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RAILROADS

The statistical record of monthly railroad revenues and expenses is much longer than the quarterly record for manufacturing. It gives us an adequate basis for separate generalizations about the railroad industry such as we are not prepared to venture for many of the twenty-two manufacturing industries.

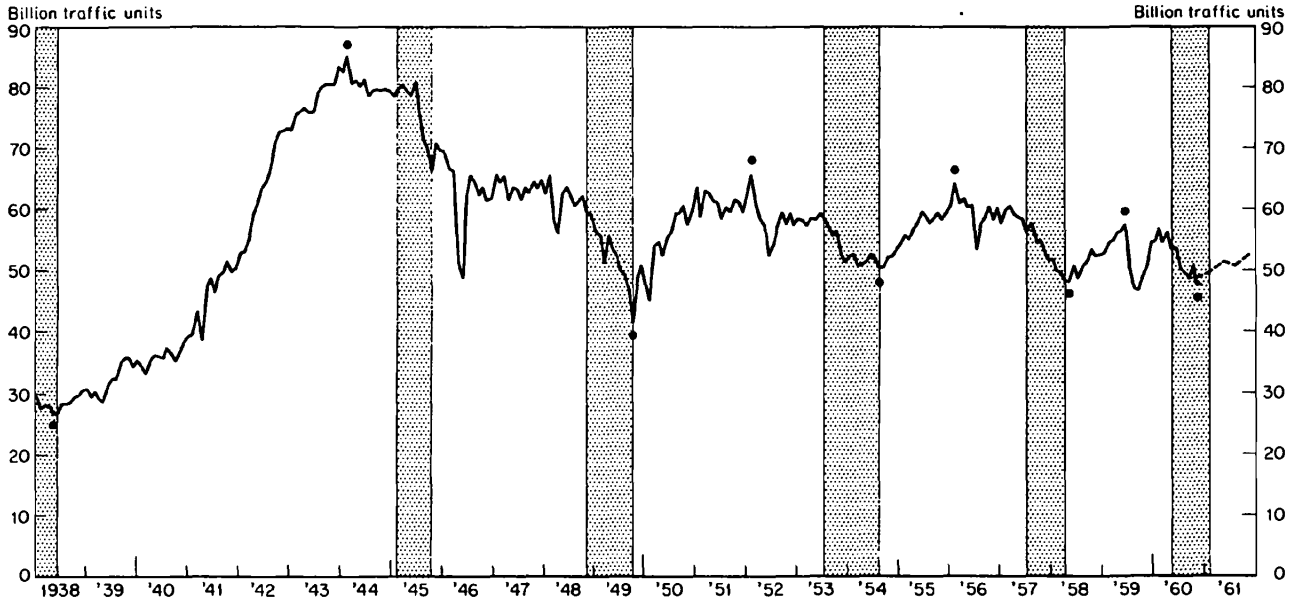
For railways we have an approximate measure of the physical volume of "production," namely traffic units. It consists of ton-miles plus 2.4 times passenger-miles. The 2.4 factor is the average ratio of revenue per passenger-mile to revenue per ton-mile over a long period of years. Traffic units are therefore a roughly price-weighted composite of the two main kinds of railway service. Having this measure, we prefer to study the relation of margins, prices, and costs to cycles in traffic rather than to cycles in railroad revenues. In some respects, the following discussion will bring up to date the findings in my monograph, *American Transportation in Prosperity and Depression* (New York, NBER, 1948). Margins, however, were not discussed in that work; instead, attention was focused on profits per unit.

Traffic Cycles Since 1938

Cycles in traffic correspond broadly to those in the economy at large (Chart 15).[1] Railway passenger traffic, however, had been greatly swollen during World War II because of large military movement and because civilians could not buy new cars and could buy gasoline only for "necessary" motor travel. Rail travel, therefore, declined not only in the immediate postwar business contraction but throughout the following expansion and into the next contraction. The decline was so severe that the composite of

[1]For a similar chart, 1907–38, see *American Transportation*, p. 76.

CHART 15
Traffic Units, 1938–61



SOURCE: Appendix Table B-3.
NOTE: Shaded areas are contractions in business. Dots are at peaks and troughs in traffic units.

freight and passenger movement also declined through all three phases. Competition for freight traffic from motor and other means of transport also became more formidable after the war; partly at least for this reason, composite traffic ceased to expand and began to contract early in the 1949–53, 1954–57, and 1958–60 business expansions.

As in other industries, we shall be interested to learn not only what net changes occur in costs, prices, margins, and profits during an upswing or downswing of traffic, but whether the changes are dissimilar in the earlier and later portions of the traffic fluctuations. A cycle in traffic can be divided into stages, and therefore segments, as cycles in quantity sold or sales were divided in preceding chapters. With monthly data, we divide the months between a peak and a trough month into three successive stages (stages II, III, IV or VI, VII, VIII), covering as nearly as possible the same length of time, and strike a monthly average of whatever variable is being studied, for each stage. We prefer to base the figure for a peak stage (V) or a trough stage (IX, I) not only on data for the peak or trough month but also on data for the preceding and following month.[2] For example, the operating ratio (a ratio explained in a later section) for January 1956 is used to compute the average ratio for stage V as well as for stage IV, and the ratio for March 1956 enters the average both for stage V and stage VI (Table 51).

Cost Inversely Related to Traffic

The cost experience of railroads was quite different from that of manufacturing companies after the war. In all but two of the twelve traffic expansions for which we have monthly data, there was a net decline in operating expense per traffic unit. In every one of the twelve contractions there was a net rise (Table 52). Railroads are not immune to the rises in prices of materials and wage rates, to which other industries are subjected in expansions. Fluctuations in traffic do not differ greatly from those in manu-

[2]The traffic peak in June 1959, however, was followed by the steel strike, which sharply reduced traffic and distorted the profit variables. Averages for this peak are, therefore, based on figures for May and June only.

