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5. Use of Labor and Fuel

In discussions of business cycles and their causes the opinion has sometimes been expressed that costs rise near the end of expansions. In part the supposed rise is attributed to a decline in efficiency: more labor and materials are required per unit of product. Conversely, cost is supposed to fall and the use of labor and materials to become more economical toward the end of contraction. It is thought that the changes in cost help to bring on the downturn and the upturn in business by their effects on prices and profits. Others contend that the large scale of operations near a business peak is necessarily associated with low costs and urge that prices and wage rates be set with the association in mind. We can extract some information on these matters from the British railway data, although the units of time to which the figures pertain are not short enough to reveal all the relevant changes that may occur.

Unit labor requirements inversely related to traffic

Labor expense on British railways is more closely related to the number of workers than to the number of manhours worked. Men available for work throughout a week are guaranteed a full standard week's wages if they are employed at all.[1] When traffic increases, management can keep the men already on the payroll busier at no extra cost. If the number of men on the payroll does not rise in proportion to traffic during an expansion, labor cost per traffic unit will tend to decline. If the number of workers does not diminish in proportion to traffic during

[1] *Ministry of Labour Gazette*, April 1919, p. 125. *Railway Gazette*, November 10, 1922, p. 595; June 2, 1923, p. 828; March 13, 1931, p. 422; March 20, 1931, p. 466. Ministry of Labour and National Service, *Time Rates of Payment and Hours of Labour*, September, 1948, pp. 42, 130.

a contraction, unit labor cost will tend to rise.[2] And apparently the number of workers usually did not rise or fall as much as traffic (Table 26).

The foregoing remarks pertain strictly to work done during standard working hours. Overtime, and night and Sunday work (at least where they are not included in a man's regularly assigned hours) are paid for more nearly in proportion to the hours worked. Furthermore, the number of such hours tends to increase and decrease out of proportion to traffic. Aggregate payments for extra time, however, must be small in comparison with those for straight time.

In addition to the evidence of Table 26, we have more specific information on the relation between labor input and traffic for certain occupations. In an earlier chapter we found that the average load of freight trains tends to vary directly with traffic, but that the gain in hourly performance which might be expected from the increase in load is largely dissipated by decline in speed. As far as labor cost is concerned, however, the decline in speed will often have no importance. A train crew might, for example, have a daily run that required 6 hours at the beginning of an expansion and 7 hours at the end. They would be entitled to 8 hours' pay in either case, and it might not be feasible to assign them other tasks in the left-over time. Since their train will carry a heavier load, the labor cost per ton-mile will be lower at the end. In passenger traffic, we found, fluctuations in traffic do not affect speed. Since there are more passengers in a train during prosperity, train labor costs per passenger-mile must be lower than in depression.

If a run is longer than 140 miles, the train crew receives an extra hour's pay (i.e. the weekly rate divided by the number of hours in a full-time week) for each additional 15 miles. But in such instances too, the pay is the same regardless of the tonnage or number of passengers carried; growth of traffic does not affect the length of runs, which is fixed by the location of terminals.

Many workers in railways shops are paid by the piece rather than by the week. Unless the number of "pieces" paid for fluctuates more than traffic, expenses for this kind of work will normally be constant per traffic unit. But labor agreements apparently provide that the

[2] These tendencies may, of course, be offset by countervailing changes in full-time weekly hours or in weekly rates of pay.

TABLE 26

Ton-miles, Journeys, and Employees, at Peaks and Troughs in First Quarter Ton-miles, 1921-1939

DATE (QUARTER ENDED MARCH 31)	LEVEL OF TON-MILES[a]	TON-MILES: *Amount (millions)*	TON-MILES: *% change from preceding date*	JOURNEYS: *Number (millions)*	JOURNEYS: *% change from preceding date*	TRAFFIC: *% change from preceding date*[b]	EMPLOYEES: *Number (thousands)*	EMPLOYEES: *% change from preceding date*
1921	Trough	3,989	......	325.5	......	......	736	......
1924	Peak	4,933	23.7	277.6	−14.7	4.5	701	−4.8
1925	Trough	4,795	−2.8	280.6	1.1	−0.8	702	0.1
1927	Peak	4,968	3.6	265.6	−5.3	−0.8	683	−2.7
1928	Trough	4,621	−7.0	277.9	4.6	−1.2	677	−0.9
1930	Peak	4,776	3.4	288.5	3.8	3.6	657	−3.0
1933	Trough	3,856	−19.3	254.9	−11.6	−15.4	566	−13.9
1938	Peak	4,753	23.3	294.1	15.4	19.4	607	7.2
1939	Trough	4,457	−6.2	285.2	−3.0	−4.6	589	−3.0

[a] As determined from first-quarter data, 1920-39, ignoring data for other quarters.

