and their speed limit the actual working time of the crew to three or four hours per day or less. It might be suspected that, in spite of the high average for all workers in the industry, a substantial reserve of unused hours exists in this branch of employment. But if short daily assignments are still numerous, there must be many others that consume a good deal more than 8 hours, for here too the average time actually worked per day has been running well above that figure, ranging from 8.15 in June to 8.73 in August. In half of the

including those for whom only days worked are reported, would, if available, be lower than those shown in the chart. But the omitted workers are only a small percentage of the total, and the ratios would be distributed with reference to total ton-miles in much the same way as those actually shown.

twelve months the average day in this service was longer than that of other railway workers.

The shorter working assignments are most common on passenger trains, next most common on through freights. Details by occupations and classes of service for August, 1943 (Table 12) may be illuminating. In passenger service, time actually worked per man per day ranged from 6.79 hours for firemen and helpers to 7.85 for brakemen and flagmen. In through freight service, firemen averaged 7.75 hours per day, conductors 9.18; the two other occupations were in between. Apparently it would be easy to exaggerate the amount by which the average working day could be lengthened even in these services. In local freight service the day is quite long: from 11.03 hours for brakemen to 11.74 for conductors. In yard operation firemen and helpers worked 8.30 hours, conductors and yard foremen 9.47 hours.

TABLE 12

Hours Worked per Employee per Weekday,[a] August 1943
Train and Engine Workers, by Service

| | PASSENGER SERVICE | FREIGHT SERVICE | | YARD SERVICE |
|---|---|---|---|---|
| | | Through | Local | |
| Engineers & motormen | 7.00 | 8.52 | 11.67 | 9.06 |
| Firemen & helpers | 6.79 | 7.75 | 11.11 | 8.30 |
| Conductors[b] | 7.84 | 9.18 | 11.74 | 9.47 |
| Assistant conductors[c] | 7.82 | | | |
| Baggagemen | 7.70 | | | |
| Brakemen & flagmen[d] | 7.85 | 8.18 | 11.03 | 8.43 |

[a] For derivation, see Table 11, note.
[b] In yard service includes yard foremen.
[c] Includes ticket collectors.
[d] In yard service, brakemen and yard helpers.

PROFITS

Expansions of traffic and the related improvement in unit performance are usually accompanied by an increase of operating profits. Net earnings usually grow faster than revenues; the percentage of gross carried through to net rises. Recent events provide a forceful illustration.

Although operating revenues in the summer of 1943 were 169 per cent higher than at the trough in 1938, operating expenses—that is, charges for such items as labor, materials, and depreciation—were only 107 per cent higher. Net revenue from railway operations—the amount remaining from revenues after deducting operating expenses—was 388 per cent greater (Table 13).

Taxes accrued by railroads have risen very sharply—531 per

TABLE 13

Operating Income Account, Seasonally Adjusted

Averages for trough quarter, 1938
and three months ending August 31, 1943

| | *April May* June 1938* | *June July August 1943* | % INCREASE |
|---|---|---|---|
| Total operating revenues | 282.9 | 761.7 | 169 |
| Total operating expenses | 220.5 | 457.4 | 107 |
| Net revenue from railway operations | 62.4 | 304.4 | 388 |
| Railway tax accruals | 27.7 | 174.8 | 531 |
| Railway operating income | 34.7 | 129.6 | 273 |
| Equipment & joint facility rents | 10.8 | 16.6 | 54 |
| Net railway operating income | 23.9 | 113.0 | 373 |

*Month of trough in total operating revenues.

cent—largely because of greater net corporate income and of higher corporate income and excess profits tax rates. Adjusted monthly data on taxes by classes are not available but annual data demonstrate the importance of income and profit taxes sufficiently. Payroll taxes amounted to $99,200,000 in 1938 and $171,000,000 in 1942. Miscellaneous taxes, chiefly property taxes imposed by State and local governments, were $222,700,000 in 1938. Their amount in 1942 is not yet known, but they do not change rapidly; probably they did not come to much over $240,000,000. Consequently about $791,000,000 of the $1,202,000,000 tax total in 1942 was income and excess profits tax accruals. In 1938 taxes of this type were only $18,900,000.