TABLE 51
Illustrative Division into Stages of a Cycle in Traffic Units, 1954–58[a]

Stage	Months Included: First		Last		Number	Operating Ratio (per cent)
I	July	1954	September	1954	3	79.7
II	September	1954	February	1955	6	76.6
III	March	1955	July	1955	5	75.0
IV	August	1955	January	1956	6	76.5
V	January	1956	March	1956	3	76.1
VI	March	1956	November	1956	9	77.2
VII	December	1956	July	1957	8	77.6
VIII	August	1957	April	1958	9	80.2
IX	April	1958	June	1958	3	81.0

[a]Trough, August 1954; peak, February 1956; trough, May 1958.

facturing production. We must conclude that increases in the volume of business have a stronger tendency to reduce costs on railroads than in factories, and declines in the volume of business have a stronger tendency to raise them on railroads.

INVERSE RELATION MORE CONSISTENT AT BEGINNING OF SWINGS IN TRAFFIC

Even on railroads there is some tendency for cost to rise as traffic approaches its peak, and a decided tendency for it to fall as traffic approaches its trough. Cost fell in all except one of the first segments of the twelve expansions (Table 53). In later segments, falls were less frequent. Cost rose in all first segments of contraction, in all but one of the second and third segments, and in seven of the fourth segments. Rises were therefore more frequent than falls in all segments, but the majority was close at the end.

Cost fell continuously from stage to stage in only three expansions (Table 54). In four, it fell at the beginning but rose after the second, third, or fourth stage. It rose continuously in five contractions, and rose at first but declined later in another five.

Cost was lowest in the last stage of only five expansions. It was highest in the last stage of five contractions, and in the fourth stage of five others.

TURN IN COST OFTEN PRECEDED TURN IN TRAFFIC

The foregoing data lead one to expect that a turn in cost often should precede a turn of the opposite character in traffic. Troughs in cost occurred before six of twelve traffic peaks. Peaks in cost occurred before ten of twelve traffic troughs (Table 55).

In the 1932–37 expansion there are two "extra" turns in cost. After declining as usual in the early months, cost began to rise after July 1933, reaching a peak in July 1935; they cannot be matched with turns in traffic. Restoration of wage levels helps to account for this extra movement in cost. Wages had been cut 10

TABLE 52
Cost (Railway Operating Expenses) Per Traffic Unit at Peaks and Troughs in Traffic, 1907–61

Turn in Traffic		Cost Per Unit[a]	Change in Cost Per Unit	
Date	Level	(cents)	To Peak from Trough	To Trough from Peak
June 1908	Trough	.5391	--	--
Apr. 1910	Peak	.5664	.0273	--
Mar. 1911	Trough	.5782	--	.0118
Feb. 1913	Peak	.5556	-.0226	--
Dec. 1914	Trough	.5885	--	.0329
May 1918	Peak	.6746	.0861	--
Mar. 1919	Trough	.9765	--	.3019
Feb. 1920	Peak	.9702	-.0063	--
July 1921	Trough	1.1830	--	.2128
Apr. 1923	Peak	.9319	-.2511	--
June 1924	Trough	.9849	--	.0530
July 1926	Peak	.8789	-.1060	--
Dec. 1927	Trough	.9212	--	.0423
Aug. 1929	Peak	.8694	-.0518	--
Aug. 1932	Trough	.8827	--	.0133
Mar. 1937	Peak	.6975	-.1852	--
May 1938	Trough	.8113	--	.1138
Feb. 1944	Peak	.6203	-.1910	--
Oct. 1949	Trough	1.1615	--	.5412
Feb. 1952	Peak	1.0940	-.0675	--
Aug. 1954	Trough	1.2080	--	.1140
Feb. 1956	Peak	1.0932	-.1148	--
May 1958	Trough	1.2625	--	.1693
June 1959	Peak	1.1760	-.0865	--
2Q 1959	Peak	1.1796	--	--
4Q 1960	Trough	1.2286	--	.0490

[a]Three-month averages.

TABLE 53
Cost Per Traffic Unit: Direction of Change from Stage to Stage of Traffic Cycles, 1907–61

From Stage	To Stage	Number of Observations		
		With Rise	With Fall	Total
I	II	1	11	12
II	III	3	9	12
III	IV	6	6	12
IV	V	4	8	12
V	VI	12	0	12
VI	VII	11	1	12
VII	VIII	11	1	12
VIII	IX	7	5	12
I	V	2	10	12
V	IX	12	0	12

TABLE 54
Cost and Revenue Per Traffic Unit, Operating Ratio, and Profit: Patterns of Change During Expansions and Contractions in Traffic, 1907–61
(number of phases)

Pattern	Cost Per Unit		Revenue Per Unit		Operating Ratio		Net Operating Revenue	
	Expansions	Contractions	Expansions	Contractions	Expansions	Contractions	Expansions	Contractions
Continuous rise	0	5	2	3	0	2	7	0
Rise, fall	1	5	0	3	0	3	1	1
Rise, fall, rise	0	2	2	2	1	5	3	0
Rise, fall, rise, fall	0	0	0	0	0	1	1	0
Continuous fall	3	0	3	1	2	0	0	4
Fall, rise	4	0	0	1	4	1	0	3
Fall, rise, fall	4	0	5	2	5	0	0	4
Fall, rise, fall, rise	0	0	0	0	0	0	0	0

per cent late in the preceding contraction. 2.5 points were restored to the workers on July 1, 1934, another 2.5 on January 1, 1935, and the remaining 5 on April 1, 1935.[3]

[3]See my *American Transportation*, p. 250.