[b] Straight average of percentages for ton-miles and passengers.

The data on ton-miles and journeys pertain to the first three months of each year. Those on employees (published in Ministry of Transport, *Railway Returns, Staff*, annual) were obtained in a census of railway employment taken in a week ending in March each year, except that the 1927 Census was taken in the week ended April 30. For other years the ending day ranges from March 7 to March 29. There was no census before 1921. The data in this table are not seasonally adjusted. All include the rail traffic or employment of the LPTB or its predecessors.

earnings of piece workers shall not fall below a weekly minimum.[3] If the number of pieces furnished to each man becomes so small that this provision comes into play, further declines in the number of pieces will be accompanied by rising cost per piece.

Although the nature of the rules governing wages is such that the ratio of man-hours to traffic is unimportant for the study of costs, that ratio is interesting from other points of view, and the lack of information on man-hours is therefore regrettable. We do have a little information about hourly productivity in one kind of work — the assembling of wagons into trains. It is performed in marshalling yards, in which a track is assigned to each destination or group of destinations for which a train is to be formed, and each wagon to be forwarded is shunted to the appropriate track. The number of cars handled per man-hour in such yards tended to rise and fall with aggregate ton-miles (Chart 23). If we could divide ton-miles, rather than wagons marshalled, by man-hours of this kind of labor, we would probably find that ton-miles also fluctuated more than hours worked in shunting — in other words that the marshalling labor required per ton-mile tends to fall in expansions and rise in contractions.[4]

Fuel economy related to cycles in volume

Cyclical growth of traffic apparently results in a less than proportionate increase in fuel burned by locomotives, and cyclical decline of traffic in a less than proportionate reduction of fuel requirements. A curve depicting ton-miles per pound of coal consumed in freight ser-

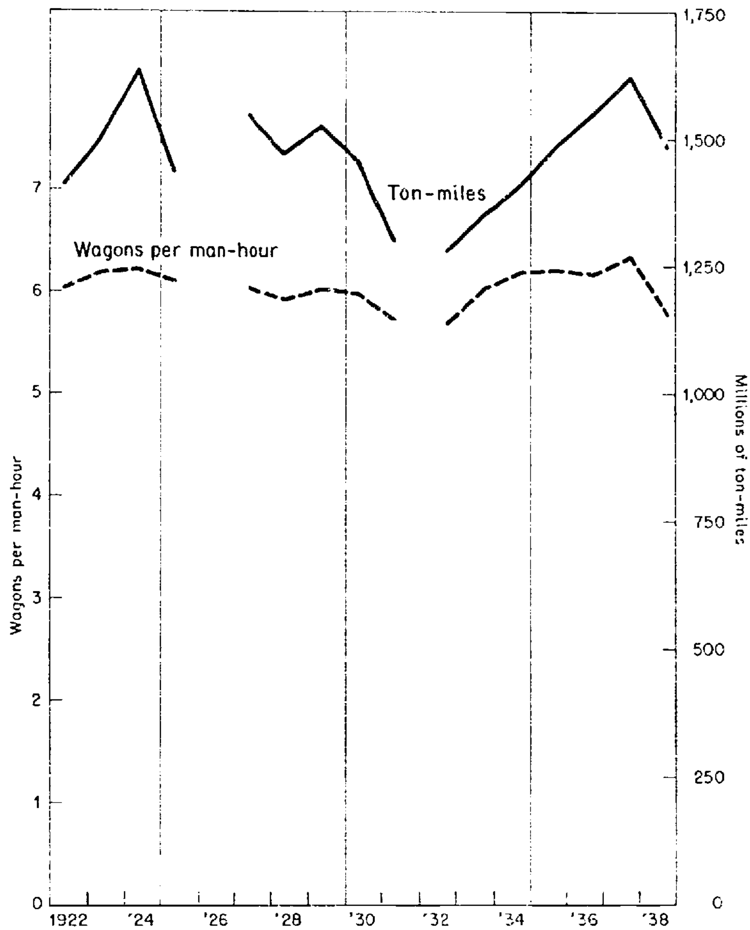
[3] Last reference, note 1. See also *Railway Gazette,* August 4, 1922, p. 151.