Since taxes rose more than net revenue, net operating income (net revenue minus taxes) increased less than net revenue before taxes.

The figure for equipment and joint facility rents pertains to Class I roads as one system; in its computation, payments by one such road to another cancel. Its magnitude therefore depends on payments by Class I roads to others, which are composed principally of payments for the use of privately owned freight cars. These cars are used mainly to haul petroleum products or perishable foodstuffs —traffic that has mild cyclical variations. The rates of compensation also show considerable 'price inflexibility'. Consequently total equipment and facility rent has only mild cyclical fluctuations. In this expansion it has risen only 54 per cent. If the great diversion

of petroleum traffic from coastwise movement had not occurred, the rise would have been even milder. Net railway operating income (net operating income minus equipment and facility rentals) rose by a greater percentage than any of the other income account figures so far reviewed except taxes and net revenue before taxes.

VOLUME AND PROFITS IN TWO WARS

The increase in operating profits has been greater and more sustained in the present expansion than in that associated with World World I. During the first two and one-half years of the current phase, the growth of net revenue differed little from its course in the earlier phase. But from then on net revenue in the first war declined sharply, and failed to recover its previous level until the expansion came to an end. In the present phase an almost exactly opposite movement can be observed. The current expansion has lasted much longer than the earlier one, and profits have advanced to new high levels (Chart 10). A study of the course of railway operating income shows much the same contrast.[22]

CHART 10

Net Revenue from Railway Operations, Seasonally Adjusted
January 1914 – April 1919 and June 1937 – August 1943

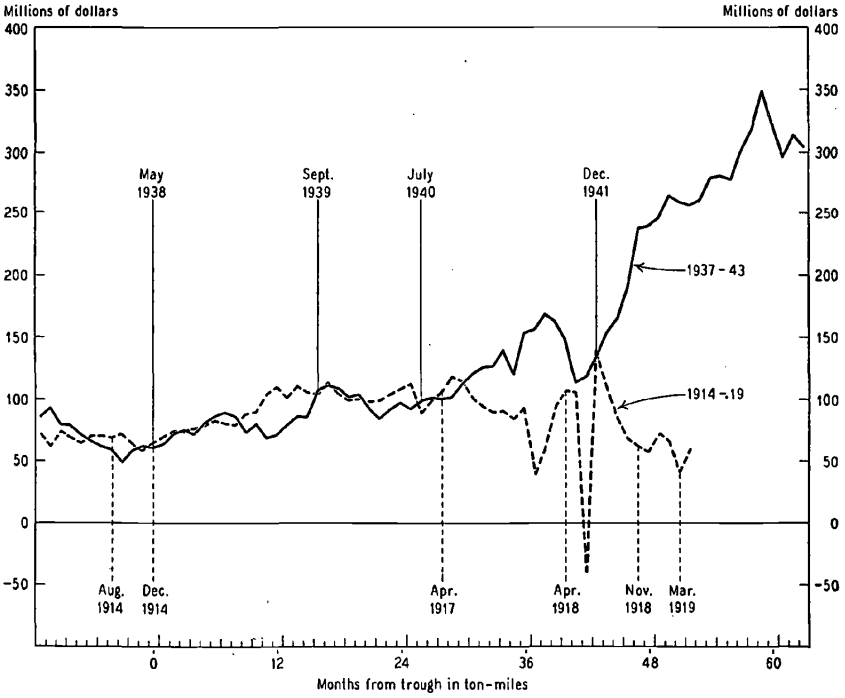
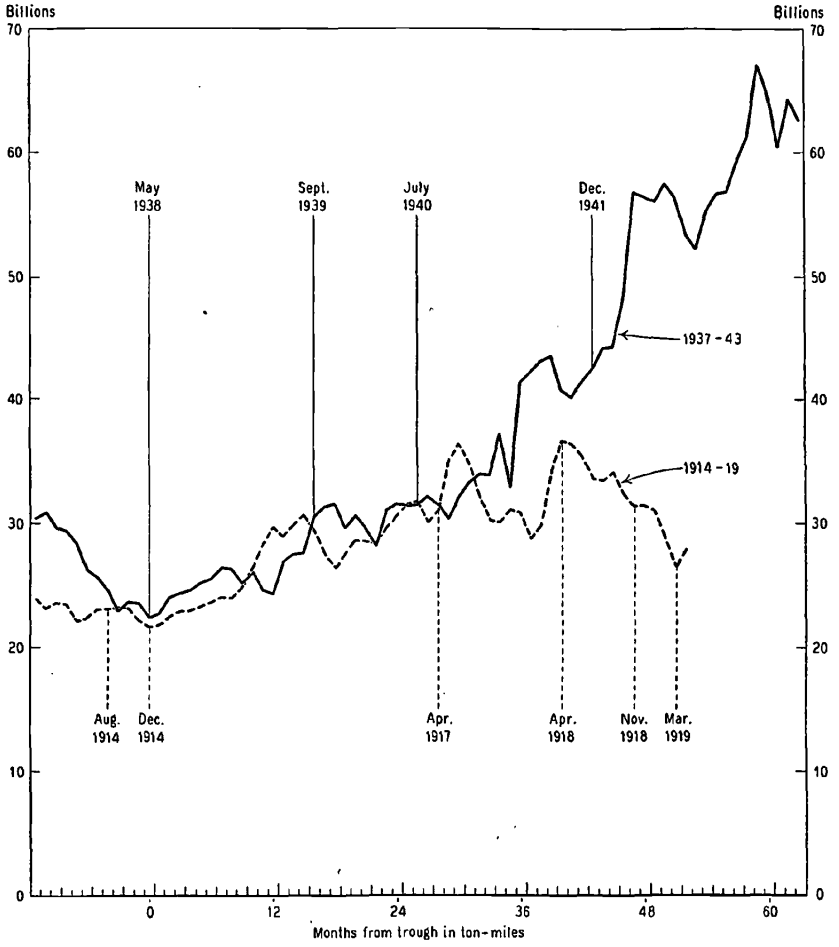