TABLE 55
Traffic and Cost Per Unit: Turning Points Compared, 1907–61

Turn in Traffic		Turn in Cost		Lead or Lag[a] of Cost at	
Level	Date	Level	Date	Traffic Peak	Traffic Trough
Trough	June 1908	Peak	Oct. 1907	--	-8
Peak	Apr. 1910	Trough	Aug. 1909	-8	--
Trough	Mar. 1911	Peak	Oct. 1912	--	+19
Peak	Feb. 1913	Trough	Feb. 1913	0	--
Trough	Dec. 1914	Peak	May 1914	--	-7
Peak	May 1918	Trough	Dec. 1915	-29	--
Trough	Mar. 1919	Peak	Apr. 1919	--	+1
Peak	Feb. 1920	Trough	Aug. 1919	-6	--
Trough	July 1921	Peak	May 1921	--	-2
Peak	Apr. 1923	Trough	Apr. 1923	0	--
Trough	June 1924	Peak	Oct. 1923	--	-8
Peak	July 1926	Trough	July 1926	0	--
Trough	Dec. 1927	Peak	July 1927	--	-5
Peak	Aug. 1929	Trough	Feb. 1929	-6	--
Trough	Aug. 1932	Peak	June 1932	--	-2
------	---------	Trough	July 1933	--	--
------	---------	Peak	July 1935	--	--
Peak	Mar. 1937	Trough	Mar. 1937	0	--
Trough	May 1938	Peak	Feb. 1938	--	-3
Peak	Feb. 1944	Trough	Oct. 1942	-16	--
Trough	Oct. 1949	Peak	Oct. 1949	--	0
Peak	Feb. 1952	Trough	Oct. 1950	-16	--
Trough	Aug. 1954	Peak	Dec. 1953	--	-8
Peak	Feb. 1956	Trough	Feb. 1956	0	--
Trough	May 1958	Peak	Apr. 1958	--	-1
Peak	June 1959	Trough	June 1959	0	--
Trough	4Q 1960	Peak	3Q 1960	--	-3

SUMMARY

Number of peaks in traffic with:	
Earlier trough in cost	6
Coinciding trough in cost	6
Later trough in cost	0
Number of troughs in traffic with:	
Earlier peak in cost	10
Coinciding peak in cost	1
Later peak in cost	2
Total	25

[a]Number of months by which turn in cost preceded (-) or followed (+) turn of opposite character in traffic units.

Hours Per Unit and Labor Cost Inversely Related to Traffic

Monthly figures on man-hours and compensation of railroad workers are available for eight traffic expansions and contractions, beginning in 1921. There was a net fall in man-hours per traffic unit in all expansions, and a net rise in most contractions (Table 56). Hourly earnings, on the other hand, rose in all but one of the expansions and contractions. But in the upswings, the rise in earnings was not large enough to offset the fall in hours per unit: labor cost per traffic unit fell in all of them. In the downswings, of course, the rise in hourly pay reinforced the effect of rising hours per unit on cost.

TABLE 56
Man-Hours Per Traffic Unit, Hourly Earnings, and Labor Cost Per Traffic Unit: Direction of Change from Stage to Stage of Traffic Cycles, 1921–61

		Number of Observations with					
From Stage	To Stage	Rise in Hours Per Unit	Fall in Hours Per Unit	Rise in Earnings	Fall in Earnings	Rise in Cost	Fall in Cost
I	II	0	8	5	3	0	8
II	III	0	8	6	2	1	7
III	IV	1	7	6	2	3	5
IV	V	1	7	4	4	3	5
V	VI	8	0	7	1	8	0
VI	VII	3	5	8	0	7	1
VII	VIII	6	2	7	1	7	1
VIII	IX	2	6	6	2	6	2
I	V	0	8	7	1	0	8
V	IX	5	3	7	1	7	1

The inverse relation between hours per unit or labor cost and traffic is strongest at the beginning of an upswing or downswing in traffic. Hours per unit fell in a majority of the second and fourth segments of traffic contractions. Labor cost rose in most cases in all segments, but less frequently in the last segment of traffic declines than in the first.

Hours per unit fell continuously from stage to stage in six of the eight traffic expansions (Table 57). Hourly earnings rose

continuously in five of the eight traffic contractions. Labor cost had a continuous fall in three expansions, and a fall-rise pattern in three; it had a continuous rise in four contractions.

TABLE 57
Man-Hours Per Traffic Unit, Hourly Earnings, and Labor Cost Per Traffic Unit: Patterns of Change During Expansions and Contractions in Traffic, 1921–61
(number of phases)

Pattern	Hours Per Unit		Hourly Earnings		Cost Per Unit	
	Expansions	Contractions	Expansions	Contractions	Expansions	Contractions
Continuous rise	0	0	1	5	0	4
Rise, fall	0	3	2	2	0	2
Rise, fall, rise	0	2	1	0	0	2
Rise, fall, rise, fall	0	3	1	0	0	0
Continuous fall	6	0	0	0	3	0
Fall, rise	1	0	2	1	3	0
Fall, rise, fall	1	0	1	0	2	0
Fall, rise, fall, rise	0	0	0	0	0	0

Direction of Change Same in Labor and Total Cost

Total operating cost per traffic unit changed in the same direction as labor cost per traffic unit in all eight traffic expansions, and in all contractions except 1929–32. From the 1929 peak stage to the 1932 trough stage, labor cost declined a little (2.2 per cent) while total cost increased a little (1.5 per cent). These are net changes. Between successive stages of this contraction (from V to VI, VI to VII, etc.) the directions do not differ. Both labor and total cost rose in the first three segments of the contraction, and fell in the fourth. The decline in labor cost in the fourth segment was more than sufficient to offset the previous rises; the decline in total cost was insufficient. Data for all cycles make possible sixty-four comparisons of changes during segments of cycles. The direction of change in labor and total cost is similar in all but one. From the fourth to the fifth stages of the 1954–56 traffic expansion, labor cost rose 2.1 per cent while total cost fell 2.2 per cent.

Little or Inverse Relation Between Rate Level and Traffic

Railroads provide an almost infinite variety of services, each of which has its price. They carry nearly every commodity and they carry each between various pairs of places. They carry passengers and mail, and collect minor portions of their revenue from still other sources. Although much is done to simplify matters by grouping commodities, origins, and destinations, the prices of railway services form a complex system; and no really precise index describing percentage changes in the average level of the whole system over short periods of time has ever been constructed. I have elsewhere argued, however, that a rough substitute, revenue per traffic unit, is useful in analyzing cyclical changes.[4]

Revenue per traffic unit, unlike prices in manufacturing, has shown no tendency to rise and fall with the volume of business done (Table 58). It rose in four of the twelve traffic expansions for which we have monthly data, but fell in the other eight. It fell in only three of the traffic contractions, and rose in the other nine.

Many of the net changes were slight, and might be accounted for by changes in the composition of traffic. The larger increases in contractions are accounted for by general changes in the level of rates authorized in proceedings before the Interstate Commerce Commission.[5] During the World War II expansion, traffic increased so greatly, and the effect of increased volume on costs was so favorable, that railroads were able to operate profitably at prewar freight rates (passenger fares were increased a little).