[4] Incoming trains, the wagons in which have reached a parting of the ways to their ultimate destination, supply part of the cars to be marshalled; others are picked up locally and brought to the yard. Both are included in the numerator of the ratio charted. The denominator comprises man-hours of "Yard Masters, Assistant Yard Masters, Yard Inspectors, Yard Foremen, Leading Shunters, Shunters, Capstan Foremen, Capstanmen, and Goods Pointsmen." From 1922 to 1931 the data cover work in February (March in 1924) and August. We average the two figures for each year and plot them midway between the two months. Only a February sample was taken in 1926; since the seasonal appears large in comparison with the cyclical variation we do not show a figure for that year. From 1932 to 1938 the data cover operations during a four-week period ending early in October. The number of yards included, 1922-38, ranges from 109 to 124.

Data on man-hours spent in loading small shipments into and out of cars, per ton of goods handled, are likewise available for occasional months or four-week periods, 1922-38. They indicate little if any cyclical variation in unit labor requirements for this kind of work.

CHART 23

Ton-miles, and Wagons Detached in Marshalling Yards per Man-hour of Shunting Staff Labor, Various Dates



Averages of February and August, 1922-31; data for October, 1932-38.

vice since 1921 is highly irregular, but we think we discern an upward drift in every expansion, a downward drift in all contractions except, perhaps, 1926-27 (Chart 24).[5]

[5] *Railway Statistics* reports coal consumption per steam locomotive mile in freight service. Consumption and mileage of locomotives assigned to shunting freight were excluded from the computation 1921-35, included 1935-39 (overlaps in 1935). Con-

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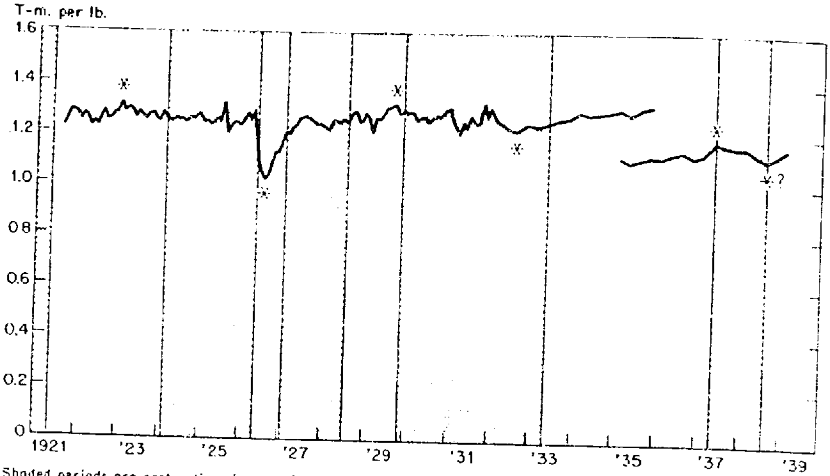
CHART 24

Net Ton-miles per Pound of Coal Consumed by Steam Locomotives in Freight Service
August 1921-First Quarter 1939



Shaded periods are contractions in ton-miles.
Coal consumed in shunting freight not included in divisor 1921-35, included 1935-39.

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sumption and mileage of engines in departmental work (hauling work trains, etc.) and road engines engaged in incidental shunting are included throughout. We multiplied the average per mile by the corresponding kinds of locomotive mileage to find aggregate consumption, which we then divided into ton-miles. Since coal used in shunting service is included in the divisor for the 1935-39 segment of the curve, the level of that segment is lower than the level for 1921-35.