CHART 11

Revenue Ton-miles, Seasonally Adjusted
January 1914 - April 1919 and June 1937 - August 1943



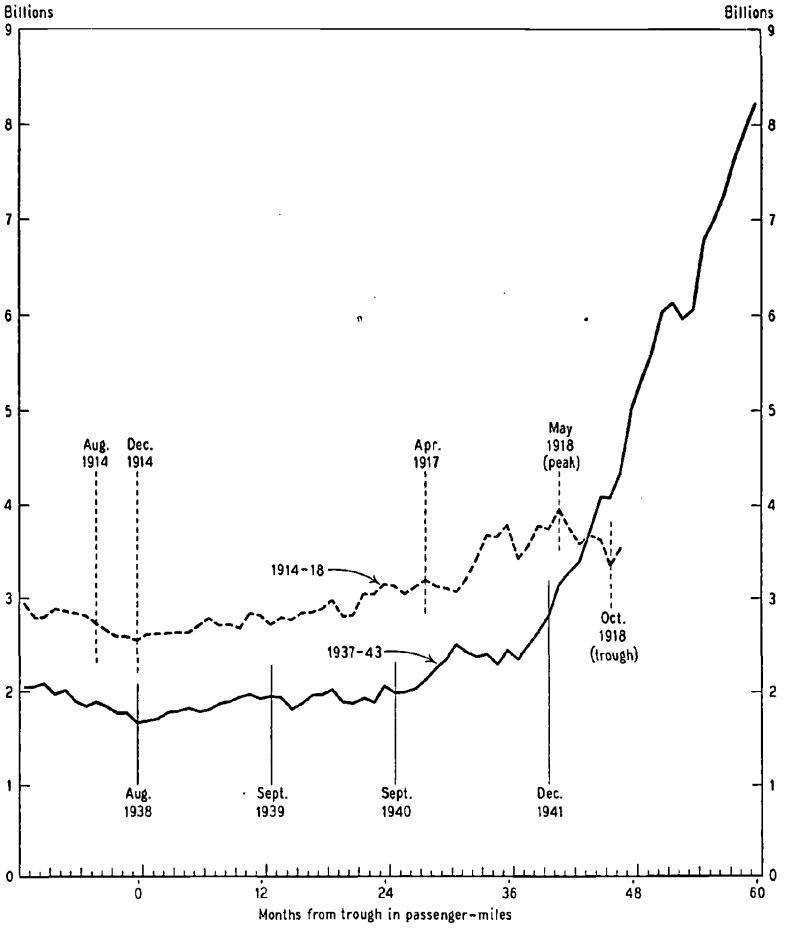

One reason for the difference is the different relationship between freight rates and prices of railway materials. We have found no index of prices paid by railroads in the earlier period. Instead we have struck unweighted averages of three Bureau of Labor Statistics wholesale price indexes: building materials, metals and metal products, and fuel and lighting, with the averages for the three months November, 1914 to January, 1915 taken as 100. The combined index

[22] The concept of net railway operating income was not introduced into the accounts until 1917; consequently no comparison in terms of this third definition of operating profits can be drawn.

CHART 12

Passenger-miles, Seasonally Adjusted

January 1914 - November 1918 and September 1937 - August 1943




rises to 189 in April, 1918 (the peak in ton-miles) and 191 in May, 1918 (the peak in passenger-miles). An index of prices of railway materials, fuels, and supplies prepared by the Bureau of Railway Economics indicates a rise of only about 14 per cent from the approximate 1938 average to December, 1942.[23]

[23] Railway wage rates, on the other hand, were stable during the earlier expansion and rose somewhat during the second. Wage adjustments were largely deferred until June 1918, one month after the peak in freight traffic and two months after the peak in travel. In that month sharp increases were made, retroactive to January 1. The retroactive increases were largely if not entirely charged to operating expenses for June, and account for the sharp fall in net operating revenue to less than zero in that month. In the current expansion wage increases averaging about 15 per cent were made in December

Neither rates nor fares were advanced much during either expansion. Freight rates and passenger fares in the earlier period were not raised substantially until June 26, 1918, after the expansion had ended. Freight rates were increased somewhat less than 5 per cent and passenger fares somewhat less than 10 per cent early in 1942; in 1943 most of these increases were rescinded. In the earlier expansion, obviously, higher prices paid for railway materials and supplies were not compensated for by higher prices received for railway services.

Another factor in the difference, as to profits, between the later stages of the two expansions is the difference in the development of traffic. During the first 31 months of the current expansion the growth in freight traffic was about as great as during the same period of the 1914-18 expansion. The two curves start from about the same level, and interlace (Chart 11). But thereafter they diverge, and the curve for the present expansion rises sharply above that for 1914-18. The current expansion in passenger traffic started at a considerably lower level than the 1914-18 expansion in travel and remained well below for the first 37 months. Then the new curve began to climb rapidly toward the old and is now well above it (Chart 12).[24] The relative movement of the two curves for profits resembles the relative movement of the two curves for freight traffic. After the first 30 months of the earlier expansion, both ton-miles and net revenue fell off sharply, then barely recovered their former level. In the current period both rose sharply after the thirtieth month, although both subsequently declined temporarily. The comparison cannot be extended beyond 40 months, for the earlier expansion lasted only 40 months; the later one showed no conclusive sign in its 63rd month (August, 1943) of having come to an end.

1941. (In modified form they were retroactive to September, but in part they were anticipated in preparing the income accounts for those months.) Further increases have recently beeen made.

[24] Some readers may be interested in comparisons starting from the outbreak of hostilities (August 1914 and September 1939) or from America's entry in 1917 on the one hand and the beginning of the defense effort in 1940 or our entry in 1941 on the other. For their convenience the appropriate dates are shown in the charts.

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