After the war, however, railroads suffered not only from the brief postwar recession, but from the loss of abnormal wartime traffic and the diversion of peacetime traffic to other means of transport, as well as from rising wage rates and prices of materials. Falling volume and inflation threatened them with insolvency; they asked for, and the Interstate Commerce Commission authorized, a series of general increases in freight rates (Table 59). In the prolonged 1944–49 contraction, freight rates were in-

[4] *American Transportation*, pp. 231–235.

[5] The general rate increases before 1940 are described in *American Transportation*, pp. 246–248.

TABLE 58
Revenue Per Traffic Unit at Peaks and Troughs in Traffic, 1907–61

Turn in Traffic		Revenue Per Unit[a] (cents)	Change in Revenue Per Unit	
Date	Level		To Peak from Trough	To Trough from Peak
June 1908	Trough	.7987	--	--
Apr. 1910	Peak	.8409	.0422	--
Mar. 1911	Trough	.8410	--	.0001
Feb. 1913	Peak	.7924	-.0486	--
Dec. 1914	Trough	.8160	--	.0236
May 1918	Peak	.8821	.0661	--
Mar. 1919	Trough	1.1251	--	.2430
Feb. 1920	Peak	1.1455	.0204	--
July 1921	Trough	1.4401	--	.2946
Apr. 1923	Peak	1.2320	-.2081	--
June 1924	Trough	1.2669	--	.0349
July 1926	Peak	1.2237	-.0432	--
Dec. 1927	Trough	1.2090	--	-.0147
Aug. 1929	Peak	1.2238	.0148	--
Aug. 1932	Trough	1.1299	--	-.0939
Mar. 1937	Peak	.9862	-.1437	--
May 1938	Trough	1.0450	--	.0588
Feb. 1944	Peak	.9516	-.0934	--
Oct. 1949	Trough	1.4430	--	.4914
Feb. 1952	Peak	1.4418	-.0012	--
Aug. 1954	Trough	1.5161	--	.0743
Feb. 1956	Peak	1.4364	-.0797	--
May 1958	Trough	1.5577	--	.1213
June 1959	Peak	1.5482	-.0095	--
2Q 1959	Peak	1.5527	--	--
4Q 1960	Trough	1.5324	--	-.0203

[a]Three-month averages.

creased about 57 per cent over the rates in effect on June 30, 1946 (substantially the prewar rates). Other general postwar increases also occurred, mostly during traffic contractions. In consequence of these general increases, the curve of revenue per traffic unit rises very steeply in the 1946–49 portion of the postwar traffic contraction and in the 1956–58 contraction (Chart 16).[6]

The rises in Table 59 are somewhat exaggerated because state railroad commissions may not have allowed them to become fully effective on intrastate traffic and because the railroads cut many rates to meet competition of other forms of transport. The pattern of step-by-step rises suggested by the precise dates does not show up in the chart of revenue per unit because there were also

[6]For charts of unit revenue and cost from 1907 to 1938, see *American Transportation*, pp. 234, 275.

TABLE 59
General Increases in Freight Rates, 1944–59

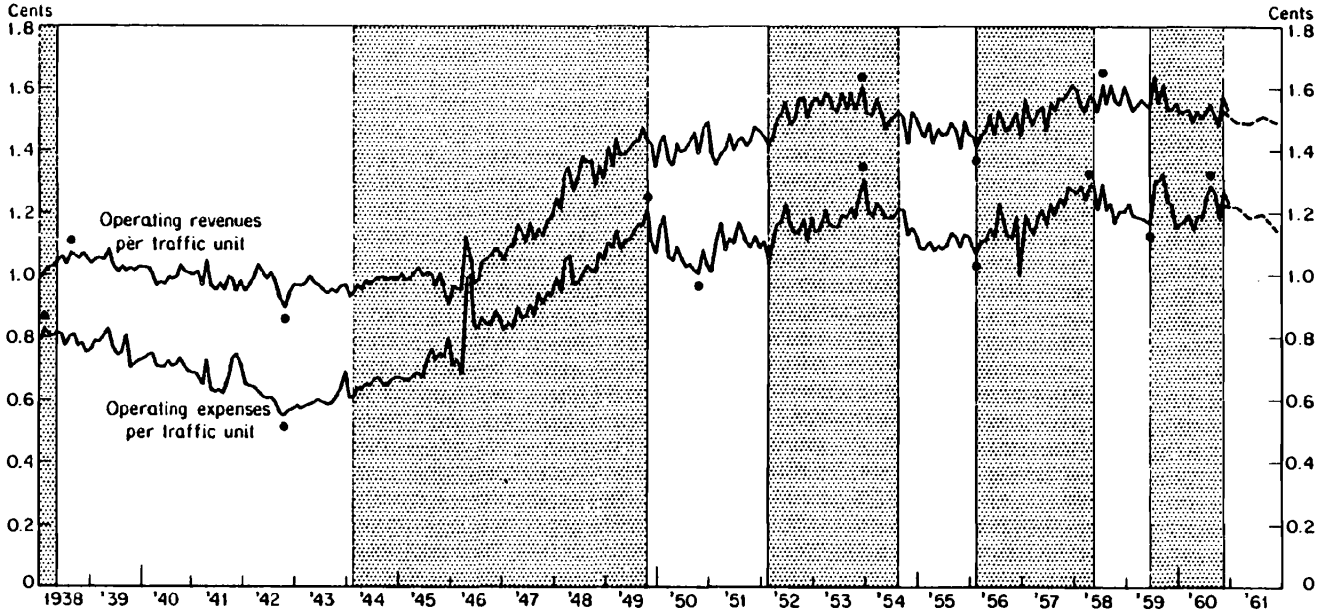
Effective Date of Rate Increases	Percentage Increase over June 30, 1946	
	Cumulated	Decumulated
During traffic contraction, Feb. 1944 to Oct. 1949		
July 1, 1946	6.5	6.5
January 1, 1947	17.6	11.1
October 13, 1947	28.1	10.5
January 5, 1948	37.8	9.7
May 6, 1948	42.8	5.0
August 21, 1948	44.2	1.4
January 11, 1949	51.7	7.5
September 1, 1949	57.3	5.6
Total		57.3
During traffic expansion, Oct. 1949 to Feb. 1952		
April 4, 1951	61.1	3.8
August 28, 1951	67.6	6.5
Total		10.3
During traffic contraction, Feb. 1952 to Aug. 1954		
May 2, 1952	78.9	11.3
During traffic contraction, Feb. 1956 to May 1958		
March 7, 1956	88.8	9.9
December 28, 1956 or Feb. 23, 1957	98.2	9.4
August 26, 1957	107.7	9.5
Total		28.8
During traffic expansion, May 1958 to June 1959		
September 15, 1958	112.1	4.4

rises in passenger fares, and because of changes in the composition of traffic.

A coal strike in April and May 1946 provided a salient instance of such a change in composition. Revenue per ton-mile from this commodity is low compared with the average received for the movement of other commodities. When a large part of this traffic disappeared, over-all revenue per traffic unit showed a sharp temporary rise (Chart 16).

Changes in the general level of railway rates, fares, and charges are small except in times of inflation or intensifying competition from other means of transport. Serious inflation occurred only in postwar periods. Competition from other means of transport has been more influential in some cycles than in others. It had no noticeable influence on general rate levels before, say, 1928, and none during the World War II expansion; its effects are quite noticeable in the 1954–56 expansion. There is no systematic difference

CHART 16
Railway Operating Revenues and Expenses Per Traffic Unit, 1938–61



SOURCE: Appendix Tables B-4, B-5.
NOTE: Shaded areas are contractions in traffic units. Dots are at peaks and troughs in the charted variable.

in frequency of change between early and late expansion or contraction (Table 60). Revenue per unit has not followed any simple and consistent pattern in successive segments of traffic cycles (Table 54).

TABLE 60
Revenue Per Traffic Unit (Price): Direction of Change from Stage to Stage of Traffic Cycles, 1907–61

From Stage	To Stage	Number of Observations		
		With Rise	With Fall	Total
I	II	4	8	12
II	III	4	8	12
III	IV	7	5	12
IV	V	4	8	12
V	VI	8	4	12
VI	VII	9	3	12
VII	VIII	7	5	12
VIII	IX	6	6	12
I	V	4	8	12
V	IX	9	3	12

Operating Margin Usually Rises and Falls With Traffic

In proportion to their revenues, railroads own much more property than most other industries. To provide the money to build their properties, they relied largely on long-term borrowing. Present operating railroad companies have taken over properties formerly operated independently by other companies, paying fixed rents for the use of these properties. Consequently, in this industry an unusually large proportion of revenue goes to pay interest, rent, and property taxes. In the aggregate, these outlays fluctuate very little with fluctuations in traffic. In railway statistics, operating expenses—mainly labor and materials—have long been shown separately from taxes and fixed charges. Analysts of railway finances have been accustomed to use the operating ratio—the percentage ratio of operating expenses to operating revenues—as a key figure. To distinguish the more from the less variable deductions from revenue, it would be more logical to exclude depreciation from operating expenses and to include

TABLE 61
Railway Operating Ratio at Peaks and Troughs in Traffic, 1907–61

Turn in Traffic		Operating Ratio[a] (per cent)	Change in Operating Ratio	
Date	Level		To Peak from Trough	To Trough from Peak
June 1908	Trough	67.5	--	--
Apr. 1910	Peak	67.3	-0.2	--
Mar. 1911	Trough	68.8	--	1.5
Feb. 1913	Peak	70.1	1.3	--
Dec. 1914	Trough	72.2	--	2.1
May 1918	Peak	87.1	14.9	--
Mar. 1919	Trough	86.8	--	-0.3
Feb. 1920	Peak	85.0	-1.8	--
July 1921	Trough	82.1	--	-2.9
Apr. 1923	Peak	75.6	-6.5	--
June 1924	Trough	77.7	--	2.1
July 1926	Peak	71.8	-5.9	--
Dec. 1927	Trough	76.2	--	4.4
Aug. 1929	Peak	71.0	-5.2	--
Aug. 1932	Trough	78.5	--	7.5
Mar. 1937	Peak	70.9	-7.6	--
May 1938	Trough	77.4	--	6.5
Feb. 1944	Peak	65.2	-12.2	--
Oct. 1949	Trough	80.5	--	15.3
Feb. 1952	Peak	75.9	-4.6	--
Aug. 1954	Trough	79.7	--	3.8
Feb. 1956	Peak	76.1	-3.6	--
May 1958	Trough	81.0	--	4.9
June 1959	Peak	76.0	-5.0	--
2Q 1959	Peak	76.0	--	--
4Q 1960	Trough	80.1	--	4.1

[a]Three-month averages.

payroll taxes, which vary with labor expense. These adjustments are not customary, however, and we shall follow the custom.

In ten of twelve expansions in traffic since 1908, the operating ratio fell from the initial trough in traffic to the peak. In ten of twelve contractions, it rose from the peak to the terminal trough (Table 61). One may call the difference between 100 and the operating ratio the operating margin; obviously, it rises and falls with traffic.

MARGIN OFTEN MOVES CONTRARY TO TRAFFIC IN LATE EXPANSION OR CONTRACTION

The operating ratio rose only once during the first segment of an expansion (Table 62). Rises were slightly more frequent in the second segment, and more frequent in the third and fourth

segments. The ratio rose in all but one of the first segments of contractions; this is the period when a rising operating ratio is most common. Rises are less frequent thereafter. They outnumbered declines, however, in all four segments.

TABLE 62
Railway Operating Ratio: Direction of Change from Stage to Stage of Traffic Cycles, 1907–61

From Stage	To Stage	Number of Observations		
		With Rise	With Fall	Total
I	II	1	11	12
II	III	2	10	12
III	IV	7	5	12
IV	V	5	7	12
V	VI	11	1	12
VI	VII	8	4	12
VII	VIII	7	5	12
VIII	IX	8	4	12
I	V	2	10	12
V	IX	10	2	12

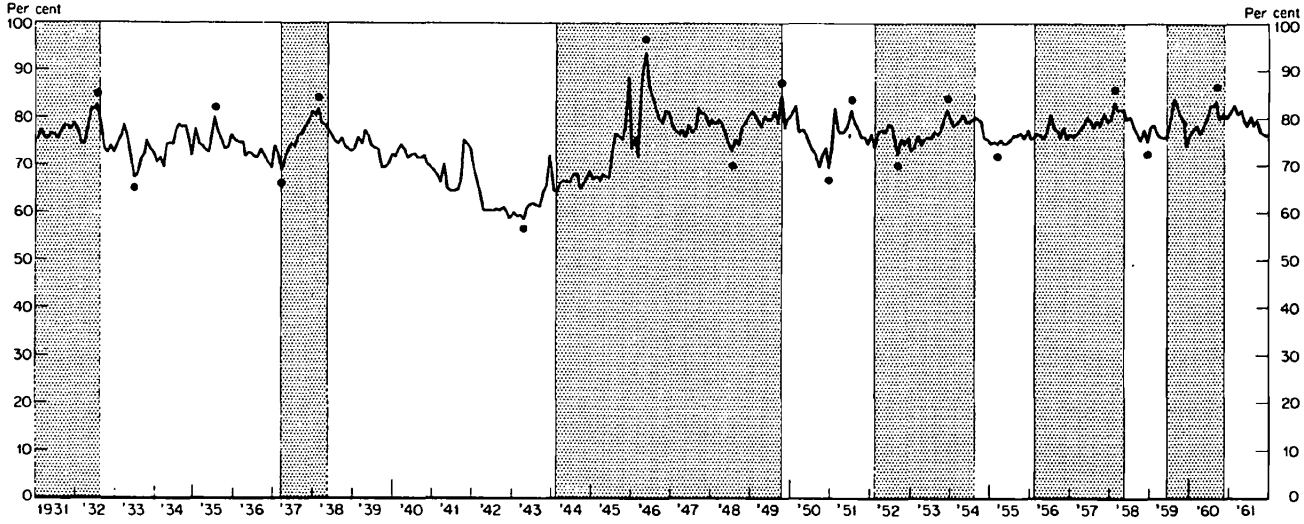
Translating these findings into terms of the operating margin, it appears that the latter almost always widens in the first segment of an upswing in traffic, but rises become less frequent thereafter. It very seldom rises in the first segment of a contraction, but rises are not uncommon in the last three segments.

TURNS IN MARGIN OFTEN LEAD TURNS IN TRAFFIC

In most cases there was a peak in the operating ratio near each trough in traffic, and a trough in the operating ratio near each peak in traffic (Chart 17). As one might expect from the foregoing sections, where turns can be paired, the turn in the ratio often precedes the turn of opposite character in traffic. Troughs in the ratio preceded traffic peaks in six of nine pairs of turns (Table 63). Peaks in the ratio preceded traffic troughs in eight of ten pairs.

Every peak in the operating ratio is a trough in the operating margin, and vice versa. The operating margin, therefore, often reached a peak before the peak in traffic, and a trough before the trough in traffic.

CHART 17
Railway Operating Ratio, 1931–61



SOURCE: Appendix Table B-6.
NOTE: Shaded areas are contractions in traffic units. Dots are at peaks and troughs in the operating ratio.

TABLE 63

Traffic and Operating Ratio: Turning Points Compared, 1907–61

Turn in Traffic		Turn in Operating Ratio		Lead or Lag[a] of Ratio at	
Level	Date	Level	Date	Traffic Peak	Traffic Trough
Trough	June 1908	Peak	Nov. 1907	--	-7
Peak	Apr. 1910	Trough	Nov. 1909	-5	--
Trough	Mar. 1911	------	---------	--	--
Peak	Feb. 1913	------	---------	--	--
Trough	Dec. 1914	Peak	Feb. 1914	--	-10
Peak	May 1918	Trough	Dec. 1915	-29	--
Trough	Mar. 1919	------	---------	--	--
Peak	Feb. 1920	------	---------	--	--
Trough	July 1921	Peak	Aug. 1920	--	-11
Peak	Apr. 1923	------	---------		--
Trough	June 1924	------	---------		
Peak	July 1926	Trough	July 1926	0	--
Trough	Dec. 1927	Peak	Dec. 1927	--	0
Peak	Aug. 1929	Trough	Dec. 1928	-8	--
Trough	Aug. 1932	Peak	July 1932	--	-1
------	---------	Trough	June 1933		
------	---------	Peak	July 1935		
Peak	Mar. 1937	Trough	Mar. 1937	0	--
Trough	May 1938	Peak	Feb. 1938	--	-3
Peak	Feb. 1944	Trough	Apr. 1943	-10	--
------	---------	Peak	May 1946	--	--
------	---------	Trough	July 1948	--	--
Trough	Oct. 1949	Peak	Oct. 1949	--	0
------	---------	Trough	Dec. 1950	--	--
------	---------	Peak	July 1951	--	--
Peak	Feb. 1952	Trough	Sep. 1952	7	--
Trough	Aug. 1954	Peak	Dec. 1953	--	-8
Peak	Feb. 1956	Trough	Mar. 1955	-11	--
Trough	May 1958	Peak	Feb. 1958	--	-3
Peak	June 1959	Trough	Dec. 1958	-6	--
Trough	4Q 1960	Peak	3Q 1960	--	-3

SUMMARY

Number of peaks in traffic with:	
Earlier trough in ratio	6
Coinciding trough in ratio	2
Later trough in ratio	1
No trough in ratio	
Ratio rising	2
Ratio falling	1
Number of troughs in traffic with:	
Earlier peak in ratio	8
Coinciding peak in ratio	2
Later peak in ratio	0
No peak in ratio	
Ratio rising	2
Ratio falling	1
Total	25

[a]Number of months by which turn in ratio preceded (-) or followed (+) turn of opposite kind in traffic.

Cost Factor Usually Dominates Operating Ratio and Margin

In seven of the twelve expansions, prices received (revenue per traffic unit) fell, but cost per traffic unit fell by a greater percentage (Table 64). Lower cost rather than higher prices, therefore, account for half of the declines in the operating ratio. In two other cases, cost fell and price rose. Falling cost was therefore the sole factor in the operating-ratio decline in seven instances and a contributing factor in two. A rise in price was the sole factor in only one instance.

In seven of the twelve contractions, the operating ratio rose in spite of rising prices; cost per traffic unit rose by a greater percentage. In three, prices fell and cost rose. No rise in the ratio was caused by a fall in prices received accompanied by a smaller fall in cost.

Similar conclusions result if the data are examined segment by segment in every cycle of traffic. With six possible combinations of change and only twelve observations for each segment, an attempt to discuss progressive changes from segment to segment in the comparative frequency of the various combinations would not be justified. It is fair, however, to count their frequency in all segments (Table 64). A rise in cost, accompanied by some, but not an offsetting, rise in price, accounts for most stage-to-stage rises in the operating ratio. A fall in cost, accompanied by some, but not an offsetting, fall in price, accounts for most stage-to-stage declines in the ratio.

The dominating influence of cost is perhaps more clearly illustrated if we leave changes in unit revenue out of account (Table 65). Thirty of the thirty-four stage-to-stage declines in cost during expansions were reflected in the operating ratio. Thirty-one of the forty-one rises in cost during contractions were reflected in the ratio. Cost and the ratio move together, both up or both down, in seventy-six of the ninety-six stage-to-stage observations in the table.

At least four of the thirteen instances in which cost rose but the operating ratio fell are accounted for by general increases in rates. If we turn aside from the stage analysis and look at the graphs

TABLE 64
Operating Ratio: Changes Classified According to Combinations of Change in Price and Cost, 1907–61

From Stage	To Stage	Rise in Operating Ratio: Rise in Price, Larger Percentage Rise in Cost	Rise in Operating Ratio: Fall in Price, Rise in Cost	Rise in Operating Ratio: Fall in Price, Smaller Percentage Fall in Cost	Rise in Operating Ratio: Total	Fall in Operating Ratio: Rise in Price, Smaller Percentage Rise in Cost	Fall in Operating Ratio: Rise in Price Fall in Cost	Fall in Operating Ratio: Fall in Price, Larger Percentage Fall in Cost	Fall in Operating Ratio: Total
I	II	0	1	0	1	0	4	7	11
II	III	0	2	0	2	1	3	6	10
III	IV	5	0	2	7	1	1	3	5
IV	V	2	1	2	5	1	1	5	7
Total		7	4	4	15	3	9	21	33
V	VI	7	4	0	11	1	0	0	1
VI	VII	6	2	0	8	3	0	1	4
VII	VIII	3	4	0	7	4	0	1	5
VIII	IX	3	2	3	8	2	1	1	4
Total		19	12	3	34	10	1	3	14
I	V	1	0	1	2	1	2	7	10
V	IX	7	3	0	10	2	0	0	2

TABLE 65
Cost Per Unit: Changes Classified According to Changes in Operating Ratio, 1907–61

From Stage	To Stage	Rise in Cost: With Rise in Ratio	Rise in Cost: With Fall in Ratio	Rise in Cost: Total	Fall in Cost: With Rise in Ratio	Fall in Cost: With Fall in Ratio	Fall in Cost: Total
I	II	1	0	1	0	11	11
II	III	2	1	3	0	9	9
III	IV	5	1	6	2	4	6
IV	V	3	1	4	2	6	8
Total		11	3	14	4	30	34
V	VI	11	1	12	0	0	0
VI	VII	8	3	11	0	1	1
VII	VIII	7	4	11	0	1	1
VIII	IX	5	2	7	3	2	5
Total		31	10	41	3	4	7
I	V	1	1	2	1	9	10
V	IX	10	2	12	0	0	0

(Charts 16 and 17)[7], it appears that the broad movements of cost and the ratio are similar. During the twenty-six months from May 1946 to July 1948, the fourteen months from July 1951 to September 1952, and the nine months from August 1920 to May 1921, however, the general drift of cost per unit was upward, but that of the ratio was downward. These are the longest periods with cost rising but the ratio falling. In each of the three periods, general rate increases were made.

From the foregoing, it appears that rises in cost per traffic unit have usually been accompanied by declines in the operating profit margin, and vice versa. Cost has never risen for a considerable period without producing a decline in margin, except when the rise in cost was so great that general increases in the rate level were deemed necessary.

Pre-Tax Margin Fluctuates More Than Operating Margin

The profit margin as we defined it in Chapter 1 differs from the operating margin that we have discussed in this chapter. Pre-tax income (j) equals net operating revenue (c) plus miscellaneous

[7]See also my *American Transportation*, Chart 95.

income (g) minus net rents (d), tax accruals (e and f), fixed charges (h), and other deductions (i) in Table 66. Miscellaneous income, net rents, and payroll tax accruals tend to fluctuate, in the aggregate, with traffic or business conditions. Fixed charges, tax accruals other than payroll and U.S. income taxes, and other deductions, on the other hand, tend to change very slowly, in the aggregate. Consequently one might expect the net change in the pre-tax margin during an upswing or downswing of traffic to be wider than the net change in the operating margin, and so it was in eight of the ten comparisons we can make (Table 67—monthly data on the final margin begin in 1931).

The first of the two exceptions occurred in the 1944–49 contraction of traffic. During these years, eighteen Class I railways emerged from receivership or trusteeship. For one, the end meant sale of its assets to another road; for a second, it meant the abandonment of operations. Reorganization reduced the long-term debt of the other sixteen from $2,424 million shortly before the end of the receivership or trusteeship to $1,255 million shortly after. Elimination of debt reduced aggregate interest charges. Roads that were not in the wringer, moreover, were able to refund old obligations at lower rates of interest. On December 31, 1943 the average rate of interest on all outstanding long-term debt was 4.15 per cent; by December 31, 1949, it had fallen to 3.68 per cent.

The other exception occurred in the expansion of 1954–56, when the final margin increased by a somewhat smaller increment than the operating margin. Without seasonally adjusting the intermediate items, which would be laborious, it is impossible to explain this exception.

Although the final margin tends to fluctuate more widely than the operating margin, the direction of change is similar. All the net changes over traffic phases are in the same direction (Table 67). All troughs in the operating ratio can be matched with nearby peaks in the final margin, and vice versa (Chart 17 and Chart 18). In eight of seventeen pairs, the dates of opposite turns coincide. In most of the others, the interval between the earlier and later turn is short, one or two months. The directions of change from one stage of a traffic cycle to the next are opposite in thirty-five of the forty comparisons we can make. Consistently opposite

TABLE 66
Railway Income Account, 1957
(million dollars)

a.	Railway operating revenues	10,491
b.	Railway operating expenses[a]	8,227
c.	Net revenue from railway operations, a-b	2,264
d.	Rents for equipment and joint facilities[b]	273
e.	Railway tax accruals: payroll	342
f.	Railway tax accruals: other (except U.S. income taxes)	407
g.	Miscellaneous income[c]	234
h.	Fixed charges (rent for leased roads, fixed interest, etc.)	369
i.	Other deductions (contingent interest, etc.)	50
j.	Net income before U.S. income taxes. (c+g) - (d+e+f+h+i)	1,057
k.	U.S. income taxes	320
l.	Net income	737
m.	Operating ratio, 100 x b/a	78.4
n.	Operating margin, 100 x c/a	21.6
o.	Margin, 100 x j/a	10.1

[a]Includes depreciation, $581 million.

[b]Payments by all roads minus receipts of all.

[c]"Other" income minus miscellaneous deductions.

TABLE 67
Railway Profit Margin at Peaks and Troughs in Traffic, 1931-61

Turn in Traffic			Pre-Tax Margin[a]	Change From Preceding Turn in Traffic		
Date		Level	(per cent)	Pre-Tax Margin	Operating Ratio	Operating Margin
Aug.	1932	Trough	-7.5	--	--	--
Mar.	1937	Peak	7.6	15.1	-7.6	7.6
May	1938	Trough	-5.1	-12.7	6.5	-6.5
Feb.	1944	Peak	21.6	26.7	-12.2	12.2
Oct.	1949	Trough	7.0	-14.6	15.3	-15.3
Feb.	1952	Peak	14.6	7.6	-4.6	4.6
Aug.	1954	Trough	9.0	-5.6	3.8	-3.8
Feb.	1956	Peak	12.2	3.2	-3.6	3.6
May	1958	Trough	5.9	-6.3	4.9	-4.9
June	1959	Peak	11.2	5.3	-5.0	5.0
2Q	1959	Peak	11.6	--	--	--
4Q	1960	Trough	3.8	-7.8	4.1	-4.1

[a]Three-month averages.

change in operating ratio and final margin, of course, means consistently similar change in the operating margin and final margin.

Profits More Closely Related Than Margins to Traffic

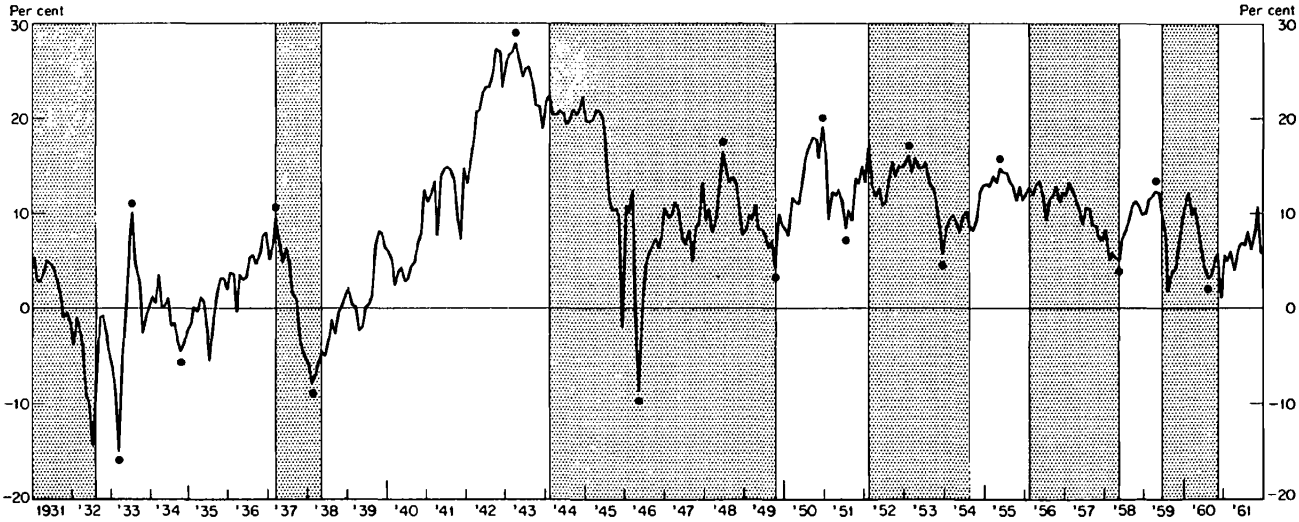
Rising traffic, accompanied by rising revenue, can sometimes cause profits to rise even though the aggregate margin declines. The operating margin rose in eleven of twelve first segments of expansion; net operating revenue rose in all twelve (Table 68). For other segments the corresponding figures are, respectively, second segments, ten, ten; third segments, five, nine; fourth segments, seven, ten. There was a net rise in operating margin during ten expansions, and in operating profit during eleven.

Falling traffic, usually accompanied by falling revenue, sometimes results in falling profits even when margins are rising. The number of first and second segments of contraction with a fall in operating margin, however, was the same as the number with a fall in operating profit. But the margin declined in only seven third segments and eight fourth, while profits fell in nine. The number of net declines over a contraction as a whole was the same for operating profits as for operating margins.

TABLE 68
Operating Profits (Net Operating Revenue): Direction of Change from Stage to Stage of Traffic Cycles, 1907–61

From Stage	To Stage	Number of Observations		
		With Rise	With Fall	Total
I	II	12	0	12
II	III	10	2	12
III	IV	9	3	12
IV	V	10	2	12
V	VI	1	11	12
VI	VII	4	8	12
VII	VIII	3	9	12
VIII	IX	3	9	12
I	V	11	1	12
V	IX	2	10	12

CHART 18
Railway Pre-Tax Margin, 1931–61



SOURCE: Appendix Table B-7.
NOTE: Shaded areas are contractions in traffic units. Dots are at peaks and troughs in margin.

In thirty-seven of the forty comparisons we can make, the direction of stage-to-stage change in net income before taxes was the same as in net railway operating revenue. The net changes over a traffic expansion or contraction as a whole were in the same direction in all ten instances.